Appendix C - Site Investigation Report

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

Geotechnical Interpretative Report

Report/Project No: 2023-002-SIM-DAL Rep 002

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PREAMBLE

The work undertaken to provide the basis of this report comprised a study of the available documented information from a variety of sources, together with (where appropriate) meetings and discussions with relevant authorities and other interested parties. The information reviewed should not be considered exhaustive and has been accepted in good faith by Geofirma Ltd as providing a true description of site conditions. However, no liability can be accepted for the detailed accuracy or otherwise of any of the reports or documents prepared by others for the Client or for third parties, or for any associated errors or omissions.

The investigation of the site has been carried out to provide information concerning the ground conditions to allow a reasonable site assessment to be made.

The exploratory holes undertaken during the fieldwork only represent a small volume of the ground in relation to the size of the site and can therefore only provide a general indication of the site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised variations in the ground condition or 'hot spots' of contamination where elevated levels of contaminants may be significantly higher than those encountered. It should be noted that this ground investigation comprises 2No cable percussion boreholes and 2No machine dug trial pits. A desk study was undertaken by others to assess historical risks, however, no liability for unforeseen geotechnical or contamination hazards can be accepted by Geofirma Ltd.

The comments and recommendations given in this report are based on the ground conditions apparent at the borehole and trial pit locations. It is likely ground conditions elsewhere on the site have not been disclosed by this investigation and have therefore not been included in this report.

The comments made on groundwater conditions are based on observations made at the time that site works were undertaken. It should be noted that groundwater levels can vary owing to seasonal or other effects, and additional groundwater measurements should be conducted immediately prior and during the construction works.

In relation to asbestos, we are unable to accept the associated liability as indemnity covering asbestos related matters is restricted from our policy. This is typically the industry norm. If we do find or suspect the presence of asbestos, we will state in the exploratory logs and notify the client, and it will be their responsibility to engage a specialist contractor to investigate the issue further.

The scope of the investigation was decided in consultation with the Client and the limitations of which were made clear. This report is produced solely for the use of the Client and his/her agent and should not be relied upon in any way by any third party.

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1. INTRODUCTION

1.1 APPOINTMENT AND BRIEF SITE SUMMARY

Geofirma Ltd has been appointed by NW3 CLT to carry out a ground investigation and undertake the interpretative reporting for the proposed development at 31 Daleham Gardens, NW3 5BU.

The site is located within the Fitzjohns and Netherhall Conservation Area in north Camden, and encloses an area of Hampstead to the north east of Finchley Road. The property was likely built in the 1800's as a single large residential property which was divided into flats later in the 20th century. The main building suffered extensive damage in a fire in 2017, leaving it structurally unsound and hence the building was demolished. The demolition of the building and the clearing up of the site was completed at the end of 2021. At the time of the ground investigation the site was vacant land with no visible buildings present.

The proposed project includes the redevelopment of the site to deliver a multi- storey apartment block, consisting of approximately 14 new units over 5 levels. The site levels fall from the western site boundary to eastern boundary and hence the ground floor of the western part of the building shall cut into the sloping site profile to form a part basement. The ground floor slab will be approximately 3.5 m below existing ground level (approximately 81.5 m OD) at the western extent of the proposed building. At the eastern extent adjacent to the pavement of Daleham Gardens, the ground floor slab and hence the ground floor slab will be close to the existing ground level.

The site is bounded by 31a Daleham Gardens to the south, the pavement of Daleham Gardens to the east, 33a Daleham Gardens to the north. Other residential properties lie to the west of the site.

Of particular note is the presence of the Belsize tunnel which is owned by Network Rail and runs beneath 31a Daleham Gardens.

The national grid reference of the site is 526673 185076 and the site is approximately 0.07 Ha.

1.2 REPORT CONTEXT

The current proposal for the redevelopment is understood to comprise the redevelopment of the above named site to comprise a 5 storey block of flats with the western part of the lower ground floor being formed as a basement due to the sloping profile of the site from the west (approximately 81.5 m OD) to the east (approximately 78 m OD).

The purpose of this report is to present the findings of the ground investigation and provide geotechnical advice to aid with the design and construction of the building. The main aspects to be addressed in this report shall relate to the proposed building foundations and the formation of the basement structures at the site.

1.3 OBJECTIVES AND METHODOLOGY

The main objectives of this report are to provide assessments on the following areas:

- Geology of the site;
- To record details of the ground investigation works undertaken;
- To discuss site groundwater and ground conditions established from the intrusive works;
- To derive geotechnical parameters to inform the design of a suitable foundations and the proposed basement;
- To determine the sulphate classification of the site concrete selection for buried structures at the site;
- To provide advice on the constructability of the proposed basement and present feasible retaining wall options;
- To present finding on the contamination status of the site;
- Present geotechnical advice on other ground related issues.

2. SITE DETAILS

2.1 SITE LOCATION AND DESCRIPTION

The site summary is in Table 1 below:

Table 1: Site Summary

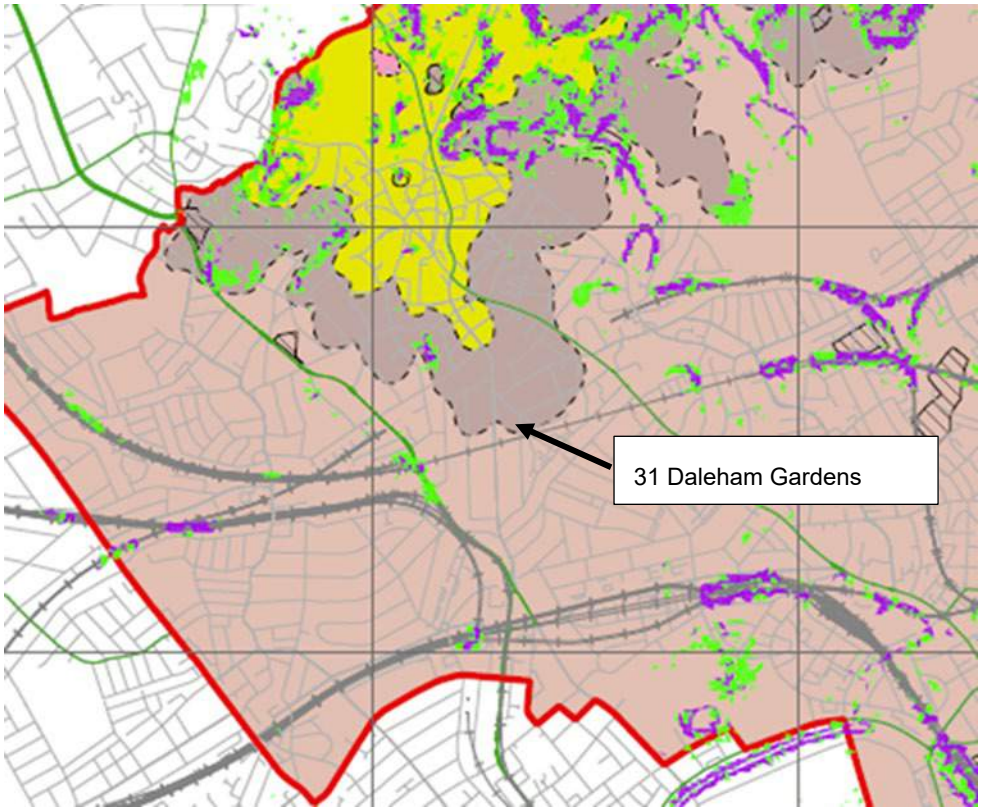
Location	The site is located in the Belsize electoral ward, within the London borough of Camden and the English Parliamentary constituency of Hampstead and Kilburn
Full Address	31 Daleham Gardens, London NW3 5BU, England
National Grid Reference	526673 185076
Area & Shape	The site has a rectangular shape and occupies an area of approximately 0.07 Ha
Development Proposals	Development of a 5 storey residential building with a part basement comprising 14 units,

Figure 1. Site Location

2.2 GEOLOGY

The published geology based on the British Geological Survey (BGS) map 1:50,000 geological map series, solid and drift Ref. 1, indicates the site is underlain directly by the Claygate Member. It should also be noted that the site lies very close to where the boundary of the Claygate Member and London Clay outcropping boundary (Figure 2).

Figure 2 Site Geology



The published geology (BGS) for the Site consists of the Claygate Member of the London Clay Formation, comprising dark grey clays with sand laminae, passing up into thin alternations of clays, silts and fine-grained sand, with beds of bioturbated silt. The stratum is underlain by the London Clay Formation, comprising silty clay diffusely interbedded with sandy clayey silt; it is commonly glauconitic, with several layers of calcareous concretions.

The Claygate Member is distinguished from the underlying London Clay Formation by the laminated character and the relative abundance of sand and is the most recent layer of the London Clay Formation. The boundary is drawn at the base of the lowest sand bed, conformable on silty clay with common sandy clayey silt interbeds. In practical terms, it is taken at the 'lowest sandy horizon mappable in the field' (Lake et al., 1986).

Underlying the Claygate Member is the London Clay.

The geological sequence is summarised in **Table 2** below.

Table 2: Summary of Published Geology

Geological Unit	Description	Composition	BGS Lexicon Description
Superficial	None	-	-
Bedrock	Claygate Member (Parent unit is the London Clay Formation)	Clay, silt and sand	Comprises dark grey clays with sand laminae, passing up into thin alternations of clays, silts and fine-grained sand, with beds of bioturbated silt. Ferruginous concretions and septarian nodules occur in places.
	London Clay Formation	Clay, silt and sand	Comprises dark grey clays with sand laminae, passing up into thin alternations of clays, silts and fine-grained sand, with beds of bioturbated silt. Ferruginous concretions and septarian nodules occur in places.

2.3 HYDROGEOLOGY

Due to the moderately permeable nature of the Claygate Member deposits when compared to the London Clay Formation, surface water precipitation tends to flow through them and be stored within the stratum as a local aquifer, with spring lines forming at the ground surface at the junction with the Claygate Member (medium permeability) and at the junction of the Claygate Member with the London Clay Formation (low permeability). The Environment Agency classifies the Claygate Member as a Secondary A Aquifer of medium vulnerability and of mixed permeability.

The aquifer status for the identified strata together with an estimate of vulnerability is given in Table 3, below.

Table 3: Aquifer Designation and Strata Vulnerability

Geological Unit	Strata	Aquifer Designation	Vulnerability
Bedrock	Claygate Member	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 aquifer. The stratum is underlain by the London Clay Formation, which is designated as unproductive strata.	Medium

2.4 HYDROLOGY

There are no surface water bodies located within 250 m of the site based on the Groundsure Report which was included in the Phase 1 Desk Study produced by STM Environmental in August 2021. The closest surface water body to the site is Hampstead No 1 pond, which is approximately 1.2 km from the site as dictated by the Hampstead Heath Map (see Figure 13 of the Camden Geological, Hydrogeological and Hydrological Study).

A review of the 'Watercourses' plan from Bartons 'Lost Rivers of London' (see Figure 11 of the Camden Geological, Hydrogeological and Hydrological Study) indicates various historical water courses that were present within the Camden area. The closest historical water body to 31 Daleham Gardens was the lost River Tyburn. The main source of the River Tyburn was Shepherd's Well (shown as Conduit Wells in the 1870-1871 Groundsure Historical Map), which was located at the corner of Fitzjohn's Avenue and Lyndhurst Road which is approximately 150 m to the north of our site. In the late 1870's, when the houses were built on Fitzjohn's Avenue, the water was culverted into a sewer to the west of the property boundary to flow south to Regent's Park and into the Thames.

The culvert is likely to be positioned at its closest point approximately 50 m to the west of our site traversing from north to south, towards Regent's Park.

3. GROUND INVESTIGATION

3.1 FIELDWORK

The investigation was carried out on the 31st January to the 3rd February 2023 by Geofirma Ltd and comprised the following:

1. The drilling of 2No Cable Percussion boreholes, BH1A and BH2, to depths of 25.45 m and 15.5 m bgl respectively. Borehole BH1 hit an obstruction in the Made Ground at 0.55 m bgl and hence was terminated. Standard Penetration Tests (SPTs) were performed in the borehole together with sampling at varying intervals.
2. The excavation of 2No. trial pits, TP1 and TP3, to expose building foundation for the previously demolished building. Both trial pits were taken to a depth of 3.5 m bgl.
3. Performance of 6 CBR tests to provide data for road pavement design.

The fieldwork was supervised by Geofirma Ltd with due regard to existing standards and guidelines including BS EN 1997-2 (2005), BS 5930 (2015), BS EN ISO 22476-3 (2011) and TRL PR/INT/277 (2004).

All soil description and sample logging were carried out in accordance with BS 5930:2015 and BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. The exploratory hole records are included in Appendix A, and locations of the exploratory holes are shown on the Exploration Hole Locations Plan, Appendix B.

Disturbed and undisturbed samples were recovered from the exploratory holes as necessary to facilitate sample description and for subsequent laboratory testing.

Observations of groundwater encountered during the fieldwork are included on the relevant exploratory hole records.

Groundwater and gas monitoring visits were undertaken on the 6th February and 9th March 2023 and records are included in appendix H.

3.2 LABORATORY TESTING

Routine geotechnical laboratory testing comprising Moisture Content (MC), Atterberg Limits, Particle Size Distribution Determination (PSD), Quick Undrained Triaxial Testing and sulphate tests were performed on selected samples. WAC tests and chemical tests were also carried out on selected samples to assess potential contamination levels of tested samples. The laboratory testing was carried out in accordance with BS EN ISO 17892-1:2014 and BS 1377-2:1990 at an Independent UKAS accredited laboratory and the results are presented in Appendix C and D; details of the tests and results are discussed in Section 4 and Section 5 of this report. A summary of the geotechnical and chemical laboratory testing is presented in Table 4 below.

Table 4: Summary of Geotechnical and Chemical Laboratory Testing

Laboratory Testing	Test Method	No. samples scheduled
Classification/Compaction		
Moisture Content	BS EN ISO 17892-1:2014	16
Liquid / plastic limits	BS1377: Part 2: 1990	4
Particle Size Distribution	BS EN ISO 17892-4:2016	4
Strength/Consolidation		
Undrained Triaxial Compression Test	BS1377: Part 8: 1990	8
Concrete		
BRE SD1 Suite – water soluble sulphate, total sulphur and pH		6
Chemical Tests		
WAC		1
Geofirma Chemical Suite		2

3.3 GROUNDWATER MONITORING

During the ground investigation it appears a fast groundwater inflow was recorded at 1.8 m bgl in borehole BH1A during the first day of drilling. This appears to have been perched water because the flow subsequently stopped during the site works and is not in continuity with the groundwater encountered during the groundwater monitoring (see Table 5).

Table 5: Summary of Groundwater Readings

	Response Zone	Stratum	Date of Groundwater Monitoring and depth m bgl (estimated levels in m OD)	
			06/02/23	09/03/23
BH1A	6 to 10	London Clay	3.25 (75.00)	3.20 (75.05)
BH2	2 to 6	Claygate Member/London	5.49 (74.94)	Dry

4. GROUND CONDITIONS

4.1 INTRODUCTION

Full details of the ground conditions encountered are presented on the exploratory hole records included in Appendix A.

Table 5: Proven Ground Conditions

Strata	Depth to Top (m bgl)	Thickness (m)
Made Ground	0.00	0.9 (BH2) to 3.6 BH1A)
Claygate Member	0.9 to 3.6	2.5
London Clay	5.5 (BH1A) to 6.5 (BH2)	Not proven

4.2 MADE GROUND

Made Ground was encountered in all the exploratory holes excavated on site and was variable. Typically, the Made Ground was encountered as a mixture of clayey gravelly SAND and gravelly sandy CLAY with the gravels being fragments of fine to coarse flint, brick, tile and concrete.

Based on the description of the material and inference from BS8002, a unit weight of 18 kN/m^3 is assumed suitable for this material. Based on the descriptions of the material being predominantly granular an angle of friction of 28° is deemed acceptable for design purposes.

5No samples were recovered from BH1A and BH2 from within the Made Ground to determine its moisture contents. The results ranged between 28% to 38%, as shown in Figure 3.

An Atterberg limit test was also performed on a selected sample from BH1A at 2.00 m bgl. The result of the test recorded liquid limit of 50%, plastic limit of 17% with plasticity index of 33. The modified plasticity index is 29 which suggests a medium volume change potential cohesive material.

SPT N values ranging between 4 and 10 were measured in the Made Ground, therefore assuming a correlation E' = 2N MPa, a drained Youngs Modulus of 10 MPa is assumed suitable.

4.3 CLAYGATE MEMBER

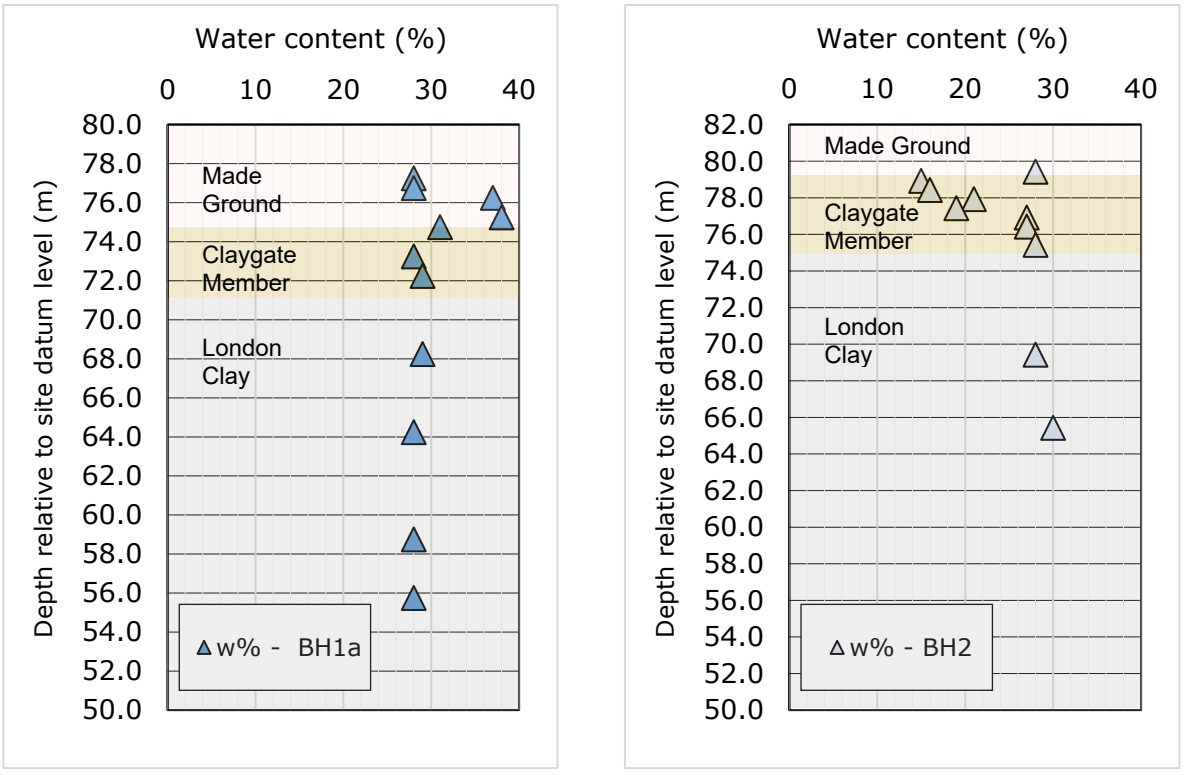
4.3.1 General Classification

Beneath the Made Ground, a stratum interpreted as Claygate Member was encountered in all the exploratory boreholes. In BH1A this material was found at depths from 3.6 m to 6.5 m bgl, and in BH2 at depths from 0.9 m to 5.5 m bgl. It predominantly comprises firm greyish orange mottled brown gravelly sandy CLAY, however, in BH2 at 2.0 m bgl a medium dense brown orange mottled clayey SAND band is present. The material is described in the logs as being occasionally described as being 'soft' after recovery and this is due to the high granular content which means the sample degrades when retrieved from the drilling shoe and SPT hammer when split. In-situ the SPT N values are greater than 10, hence in the soil is either firm (cohesive), or medium dense (granular).

4.3.2 Moisture Contents

12No. natural moisture contents were measured on samples taken from depths ranging between 1.0 m (BH2) and 6.0 m (BH1A) with values ranging between 15 % and 31 %. The moisture content variation against the estimated relative datum level is plotted in Figure 3.

Figure 3. Moisture content w% vs depth (a) BH1A (b) BH2



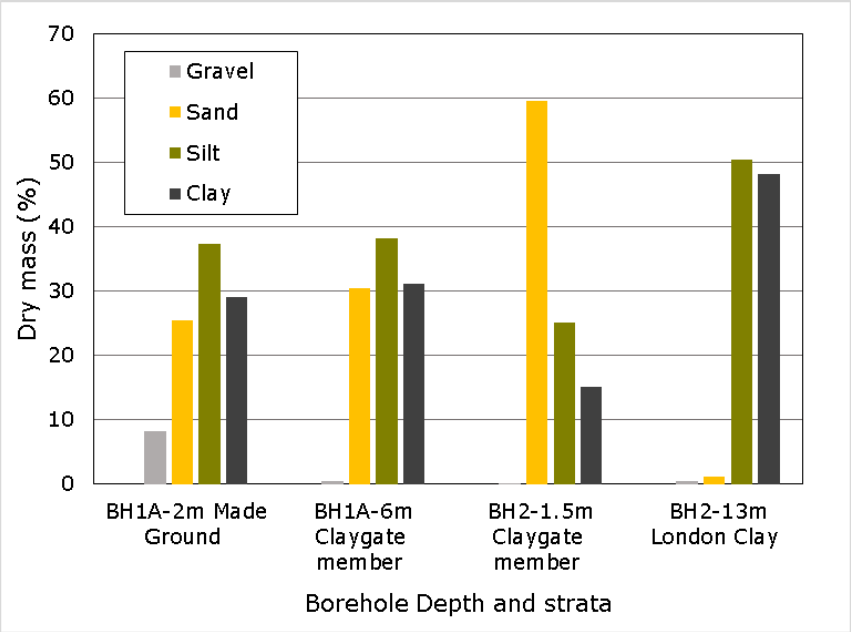
(a) (b)

4.3.3 Particle Size Distribution (PSD)

Particle Size Distribution (PSD) test was carried out on 2No samples of the Claygate Member recovered from BH1A and BH2.

The results indicate the recovered samples are sandy silty SAND/sandy silty CLAY, with between 30% to 60% granular composition, which is typical of the Claygate Formation. Figure 4 below summarises the PSD result.

Fig 4: Results of the Grading Analysis



4No. Atterberg limit tests were also performed on selected samples within the boreholes at depths of between 3.0 and 6.0 m bgl (BH2). The result of the test recorded liquid limits of 43% to 51%, plastic limits of 16% to 18% with plasticity indices of 29 and 33, indicative of clay of medium plasticity. Typically, particles of all samples tested passed through the 425µm sieve and therefore, there is no requirement to modify plasticity indices.

4.3.4 Strength Characteristics

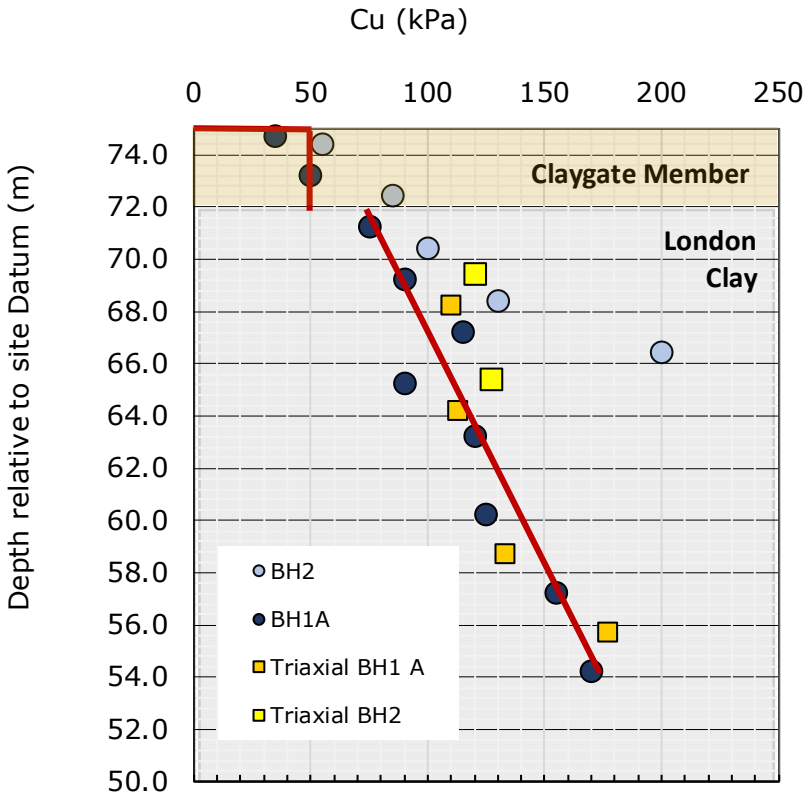
Standard Penetration Testing was carried out and the uncorrected SPT 'N' Values were recorded on the exploratory hole records. The data indicates N-values ranging between 7 and 11.

Undrained triaxial tests have been undertaken on representative sample of the Claygate Member recovered. The 2No tests undertaken in this material indicated strengths of 51 and 59 kPa.

Shear strengths were also derived from SPT 'N' using the empirical formula Cu = 5*N (Stroud and Butler (1975) and CIRIA 143 Ref. [2]).

Based on the data the following undrained shear strength has been adopted as shown in Figure 3: C_u = 50 kPa

Fig 5: Results of the Undrained Shear Strength vs Depth



4.3.5 Frictional Angle

4No Atterberg limit test results have been obtained for samples retrieved within the Claygate Member to determine the index properties of the soil, and hence derive the characteristic critical state effective angles of friction using guidelines from BS8002 (2015). The critical state angles of friction derived based on the plasticity indices yielded values of between 23° and 25°. However, angle of friction of 24° is considered representative for this material. The worst case characteristic critical state effective cohesion *c'* is assumed to be zero.

4.3.6 Young Modulus/Compressibility

The value of undrained Young's Modulus, E_u, of the Claygate Member can be determined by using SPT 'N' values and CIRIA recommendations in CIRIA 760 for ULS retaining wall design the relationship of $E_u = 500C_u$ is a reasonable estimation. However, for the SLS assessments/Ground Movement Assessment, due to the small strain range of stiffnesses used for the calculation of lateral movements associated with retaining walls an $E_u = 1000C_u$ may be adopted. Since the movements associated with foundations are due to larger strains and

the stiffness of soil is strain dependant a reduced E_u = 300 C_u should be adopted for calculation of foundation settlements.

Therefore, for retaining wall analysis and the GMA assessment an E_u = 50 MPa may be adopted. For the ULS design of the retaining wall an E_u = 25 MPa maybe be adopted, whilst for settlement calculations a E_u = 15 MPa is recommended.

Assuming a Poisson's ratio (ν') of 0.15, an *E'* (drained Young modulus) of 0.75 * E_u should be adopted. Therefore, for the retaining wall analysis and the GMA assessment an E' = 37.5 MPa may be adopted. For the ULS design of the retaining wall an E' = 18.75 MPa maybe be adopted, whilst for settlement calculations a E'= 12.5 MPa is recommended.

The coefficient of compressibility (m_v) has been estimated for the underlying Claygate Member based on the expressions:

$$m_v = 1/f_2N \ m^2/MN$$

Based on the above correlation, a m_v of 0.2 m^2/MN is deemed realistic for the estimation of settlement under loadings.

4.4 LONDON CLAY

4.4.1 General Classification

Beneath the Claygate Member, is the London Clay. The clay was encountered in the BH1A and BH2 at depths of between 5.50 m bgl and 6.50 m bgl respectively. The full thickness of the material was unproven. In the boreholes the stratum was described as generally comprising firm to stiff slightly sandy fissured silty CLAY with micaceous inclusions on the fissured surfaces.

Based on the description on the laboratory test results carried out within this material at 6.60 m bgl, a bulk unit weight of 19 kN/m^3 was recorded. Based on the descriptions of the material being predominantly cohesive and well documented data about London Clay Formation, an effective critical state angle of friction of 24° is deemed acceptable for design purposes.

4.4.2 Moisture Contents

6No. natural moisture contents were measured on samples taken from depths ranging between 10.0 m bgl and 22.5 m bgl with values ranging between 28% and 30%.

4.4.3 Particle Size Distribution (PSD)

Particle Size Distribution (PSD) test was carried out on 1No samples of the London Clay taken from borehole BH2.

The results indicate the recovered samples are silty CLAY, which is typical of London Clay. Figure 4 below summarises the PSD result.

1No Atterberg limit tests was also performed on a selected sample taken from BH2 at 5 m bgl. The results of the test recorded a liquid limit of 54 %, a plastic limit of 18 % with a plasticity index of 36, indicative of a clay of intermediate plasticity. Typically, all samples passed through the 425µm sieve and therefore, there is no requirement to modify plasticity indices.

4.4.4 Strength Characteristics

Standard Penetration Testing was carried out and the uncorrected SPT 'N' Values were recorded on the exploratory hole records. The data indicates a general trend of increasing N-value with depth ranging between 18 and 40.

Undrained triaxial tests have been undertaken on representative sample of the London Clay recovered. The 2No tests undertaken in this material indicated strengths of 110 and 117 kPa.

Shear strengths were also derived from SPT 'N' using the empirical formula Cu = 5*N (Stroud and Butler (1975) and CIRIA 143 Ref. [2]).

Based on the data the following undrained shear strength vs depth relationship has been adopted as shown in Figure 5:

C_u = 80 + 5z kPa (z is the depth below the surface of the London Clay assume 72 m OD)

4.4.5 Frictional Angle

A significant amount of geotechnical data relating to the London Clay is available from historical archives. Furthermore, 1No Atterberg limit test results have been obtained for samples retrieved within the London Clay to determine the index properties of the soil, and hence derive the characteristic critical state effective angles of friction using guidelines from BS8002 (2015). The critical state angles of friction derived based on the plasticity indices yielded values of between 23°. An angle of friction of 23° is considered representative for this material. The worst case characteristic critical state effective cohesion *c'* is assumed to be zero, however, for retaining wall designs ranging between 0 kPa to 5 kPa maybe adopted subject to the softening of the clay and its long-term behaviour under loading.

4.4.6 Young Modulus/Compressibility

The value of undrained Young's Modulus, E_u, of the London Clay can be determined by using SPT 'N' values and CIRIA recommendations in CIRIA 760 for ULS retaining wall design the relationship of $E_u = 500C_u$ is a reasonable estimation. However, for the SLS assessments/Ground Movement Assessment, due to the small strain range of stiffnesses used for the calculation of lateral movements associated with retaining walls an $E_u = 1000C_u$ may be adopted. Since the movements associated with foundations are due to larger strains and the stiffness of soil is strain dependant a reduced $E_u = 300\ C_u$ should be adopted for calculation of foundation settlements.

Therefore for retaining wall analysis and the GMA assessment an E_u = 80 + 5z MPa may be adopted. For the ULS design of the retaining wall an E_u = 40 + 2.5z MPa maybe be adopted, whilst for settlement calculations a E_u = 24 + 1.5z MPa is recommended.

Assuming a Poisson's ratio (ν') of 0.15, an *E'* (drained Young modulus) of 0.75 * E_u should be adopted. Therefore for the retaining wall analysis and the GMA assessment an E' = 60 + 3.75z MPa may be adopted. For the ULS design of the retaining wall an E' = 30 + 1.875z MPa maybe be adopted, whilst for settlement calculations a E' = 18 + 1.125 MPa is recommended.

The coefficient of compressibility (m_v) has been estimated for the underlying Claygate Member based on the expressions:

$$m_v = 1/f_2 N \ m^2/MN$$

Based on the above correlation, a m_v of 0.1 m^2/MN is deemed realistic for the estimation of settlement under loadings.

4.5 SUMMARY OF GEOTECHNICAL PARAMETERS

Based on the ground investigation and laboratory testing, the following design parameters have been derived and presented in Table 6 below. These may be relied upon in the design of geotechnical structures.

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Table 6: Summary of Geotechnical Parameters

Stratum	Typical thickness Range (m)	Bulk Density (kN/m^3)	C_u (kN/m^2)	Φ'_{cv} (°)	m_v (m^2/MN)	$E_{u\ (ULS)\ wall}$ (MN/m^2)	$E_{u\ (SLS)\ wall}$ (MN/m^2)	$E_{u\ settlemsnt}$ (MN/m^2)	$E'_{(ULS)wall}$ (MN/m^2)	$E'_{(SLS)\ wall}$ (MN/m^2)	$E'_{settlemsnt}$ (MN/m^2)
Made Ground	0.9 to 3.6	18	-	28	-	10	10	-	7.5	7.5	-
Claygate Member	2.5	18	50	24	0.2	25	50	15	18.75	37.5	12.5
London Clay Formation	Not Proven	19	80 + 5z	23	0.1	40 +2.5z	80 + 5z	24 + 5z	30 + 1.875z	60 + 3.75z	18 + 1.125z

(1) z is measured below the surface of the London Clay

5. ENGINEERING CONSIDERATIONS

5.1 FOUNDATION DESIGN ISSUES

5.1.1 Introduction

The preliminary estimated loads on the proposed foundations are stated in Sketch No. 1803-XX-SK-01. The drawings indicate the SLS loads applied by typical columns to the foundations could range between 580 kN and 675 kN. Based on the ground investigation, there could be up to 3 m of Made Ground within the previous building footprint, whilst to the rear of the site the Made Ground thickness could be less than 1 m. Hence there is the possibility different foundation options can be adopted for this scheme.

5.1.2 Shallow Foundations

The original 3 to 4 storey building at the site was constructed on shallow foundations founded in the Claygate Member. From this important observation it would be sensible to infer that the natural ground underlying the site is capable of carrying the loading for the new development on shallow foundations.

In areas of the site surrounding the previous footprint of the original site building the Made Ground is less than 1 m thick. If the foundations for the proposed building are constructed outside the zone of the Made Ground, shallow foundations can be used. The Atterberg Limit tests indicate the Claygate Member have medium volume change potential, hence this must be considered in the design of shallow foundations at this site, especially to the rear of the site where trees are present. Taking the above into account, it is important to note that the moisture content values measured in the top 3 to 4 m of BH2 (which is closest to the trees) are typically lower than those measured in BH1A, which is further away from the trees. This may be sign of desiccation in the top 3 to 4 m, or could just be because the Claygate Member is more granular in borehole BH2 (a clayey medium SAND) and hence holds less water in its soil matrix.

If shallow foundations are to be used, an assumed undrained shear strength (C_u) of 50 kPa may be adopted for the Claygate Formation based on the SPT and triaxial test data. This value is assumed to be conservative because the 3 to 4 storey building was previously located at this site, hence the 'actual' undrained shear strength for the building to have performed satisfactorily over the 150 years plus of it is service would exceed this value.

The expression used to determine the allowable bearing capacity of foundations in clay is:

$$\mathbf{q_{all} = N_c\, d_c\, S_c\, Cu \,/\, FOS + q}$$

N_c = Bearing capacity factor corrected for depth/breadth ratio and shape factor (see fig.6)

Cu = Undrained shear strength

FOS = Factor of safety = 3

q = Overburden above foundation formation level

Fig.6 Bearing Capacity Factor after Skempton

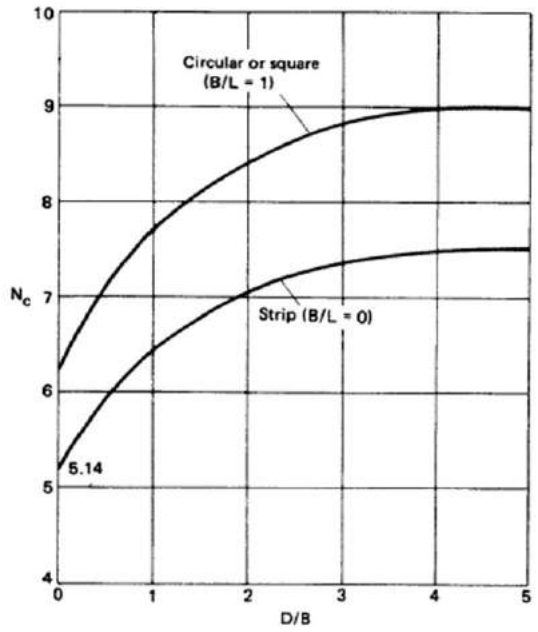

Figure 8.5 Skempton's values of N_c for $\phi_u = 0$. (Reproduced from A.W. Skempton (1951) *Proceedings of the Building Research Congress*, Division I, p. 181, by permission of the Building Research Establishment, © *Crown copyright*.)

Table 7: Summary of Assessment of Allowable Bearing Capacity

Depth below ground level (base of footing)	**1.0 m bgl**	**1.5 m bgl**	**2 m bgl**
Est Undrained Shear Strength Cu (kN/m²)	50	50	50
Allowable Bearing Capacity (kN/m²) (assuming foundations are a 0.6 m strip and FOS = 3)	125	150	160
Allowable Bearing Capacity (kN/m²) (assuming foundations are a pad 1.5 x 1.5 m and FOS = 3)	150	160	175
Allowable Bearing Capacity (kN/m²) (assuming foundations are a pad 2 x 2 m and FOS = 3)	125	150	165

Based on the calculated allowable bearing capacity values in Table 7, 1.5 m and 2.0 m pads can carry a column loads approximately 500 kN and 600 kN respectively. The above bearing capacities have been calculated using the traditional approach with a factor of safety (FOS) = 3.

Using the Eurocode approach, and assuming the foundations are at a depth of 1.5 m bgl, **the required pad** size to carry the maximum column internal load design action of *1 x 465 + 1.3 x 210 = 738 kN,* and external column design action of *1 x 465 + 1.3 x 115 = 615 kN* is determined assessing the design resistance of ground, R_d.

The design resistance R_d at formation level 1.5 m bgl for an assumed 1.5 m by 1.5 m pad

$$\frac{R_d}{Area} = N_c \frac{Cu}{1.4} + p_o$$

Assuming the N_c for a pad = 7.7 (see Figure 6) and the undrained shear strength is 50 KPa.

$$R_d = 1.5 \times 1.5 \times \left(7.7 \times \frac{50}{1.4} + 1.5 \times 18\right)$$

$$R_d = 1.5 \times 1.5 \times (302\ kN/m^2)$$

$$R_d = 680\ kN > 615\ kN$$

A 1.5 m x 1.5 m pad founded 1.5 m bgl in the Claygate Formation can carry the external column load.

The design resistance R_d at formation level 1.5 m bgl for an assumed 1.75 m by 1.75 m pad

$$\frac{R_d}{Area} = N_c \frac{Cu}{1.4} + p_o$$

Assuming the N_c for a pad = 7.4 (see Figure 6) and the undrained shear strength is 50 KPa.

$$R_d = 1.75 \times 1.75 \times \left(7.4 \times \frac{50}{1.4} + 1.5 \times 18\right)$$

$$R_d = 1.75 \times 1.75 \times (290\ kN/m^2)$$

$$R_d = 888\ kN > 738\ kN$$

A 1.75 m x 1.75 m pad founded 1.5 m bgl in the Claygate Member can carry the internal column load. A quick settlement check has been performed to satisfy the Eurocode requirements and it is anticipated total settlements of up to 25 mm could be achieved for the heavier column loads, although it is recommended the pad sizes are increased to 2 m x 2 m for the larger loads to control the settlement – or a raft used. If total settlements of this level are deemed excessive, piled foundations should be used.

To assess whether shallow foundations may be used on the site, additional trial pitting is necessary to confirm the thickness of the Made Ground in more detail across the site.

5.1.3 Piled Foundations

To mitigate the risk associated with the use of shallow foundations at this site, it may be considered appropriate to use piled foundations. However, if piles are to be used the interaction between the piles and the tunnel beneath 31a Daleham Gardens have to be assessed. In order to undertake the assessment competently the tunnel properties need to be known, with the most important being the location of the tunnel, that is its depth and

alignment. The predicted tunnel alignment and depth is shown in sketch 1803-XX-SK-04b (see appendix F).

The information provided by the sketch indicates the top section of all the pile should be sleeved within the arching zone (assumed to be 45 degrees from the tunnel invert in the sketch) above the Network rail tunnel that underlies 31A Daleham Gardens. The pile Eurocode 7 design resistances are tabulated in Table 9 with the reduced shaft friction attributed to the piles. This approach is deemed to be conservative, therefore it is suggested numerical analysis is undertaken to assess more accurately the interaction of the tunnel and the proposed pile. If this process is undertaken, it is possible that pile capacities more akin with the values in Table 8 maybe adopted with the full skin friction of the pile included in the shaft resistance calculation.

The piling contractor must undertake their own design to satisfy themselves on the validity of design resistances provided in Tables 8 and 9.

Obstructions are potentially present in the Made Ground overlying the site, hence it advisable these are removed in advance of the pile installation.

Table 8: ***Summary of Design Action DA1-2 with pile design length (measured below foundation level)***

Reduced level (m)	Pile length (m)	Design Action DA1-2 (kN)			
		Ø = 0.3	Ø = 0.35	Ø = 0.45	Ø = 0.6
76	**2**	0	0	0	0
74	**4**	22	28	41	66
72	**6**	43	52	73	109
70	**8**	88	107	148	218
68	**10**	132	158	215	310
66	**12**	180	215	289	411
64	**14**	232	277	370	522
62	**16**	290	344	458	642
60	**18**	352	417	553	771
58	**20**	419	496	656	911
56	**22**	491	580	765	1059
54	**24**	562	664	873	1202

Table 9: ***Summary of Design Action DA1-2 with pile design length (measured below foundation level) following*** **Network Rail's** ***guidance notes for works in the vicinity of tunnels***

Reduced level (m)	Pile length (m)	Design Action DA1-2 (kN)			
		Ø = 0.3	Ø = 0.35	Ø = 0.45	Ø = 0.6
76	**2**	0	0	0	0
74	**4**	0	0	0	0
72	**6**	0	0	0	0
70	**8**	0	0	0	0
68	**10**	0	0	0	0
66	**12**	48	60	90	145
64	**14**	98	120	168	251
62	**16**	153	184	252	365
60	**18**	212	254	342	488
58	**20**	275	328	439	619
56	**22**	343	407	542	759
54	**24**	415	491	651	907
52	**26**	491	580	767	1063
50	**28**	571	674	888	1228

5.2 RETAINING WALLS FOR UNDERGROUND STRUCTURES

Based on the existing drawings the maximum retained height for the proposed basement will be up to 5m. The retained height shall reduce from west to east across the site.

A sheet pile wall can be used to aid in the formation of the excavation for the dig, and with the benefit of having a smaller footprint dimension width/profile of typically 300 mm to 500 mm would result in more useable space of the development due to the constraints on the site width. However, the likelihood of vibrations being induced during the pile driving must be taken into account. If the adjacent buildings and the party walls surrounding the site are also deemed sensitive, the driving impact of the sheet piling could detrimentally impact these structures. Also, due to the residential nature of the area, the noise which occurs as a result of the driving process may cause disturbance.

A contiguous bored pile retaining wall could also be the used for constructing the basement. Based on the current proposed maximum retaining height, a maximum pile diameter of 450 mm or 600 mm would be deemed acceptable. A contiguous bored pile wall does have gaps between the individual piles, and the ground investigation does indicate there may be perched water trapped in the Claygate Formation, however, it is anticipated the groundwater is below the dig level, so even if encountered can be controlled by using pumping. The site is in a

residential area, hence noise caused by drilling using boring rig would be less in comparison to driving sheet piling into the ground using high impact methods. Also being located next to a party wall, the use of bored piles will cause less vibrations to the neighbouring properties. Since bored pile may also be used to carry the internal column loads, there will be cost and programme savings in using bored pile for both the retaining walls and foundation piles.

Obstructions are potentially present in the Made Ground overlying the site, hence it advisable these are removed in advance of forming the retaining wall.

Also of particular interest there will be sections of the retaining wall installed immediately adjacent to the site boundary party walls. The base of the party wall walls are likely to protrude into 31 Daleham Gardens and hence potential obstruct the line of the piled walls. It is therefore recommended the base of these party walls are exposed in areas to confirm the wall foundation type and projection on to the development footprint.

Suitable geotechnical parameters to use in the design of the basement walls can be obtained from Table 6.

Due to the proximity of the retaining walls to sensitive structures, temporary propping will be necessary to limit lateral movement of the adjacent structures towards the excavation. Coordination will be required between the retaining wall designer and the temporary works designer to ensure movements are with tolerable levels.

5.3 EXCAVATIONS

Open cut excavation techniques may be used to form certain areas of the basement excavation where there is sufficient space to form temporary safe slopes. Based on the description of the material and the results of the correlations used to determine an angle of friction for the Made Ground and Claygate formation safe temporary slope would be 1V:2H, however, these may have to be slackened if the site is subject to sustained rainfall.

As noted on the borehole log for BH1A, a groundwater strike was encountered at 1.8 m bgl in the Made Ground (approx. 76.5 m OD), and on the last groundwater monitoring visit the groundwater was encountered in BH1A at approximately 75 m OD. The difference in the water strike level and the monitored groundwater level would indicate that both water bodies are not necessary in continuity, with the water in the Made Ground almost certainly being perched. Therefore, any localised ingress from the Made Ground should be controllable by sump pumping, if required. Note currently that the monitored groundwater level is approximately 1.5 m below the proposed dig level, however, the groundwater is likely to fluctuate seasonally and possibly in response to rainfall. It is therefore recommended that groundwater monitoring is performed up until the construction phase to enable a decision to be made on whether dewatering is necessary, and if so, the proposed technique and methodology.

Based on our experience during the trial pits, the excavation of the materials encountered during the ground investigation should be easily achieved using conventional digging techniques, however, obstruction maybe encountered since the site did previously have a

building located on it. Records of the site demolition and clear up with photographs are in Appendix J.

Care should be taken to limit the exposure of any excavation surface before the actual placement of the concrete as groundwater or rainwater could result in deterioration of the formation surface. Foundation excavations should be inspected by qualified personnel and any soft or loose materials that are encountered should be removed and replaced with a blinding layer as quickly as possible.

5.4 PAVEMENT DESIGN

In situ CBR results indicated test values ranging between 0.81% and 5.4%. The values seem low, however, it should be noted the CBR values measured appear to be highly dependent on the moisture content of the soil.

Based on the data obtained a CBR value of 2% is recommended for the site, however, it would be prudent that the top 500 mm of soil is removed and the exposed surface is proof-rolled before placement of any road or pavement build up is commenced.

5.5 CONCRETE SULPHATE RESISTANCE

4No soil samples were tested for sulphates with the water-soluble sulphate values varying between 70 mg/l and 620 mg/l. Total sulphur tests were also performed, and when converted the total potential sulphate varied between 0.72 % and 1.89 %.

Hence in accordance with BRE Guidance Special Digest 1:2005, and assuming mobile groundwater and brownfield location, a Design Sulphate Class of DS-4 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-3s should be used for the design of buried concrete structures at the site.

5.6 CONTAMINATION ASSESSMENT

5.6.1 Human Health Risk Assessment

The site previously housed the original 31 Daleham Gardens, which was damaged by fire and then was demolished. As part of the demolition process it would appear both demolition material and soil were taken of site as part of this process. The quantities of construction waste taken off site and material imported on to site are documented in the 'Demolition Recycling Report' and the logs sheets which were produced by M & M Demolition (see appendix J).

A Tier 1 (generic) quantitative risk assessment has been undertaken by screening measured contaminant concentrations derived from the ground investigation works against reference values for chronic (long term) risk to human health known as Generic Assessment Criteria (GAC).

In line with the conceptual site model, GAC for the residential without plant uptake exposure scenario have been utilised. The GAC are predominantly based on the LQM / CIEH S4ULs and DEFRA C4SL.

The below contaminants have subsequently been targeted for chemical analysis.

Table 8: Tier 1 Generic Risk Assessment

Determinant	Measured Concentration*		GAC (Conservative assumption of 1% Soil Organic Matter)	Number of results above GAC (No. of samples tested)
	Minimum	Maximum		
Arsenic	9.6	15	35	0 (2)
Cadmium	<0.2	<0.2	85	0 (2)
Chromium (hexavalent)	<1.2	<1.2	4.3	0 (2)
Chromium III	12	36	630	0 (2)
Copper	12	20	6200	0 (2)
Lead	32	48	313	0 (2)
Mercury	<0.3	<0.3	1.5	0 (2)
Nickel	9.9	11	130	0 (2)
Selenium	<1	<1	430	0 (2)
Zinc	39	82	40,000	0 (2)
Total Phenols	<1	<1	10	0 (2)
Acenaphthene	<0.05	<0.05	210	0 (2)
Acenaphthylene	<0.05	<0.05	170	0 (2)

Anthracene	<0.05	<0.05	2,300	0 (2)
Benzo(a)anthracene	<0.05	0.44	11	0 (2)
Benzo(a)pyrene	<0.05	0.53	5.3	0 (2)
Benzo(b)fluoranthene	<0.05	0.99	3.9	0 (2)
Benzo(ghi)perylene	<0.05	0.37	44	0 (2)
Benzo(k)fluoranthene	<0.05	0.99	8.5	0 (2)
Chrysene	<0.05	0.44	6	0 (2)
Dibenz(a,h)anthracene	<0.05	<0.05	0.31	0(2)
Fluoranthene	<0.05	0.59	260	0 (2)
Fluorene	<0.05	<0.05	160	0 (2)
Indeno(1,2,3-cd)pyrene	<0.05	0.31	3.2	0 (2)
Naphthalene	<0.05	<0.05	1.5	0 (2)
Phenanthrene	<0.05	0.18	92	0 (2)
Pyrene	<0.05	0.59	560	0 (2)
BTEX, MTBE and TPH	All fractions are either below laboratory limit of detection or their respective GAC. Expect for TPH-CWG – Aliphatic with a 12 mg/kg which is low and near to the detection limit.			
Asbestos	None detected in the two samples.			
**Concentration expressed in mg/kg except where listed* *[X]Based on Insert Waste Landfill Acceptance Criteria*				

Notes:

** Source of GAC: 1 = LQM / CIEH (2014) S4UL3785 | 2 = Defra (2014) C4SL*

*** For asbestos, the number of detections is shown and does not relate to any GAC*

Direct analysis of all the chemical assessment data indicates the contaminants are all below their relevant GAC for all contaminants within both the Made Ground and natural strata.

Although no elevated contaminants were encountered it would be prudent that mitigation measures stated in Table 11 are adhered to. This is especially relevant due to the history of the site, even though the information in appendix J does contain information indicating the site clear up was performed to the satisfaction of Camden Council.

A copy of the laboratory chemical assessment data is presented in Appendix C of this Report.

5.6.2 Ground Gas Risk Assessment

2No gas monitoring visits were undertaken on the 6th February and 9th March 2023.

Table 9: Summary of Maximum Ground Gas Readings

Summary of Maximum Gas Monitoring Results								
Date	**Atm Pressure (mB)**	**Hole Ref.**	**Flow (l/h)**	**CH_4 (%)**	**CO_2 (%)**	**CO (%)**	**O_2 (%)**	**H_2S (ppm)**
06/02/2023	1032	BH1A	0	0	0.1	0	14.2	0
		BH2	0	0	3.3	0	16.3	0
09/03/2023	982	BH1A	0	0	0.2	0	18.9	0
		BH2	0	0	5.4	0	14.5	0

Gas Screening Values (GSV) have been calculated based on the above data. CIRIA (2007b) and NHBC (2007) provide methods for assessment of CO2 and CH4 based upon gas screening values (GSV) utilising flow rates and concentrations measured in appropriate standpipes. To enable calculation of the GSV, the flowrates have been adopted as 0.1 l/hr.

The GSVs within CIRIA (2007b) are based upon all buildings other than standard residential houses. The NHBC (2007) GSV are based upon standard residential houses with precast concrete floors (block and beam). As such, based upon the currently proposed end use of the site the NHBC guidance should be adopted.

Table 10: Summary of Maximum Gas Screening Values and Site Classification

Summary Gas Screening Values (GSV)							
Hole Ref.	**Assumed Flow (l/h)**	**CH_4 (%)**	**CO_2 (%)**	**CH_4 GSV (l/hr)**	**NHBC**	**CO_2 GSV (l/hr)**	**NHBC**
BH2 (max)	0.1	0	5.4	0	Green/ CS1	0.0054	Green/ CS1

Since methane was not detected, and with the gas screening value for carbon dioxide being significantly below the thresholds for the NHBC, the site classification is Green and CS1. The absence of other gases during the monitoring events also supports the site being very low risk.

Based on the above, ground gas protection measures are not considered to be required for this site.

5.6.3 Waste Acceptance Criteria (WAC)

WAC testing was carried out on a single sample retrieved from TP3 at a depth of 0.1 m bgl within the Topsoil. A Loss on Ignition (LOI) of 10.1% and a Total Organic Carbon (TOC) of 5% were measured, which exceed the Hazardous Waste for LOI, and stable non-reactive hazard waste in a non-hazardous landfill criteria for TOC of 10% and 3% respectively.

The single sample tested may not representative of the considerable amount of material likely to be won during the excavation works, especially since only one sample was tested. Therefore, further testing must be performed by the earthworks contractor during construction prior to removal of any spoil off site to classify the site soils to be transported to a suitably licenced landfill facility to enable a more rigorous assessment to be undertaken.

5.6.4 Review of Qualitative Risk Assessment Following Investigation

Risk classification is a function of the severity of a potential impact or health effect, and the perceived likelihood of such harm occurring. Qualitative assessment of the risks posed by the potentially significant pollutant linkages identified in Section 5.6.1 is summarised in Table 11-below and is supplemented by the quantitative data obtained as part of the ground investigation.

Based on the findings of this Phase 2 report for the site the risks to human health are considered to be **acceptably low**, providing appropriate mitigation measures are adopted at

the site. It is particularly important that the mitigation measures are employed during the earthworks because of the site history.

The assessment within the report has been undertaken to determine the potential risks posed to identified receptors based on the proposed development at the time of writing. Should revisions in the development plans result in a change in the assessment parameters included in this report, a reassessment of the conceptual model and risk should be carried out

Table 11: Phase II Conceptual Site Model

Source	Pathway	Receptor	Consequence	Likelihood	Classification*	Rationale/Mitigation
Organic and inorganic contaminants potentially present in Made Ground	Dermal contact, ingestion, particulate inhalation	Nearby site occupants & users (from on-site sources) Future site occupants & users	Low to Medium	Unlikely	Low to moderate	No elevated results and no asbestos encountered during the ground investigation. Reports and logs produced M & M demolition infer the cleanup of the site. Appropriate PPE to be worn by site workers during basement excavation and construction works and COSHH assessment to be carried out. Risk is considered low if PPE is worn and general hygiene rules are followed on site.. On completion of construction works the majority of the site will be covered by building/hardstanding, hence risk to future site users will be low.
	Diffusion through plastic water supply pipes	Water supply pipes	Low	Unlikely	Very Low	Relates to local deposits of Made Ground / fill associated with construction of foundations and hardstanding. No organics observed during the ground investigation or elevated TPH results so risk to water pipes is negligible.
	Leaching into groundwater; subsurface migration.	Secondary A Aquifer	Low to Medium	Unlikely	Low to moderate	Low permeability London Clay Formation underlying the Claygate Formation is classed as unproductive strata and will restrict vertical migration. The site is not designated to be within Groundwater Source Protection Zones within 2000m radius of site. Leachate testing recommended to confirm this assessment.

Source	Pathway	Receptor	Consequence	Likelihood	Classification*	Rationale/Mitigation
Potential asbestos containing materials in structure	Release of asbestos fibres; subsequent inhalation	Site occupants & users	Low	Unlikely	Very Low to negligible	No asbestos encountered during the ground investigation. Asbestos already moved as part of site clear up by M & M Demolition (See appendix J). Further records available from the client, NW3 CLT).
		Construction workers				

6. REFERENCES

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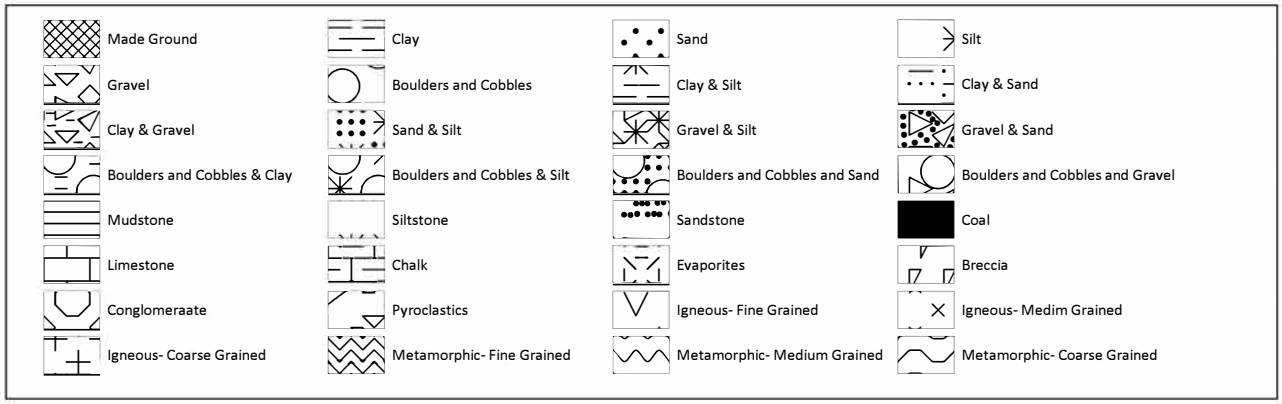
APPENDIX A –

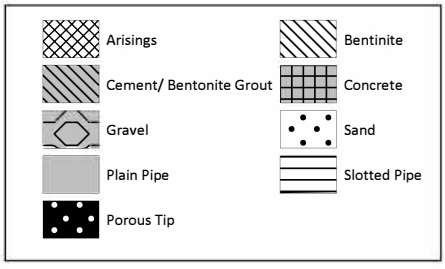
EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Logs

Soil and Rock Legend



Installation/ Backfill Legend



Sampling and In-Situ Testing

B: Bulk Sample

BLK: Block Sample

C: Chemical Sample

CBR: CBR Mould Sample

CS: Core Sub-Sample

D: Disturbed Sample

P: Piston Sample

S: SPT Split Spoon Sample

U: Undisturbed Sample

UT: Undisturbed Thinwall Sample

W: Water Sample

X: Dynamic Sample

BHVP: Borehole Vane Peak Strength

BHVR: Borehole Vane Residual Strength

HVP: Hand Vane Peak Strength

HVR: Hand Vane Residual Strength

Kch: Constant Head Permeability Test

Kfh: Falling Head Permeability Test

Kpf: Packer Free-Flow Permeability Test

Kpi: Packer Injection Permeability Test

Krh: Rising Head Permeability Test

PLTa: Point Load Test- Axial

PLTd: Point Load Test- Diametral

PLTil: Point Load Test- Irregular Lump

PP: Pocket Penetrometer

PM: Pressuremeter Test

SPT: Standard Penetration Test (Split Spoon Sampler)

SPTC: Standard Penetration Test (Solid Cone)

Mechanical and Discontinuity Log

AZCL: Assumed Zone of Core Loss

CRF: Core Recovered From The Following Run

NI: Non-Intact

NM: Not Measured

NR: No Recovery

TCR: Total Core Recovery as percentage of Core Run

SCR: Solid Core Recovery as percentage of Core Run. Solid Core = At least 1 full core diameter

RQD: Rock Quality Designation as percentage of Core Run. Lengths of Solid Core greater than or equal to 100mm

IF: Fracture Spacing in mm. Minimumm, maximumm and typical spacings given

FI: Fracture Index- No.of fractures per m. Minimumm, maximum and typical given

Notes:

1. Unless indicated, the exploratory hole is vertical and all depths are measured along its axis from ground level.
2. Descriptions: BSEN ISO 14688-9 2002&2003, BS5930 2015. Weathering: EN ISO 14689-1.
3. Chalk is logged in general accordance with Lord et al (2002) CIRIA C574.
4. Description is based on qualitative field assessment except where noted.
5. Granular soils density = N Value. Bedding, banding, discontinuity spacing: measured. Rock strength: geological hammer.
6. Consistency of cohesive materials is based on qualitative field assessment.
7. Core loss assumed to be at top of core run unless strong indication as to where loss has occurred.
8. Drilling and handling induced discontinuities where discernible omitted from SCR,RQD and IF/ FI.
9. In-situ test values are uncorrected.
10. Pocket Penetrometer used is ELE-29-3729. Readings=Kg/cm2 range:0.5-4.5Kg/cm2. Or similar.
11. For deatils of other In-situ test equipment used see log.
12. Water levels are recorded during drilling or excavating and may not represent standing levels.
13. Where flush is used groundwater observations not possible other than significant strikes.
14. Unless stated otherwise core photography undertaken rig side. Core washed prior to photography from rock-head.

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

BH1

Start Date: **01/02/2023** Eastings: Drilled By: **Geofirma Ltd**

Finish Date: **01/02/2023** Northings: Drill Rig/ Team: **Dando 2000** Logged By: **E Smith**

Termination Depth (mBGL): **0.55** Elevation (mAD): Driller: **CB/ BW** Checked By: **J Wills**

Exploratory Hole Progress, Details with Depth and General Remarks

Hole Depth (mBGL)	Hole Diameter (mm)	Casing Depth (mBGL)	Casing Diameter (mm)	Depth to Water (mBGL)	Comments
0.00	PIT	NA	NA	NR	Hand-dug pit
0.55	PIT	NA	NA	NR	End of hole

Water Strikes

Depth of Strike (mBGL)	Depth of Casing (mBGL)	Date and Time	Post Strike Depth (mBGL)	Minutes After Strike	Sealed at (mBGL)	Remarks
						No groundwater encountered

Termination: Refusal from demolition debris. Location moved to BH1A.

Groundwater: None encountered

Sampling: None encountered

Backfill: Hole backfilled with arisings

Weather: Cold, sunny

Notes:

1. SPT Hammer SDA3
2. 1 hour chiselling recorded by driller

Cable Percussion BH Log

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

BH1

Start Date: **01/02/2023** | Eastings: | Drilled By: **Geofirma Ltd**

Finish Date: **01/02/2023** | Northings: | Drill Rig/ Team: **Dando 2000** | Logged By: **E Smith**

Termination Depth (mBGL): **0.55** | Elevation (mAD): | Driller: **CB/ BW** | Checked By: **J Wills**

Legend	Depth From/ To (mBGL)	Description	Depth and Thickness (mBGL) (m)	Sampling From/ To (mBGL)	Sampling Type	Sampling No.	Testing From/ To (mBGL)	Testing Type/ Result	Field Records	Backfill/ Installation
	0.00-0.30	MADE GROUND. Black very organic slightly clayey slightly gravelly medium sand with abundant rootlets	Thickness: 0.30							
	0.30-0.55		Thickness: 0.25							

Hand excavated pit

Refusal from demolition debris. Location moved to BH1A.

For explanation of abbreviations and legend refer to Key

Cable Percussion BH Log

GEOFIRMA
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31 Daleham Gardens, London, NW3 5BU

BH1A

StartDate:**02/02/2023**

Finish Date: **03/02/2023**

Termination Depth (mBGL): **25.45**

Eastings:

Northings:

Elevation:

Drilled By:**Geofirma Ltd**

Drill Rig/ Team: **Dando 2000**

Driller: **CB/ BW**

Logged By: **E Smith**

Checked By:**J Wills**

Exploratory Hole Progress, Details with Depth and General Remarks

Hole Depth (mBGL)	Hole Diameter (mm)	Casing Depth (mBGL)	Casing Diameter (mm)	Depth to Water (mBGL)	Comments
0.00	PIT	NA	NA	Dry	Hand-dug pit
1.50	150	NA	NA	Dry	SPT
2.50	150	NA	150	Dry	SPT
3.50	150	4.5	150	Dry	SPT
4.00	150	4.5	150	Dry	Undisturbed sampling
5.00	150	4.5	150	Dry	SPT
6.00	150	4.5	150	Dry	Undisturbed sampling
7.00	150	4.5	150	Dry	SPT
8.00	150	4.5	150	Dry	Undisturbed sampling
9.00	150	4.5	150	Dry	SPT
10.00	150	4.5	150	Dry	Undisturbed sampling
11.00	150	4.5	150	Dry	SPT
12.00	150	4.5	150	Dry	Undisturbed sampling
13.00	150	4.5	150	Dry	SPT
14.00	150	4.5	150	Dry	Undisturbed sampling
15.00	150	4.5	150	Dry	SPT
16.50	150	4.5	150	Dry	Undisturbed sampling
18.00	150	4.5	150	Dry	SPT
19.50	150	4.5	150	Dry	Undisturbed sampling
21.00	150	4.5	150	Dry	SPT

Water Strikes

Depth of Strike (mBGL)	Depth of Casing (mBGL)	Date and Time	Post Strike Depth (mBGL)	Minutes After Strike	Sealed at (mBGL)	Remarks
1.80	NR	NR	NR	NR	NR	Perched water

Termination: 25.45m bgl. Geofirma specification met.

Groundwater: Water strike at 1.8 m bgl when drilling, driller recorded as fast water flow. No water was was recorded next day 03/02/2023.

Sampling: 2No. B, 20No. D, 4No. ES, 12No. SPTD, 10No. U.

Backfill: Slotted standpipe installed on completion. Refer to installation column. log. Cold, sunny

Weather:

Notes:

GEOFIRMA
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31 Daleham Gardens, London, NW3 5BU

BH1A

Start Date: **02/02/2023** Eastings: Drilled By: **Geofirma Ltd**

Finish Date: **03/02/2023** Northings: Drill Rig/ Team: **Dando 2000** Logged By: **E Smith**

Termination Depth (mBGL): **25.45** Elevation (mAD): Driller: **CB/ BW** Checked By: **J Wills**

Legend	Depth From/ To (mBGL)	Description	Depth and Thickness (mBGL) (m)	Sampling From/ To (mBGL)	Sampling Type	Sampling No.	Testing From/ To (mBGL)	Testing Type/ Result	Field Records	Backfill/ Installation
	0.00-0.30	MADE GROUND Black slightly clayey slightly gravelly medium sand with abundant rootlets. Gravel is angular to rounded fine to coarse flint and brick. (TOPSOIL)	Thickness: 0.30							
	0.30-0.55		Thickness: 0.25	0.30	ES	1				
	0.55-1.00	MADE GROUND.Grey clayey sandy gravel (demo crush)	Thickness: 0.45	0.50	ES	2				
	1.00-3.60	MADE GROUND Grey and brown clayey sandy gravel of angular to subangular fine to coarse concrete brick and tile.	Thickness: 2.60	1.00	D	3				
		MADE GROUND Soft light orangeish brown slightly gravelly slightly sandy CLAY. Remolded Claygate with occasional inclUsion of demolition debris (brick and concrete). Gravel is angular to subangular fine to coarse brick and concrete.		1.50-1.95 1.50	SPT ES D	4 5	1.50-1.95	SPT N=10	1,3/3,1,3,3	
				2.00	D	6				
				2.50-2.95	SPT D	7	2.50-2.95	SPT N=4	1,1/1,1,1,1	
				3.00 3.00	D ES	8 9				
	3.60-6.50	CLAYGATE MEMBER Soft to firm greyish brown sandy CLAY. Sand is fine.	Thickness: 2.90	3.50-3.95	SPT D	10	3.50-3.95	SPT N=7	1,1/2,2,1,2	
				4.00 4.00-4.45 4.00-4.50	D U B	11 12 13	4.00-4.45	U No Recov	12 blows	
				5.00-5.45	SPT D	14	5.00-5.45	SPT N=10	2,1/1,4,2,3	
				5.50	D	15				
				6.00-6.45	U	16	6.00-6.45	U 90% Recov	12 blows	
	6.50-8.50	LONDON CLAY. Firm grey sandy CLAY. Micaeous inclusion present in sand. Sand is fine and sub angular.	Thickness: 2.00	6.50	D	17				
				7.00-7.45	SPT D	18	7.00-7.45	SPT N=15	2,2/3,4,4,4	
				7.50	D	19				
				8.00-8.45	U	20	8.00-8.45	U 50% Recov	24 blows	
	8.50-11.50	LONDON CLAY. Firm grey sandy CLAY. Micaeous inclusion present in sand. Sand is fine and sub angular.	Thickness: 3.00	8.50	D	21				
				9.00-9.45	SPT D	22	9.00-9.45	SPT N=18	3,2/3,5,5,5	
				9.50	D	23				

Hand excavated pit to 1.20m then hole advanced using cable percussive tools. Standpipe installed to 10 m bgl with slotted zone between 6 m bgl and 10 m bgl. Water strike at 1.8 m bgl when drilling, driller recorded as fast water flow. No water was was recorded next day 03/02/2023.

For explanation of abbreviations and legend refer to Key

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

BH1A

Start Date: **02/02/2023** Eastings: Drilled By: **Geofirma Ltd**

Finish Date: **03/02/2023** Northings: Drill Rig/ Team: **Dando 2000** Logged By: **E Smith**

Termination Depth (mBGL): **25.45** Elevation (mAD): Driller: **CB/ BW** Checked By: **J Wills**

Legend	Depth From/ To (mBGL)	Description	Depth and Thickness (mBGL) (m)	Sampling From/ To (mBGL)	Sampling Type	Sampling No.	Testing From/ To (mBGL)	Testing Type/ Result	Field Records	Backfill/ Installation
		LONDON CLAY Firm grey sandy CLAY. Micaeous inclusion present in sand. Sand is fine with sub angular particles.		10.00-10.45	U	24	10.00-10.45	U 100% Recov	31 blows	
				10.50	D	25				
			11	11.00-11.45	SPT D	26	11.00-11.45	SPT N=23	3,4/5,6,6,6	
	11.50-25.15	LONDON CLAY Stiff grey slightly sandy micaceous fissured CLAY. Fissures are randomly orientated widely spaced smooth, undulating and clean. Micaceous inclusion present on firssured surfaces.	Thickness: 13.65	11.50	D	27				
			12	12.00-12.45	U	28	12.00-12.45	U 100% Recov	34 blows	
				12.50	D	29				
			13	13.00-13.45	SPT D	30	13.00-13.45	SPT N=18	3,4/3,5,4,6	
				13.50	D	31				
			14	14.00-14.45	U	32	14.00-14.45	U 100% Recov	54 blows	
				14.50	D	33				
			15	15.00-15.45	SPT D	34	15.00-15.45	SPT N=24	3,4/5,6,5,8	
				15.50	D	35				
			16							
				16.50-16.95	U	36	16.50-16.95	U Recov NR	64 blows	
				16.50-17.00	B	37				
			17							
			18	18.00-18.45	SPT D	38	18.00-18.45	SPT N=25	4,4/6,5,7,7	
				18.50	D	39				
			19							
				19.50-19.95	U	40	19.50-19.95	U 80% Recov	74 blows	
			20							

Hand excavated pit to 1.20m bgl then hole advanced using cable percussive tools. Standpipe installed to 10 m bgl with slotted zone between 6 m bgl and 10 m bgl. Water strike at 1.8 m bgl when drilling,driller recorded as fast water flow. No water was was recorded next day 03/02/2023.

For explanation of abbreviations and legend refer to Key

Cable Percussion BH Log

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

BH1A

Start Date: **02/02/2023** Eastings: Drilled By: **Geofirma Ltd**

Finish Date: **03/02/2023** Northings: Drill Rig/ Team: **Dando 2000** Logged By: **E Smith**

Termination Depth (mBGL): **25.45** Elevation (mAD): Driller: **CB/ BW** Checked By: **J Wills**

Legend	Depth From/ To (mBGL)	Description	Depth and Thickness (mBGL) (m)	Sampling From/ To (mBGL)	Sampling Type	Sampling No.	Testing From/ To (mBGL)	Testing Type/ Result	Field Records	Backfill/ Installation
		LONDON CLAY Stiff grey slightly sandy micaceous fissured CLAY. Fissures are randomly orientated widely spaced smooth, undulating and clean. Micaceous inclusion on present on firssured surfaces.		20.00	D	41				
			21	21.00-21.45	SPT D	42	21.00-21.45	SPT N=31	4,5/7,8,8,8	
				21.50	D	43				
			22							
				22.50-22.95	U	44	22.50-22.95	U 100% Recov	76 blows	
			23	23.00	D	45				
			24	24.00-24.45	SPT D	46	24.00-24.45	SPT N=34	4,5/7,8,9,10	
				24.50	D	47				
			25	25.00-25.45	U	48	25.00-25.45	U 100% Recov	70 blows	
	25.15-25.45	LONDON CLAY. Claystone band	Thickness: 0.30							

Hand excavated pit to 1.20m then hole advanced using cable percussive tools. Standpipe installed to 10 m bgl with slotted zone between 6 m bgl and 10 m bgl. . Water strike at 1.8 m bgl when drilling,driller recorded as fast water flow. No water was was recorded next day 03/02/2023.

For explanation of abbreviations and legend refer to Key

Cable Percussion BH Log

GEOFIRMA
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31 Daleham Gardens, London, NW3 5BU

BH2

Start Date: **01/02/2023**
Eastings:
Drilled By: **Geofirma Ltd**

Finish Date: **01/02/2023**
Northings:
Drill Rig/ Team: **Dando 2000**
Logged By: **E Smith**

Termination Depth (mBGL): **15.50**
Elevation (mAD):
Driller: **CB/ BW**
Checked By: **J Wills**

Exploratory Hole Progress, Details with Depth and General Remarks

Hole Depth (mBGL)	Hole Diameter (mm)	Casing Depth (mBGL)	Casing Diameter (mm)	Depth to Water (mBGL)	Comments
0.00	PIT	NA	NA	Dry	Hand-dug pit
1.00	150	NA	NA	Dry	SPT
1.50	150	NA	NA	Dry	Undisturbed sampling
2.50	150	NA	NA	Dry	SPT
3.50	150	2.50	150	Dry	Undisturbed sampling
4.50	150	2.50	150	Dry	SPT
5.00	150	2.50	150	Dry	Undisturbed sampling
6.00	150	2.50	150	Dry	SPT
7.00	150	2.50	150	Dry	Undisturbed sampling
8.00	150	2.50	150	Dry	SPT
9.00	150	2.50	150	Dry	Undisturbed sampling
10.00	150	2.50	150	Dry	SPT
11.00	150	2.50	150	Dry	Undisturbed sampling
12.00	150	2.50	150	Dry	SPT
13.00	150	2.50	150	Dry	Undisturbed sampling
14.00	150	2.50	150	Dry	SPT
15.00	150	2.50	150	Dry	Undisturbed sampling then end of hole @15.45m

Water Strikes

Depth of Strike (mBGL)	Depth of Casing (mBGL)	Date and Time	Post Strike Depth (mBGL)	Minutes After Strike	Sealed at (mBGL)	Remarks
						No groundwater encountered

Termination: 15.50m bgl. Geofirma specification met.

Groundwater: None encountered

Sampling: 0No. B, 16No. D, 3No. ES, 8No. SPTD, 8No. U.

Backfill: Slotted standpipe installed on completion. Refer to installation column on log.

Weather: Cold, sunny

Notes:

Cable Percussion BH Log

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

BH2

Start Date: **01/02/2023** Eastings: Drilled By: **Geofirma Ltd**

Finish Date: **01/02/2023** Northings: Drill Rig/ Team: **Dando 2000** Logged By: **E Smith**

Termination Depth (mBGL): **15.50** Elevation (mAD): Driller: **CB/ BW** Checked By: **J Wills**

Legend	Depth From/ To (mBGL)	Description	Depth and Thickness (mBGL) (m)	Sampling From/ To (mBGL)	Sampling Type	Sampling No.	Testing From/ To (mBGL)	Testing Type/ Result	Field Records	Backfill/ Installation
	0.00-0.30	MADE GROUND Soft dark brown slightly gravelly sandy CLAY. Gravel is angular to rounded fine to coarse flint and brick. (TOPSOIL)	Thickness: 0.30	0.20	ES	1				
	0.30-0.90	MADE GROUND Soft brown slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse flint and brick	Thickness: 0.60	0.50	ES	2				
	0.90-2.00	CLAYGATE MEMBER Soft light orangeish brown mottled grey slightly sandy CLAY. Sand is fine to medium.	Thickness: 1.10	1.00 1.00 1.00-1.45 1.50-1.95	D ES SPT D U	3 4 5 6	1.00-1.45 1.50-1.95	SPT N=12 U 100% Recov	1,1/3,2,3,4 30 blows	
	2.00-3.00	CLAYGATE MEMBER Brown orangeish mottled grey clayey medium SAND	Thickness: 1.00	2 2.50-2.95	D SPT D	7 8	2.50-2.95	SPT N=17	2,3/4,4,4,5	
	3.00-5.50	WEATHERED/REWORKED LONDON CLAY. Soft to firm light orange brown mottled grey slightly gravelly sandy CLAY. Sand is fine.	Thickness: 2.50	3.00 3.50-3.95 4.00 4.50-4.95 5.00 5.00-5.45	D U D SPT D D U	9 10 11 12 13 14	3.50-3.95 4.50-4.95 5.00-5.45	U 100% Recov SPT N=10 U 100% Recov	34 blows 2,1/2,3,2,3 28 blows	
	5.50-8.00	LONDON CLAY Firm grey CLAY with sand inclusions. Sand is fine to medium.	Thickness: 2.50	5.50 6.00-6.45 6.50 7.00-7.45 7.50	D SPT D D U D	15 16 17 18 19	6.00-6.45 7.00-7.45	SPT N=11 U 100% Recov	1,2/3,2,3,3 35 blows	
	8.00-12.00	LONDON CLAY Firm becoming stiff fissured grey sandy CLAY. Sand is fine	Thickness: 4.00	8.00-8.45 8.50 9.00-9.45 9.50	SPT D D U D	20 21 22 23	8.00-8.45 9.00-9.45	SPT N=17 U 60% Recov	3,3/3,4,5,5 20 blows	

Hand excavated pit to 1.20m then hole advanced using cable percussive tools. Standpipe installed to 6 m bgl with slotted zone between 2 m bgl and 6 m bgl.

For explanation of abbreviations and legend refer to Key

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

BH2

Start Date: **01/02/2023** Eastings: Drilled By: **Geofirma Ltd**

Finish Date: **01/02/2023** Northings: Drill Rig/ Team: **Dando 2000** Logged By: **E Smith**

Termination Depth (mBGL): **15.50** Elevation (mAD): Driller: **CB/ BW** Checked By: **J Wills**

Legend	Depth From/ To (mBGL)	Description	Depth and Thickness (mBGL) (m)	Sampling From/ To (mBGL)	Sampling Type	Sampling No.	Testing From/ To (mBGL)	Testing Type/ Result	Field Records	Backfill/ Installation
		LONDON CLAY.Firm becoming stiff fissured grey sandy CLAY. Sand is fine		10.00-10.45	SPT D	24	10.00-10.45	SPT N=20	3,3/4,5,5,6	
				10.50	D	25				
			11	11.00-11.45	U	26	11.00-11.45	U 100% Recov	42 blows	
				11.50	D	27				
	12.00-15.50	LONDON CLAY. Stiff slightly sandy fissured CLAY. Fissures are randomly orientated widely spaced smooth, undulating and clean. Micaeous inclusion present on fissured surfaces	12 Thickness: 3.50	12.00-12.45	SPT D	28	12.00-12.45	SPT N=26	2,5/4,6,8,8	
				12.50	D	29				
			13	13.00-13.45	U	30	13.00-13.45	U 100% Recov	56 blows	
				13.50	D	31				
			14	14.00-14.45	SPT D	32	14.00-14.45	SPT N=40	4,3/5,7,9,19	
				14.50	D	33				
			15	15.00-15.45	U	34	15.00-15.45	U 100% Recov	61 blows	

Hand excavated pit to 1.20m then hole advanced using cable percussive tools. Standpipe installed to 6 m bgl with slotted zone between 4 m bgl and 6 m bgl.

For explanation of abbreviations and legend refer to Key

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31 Daleham Gardens, London, NW3 5BU

Trial Pit Log

TP1

Start Date: **01/02/2023** Eastings: Elevation (mAD): Termination Depth (mBGL): **3.50** Logged By: **E Smith**

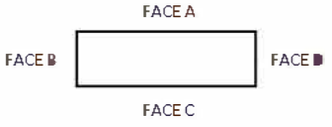
Finish Date: **01/02/2023** Northings: Excavation Contractor: Checked By: **J Wills**

Legend	Depth (mBGL)	Reduced Level/ Thickness (m AOD/m)	Strata Description	Depth (mAD)	Sample	Test
	0.00-0.30	Thickness: 0.30	MADE GROUND Black very organic slightly clayey slightly gravelly medium SAND with abundant rootlets. Gravels are angular with low sphericity.	0.00-0.30	ES	
	0.30-0.55	Thickness: 0.25	MADE GROUND Grey clayey medium sandy gravel (demolition crush). Gravels and demolition crush are angular with low sphericity.	0.30-0.55	ES	
	0.55-3.50	Thickness: 2.95	CLAYGATE MEMBER Soft to firm brown slightly gravelly medium sandy CLAY. Gravel is rounded fine to coarse flint	0.55-3.50	ES	

Method: Not Recorded
Support: None
Stability: Not Recorded
Man Entry:
Ease of Excavation: Not Recorded
Variability: **All sides similar. Logged on excavated materials.**

Notes:

Termination: Reached specified depth. Trial pit depth specified by Geofirma Ltd.
Groundwater: No groundwater
Photographs:
No. of Samples: 3no. ES
Backfill: Arisings
Plan Dimensions:
Not Recorded
Strike of Face A:



For explanation of abbreviations and legend refer to Key

TP1

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

TP1 - Spoil

		GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project Title	31 Daleham Gardens, London NW3 5BU	
Project No	2023/002/SIM/DAL	

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

31 Daleham Gardens, London, NW3 5BU

Trial Pit Log

TP3

Start Date: **01/02/2023** Eastings: Elevation (mAD): Termination Depth (mBGL): **3.50** Logged By: **E Smith**

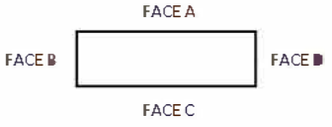
Finish Date: **01/02/2023** Northings: Excavation Contractor: Checked By: **J Wills**

Legend	Depth (mBGL)	Reduced Level/ Thickness (m AOD/m)	Strata Description	Depth (mAD)	Sample	Test
	0.00-0.20	Thickness: 0.20	MADE GROUND Soft dark brown slightly gravelly sandy clay. Gravel is angular to rounded fine to coarse flint and brick. (TOPSOIL)	0.00-0.20	ES	
	0.20-3.50	Thickness: 3.30	CLAYGATE MEMBER Soft to firm brown slightly gravelly sandy CLAY. Gravel is rounded fine to coarse flint	0.20-3.50		

Method: Not Recorded
Support: None
Stability: Not Recorded
Man Entry:
Ease of Excavation: Not Recorded
Variability: **All sides similar. Logged on excavated materials.**

Notes:

Termination: Reached specified depth. Trial pit depth specified by Geofirma Ltd.
Groundwater: No groundwater
Photographs:
No. of Samples: 1no. ES
Backfill: Arisings
Plan Dimensions:
Not Recorded
Strike of Face A:



For explanation of abbreviations and legend refer to Key

TP3

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

TP3 - Spoil

Project Title	31 Daleham Gardens, London NW3 5BU
Project No	2023/002/SIM/DAL

GEOFIRMA LTD
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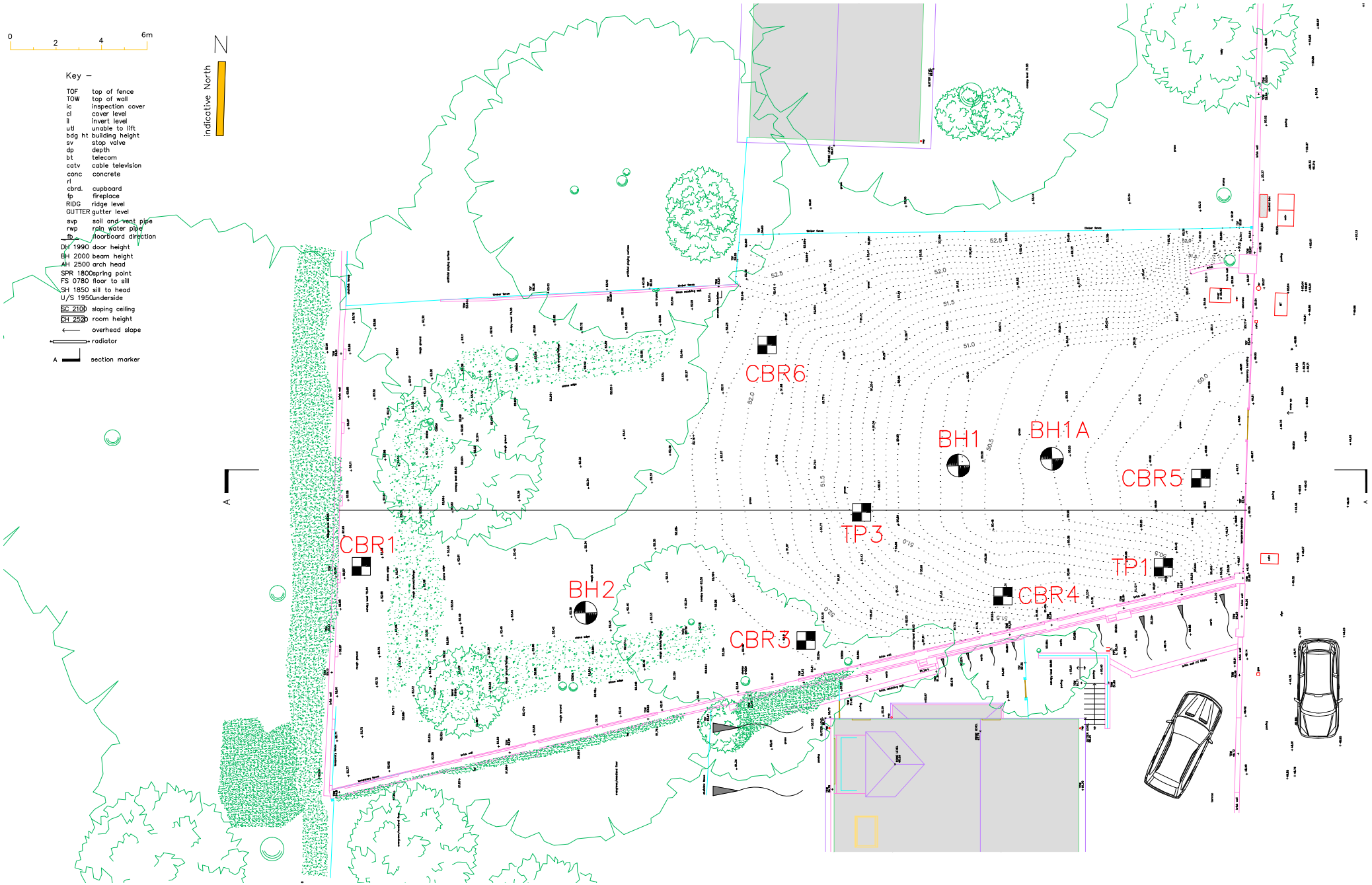
APPENDIX B –

EXPLORATORY HOLE LOCATION PLAN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2
4
6m
N
indicative North
Key –
TOF top of fence
TOW top of wall
ic inspection cover
cl cover level
il invert level
utl unable to lift
bdg ht building height
sv stop valve
dp depth
bt telecom
catv cable television
conc concrete
rl
cbrd. cupboard
fp fireplace
RIDG ridge level
GUTTER gutter level
svp soil and vent pipe
rwp rain water pipe
fb floorboard direction
DH 1990 door height
BH 2000 beam height
AH 2500 arch head
SPR 1800spring point
FS 0780 floor to sill
SH 1850 sill to head
U/S 1950underside
SC 2100 sloping ceiling
CH 2520 room height
overhead slope
radiator
section marker
CBR6
BH1
BH1A
CBR5
TP3
CBR1
TP1
BH2
CBR4
CBR3
A
A

APPENDIX C –

GEOTECHNICAL LABORATORY TEST RESULTS

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test type.

Job No.	Project Name	Programme	
32976	31 Daleham Gardens	Samples received	03/02/2023
		Schedule received	08/02/2023
Project No.	Client	Project started	09/02/2023
2023-002-SIM-DAL	Geofirma	Testing Started	15/02/2023

Hole No.	Sample Ref	Sample Top m	Sample Base m	Sample Type	Soil Description	Test Type	Density bulk Mg/m3	Density dry Mg/m3	w %	Length mm	Diameter mm	σ3 kPa	At failure Axial strain %	At failure σ1 - σ3 kPa	At failure cu kPa	At failure Mode	Remarks
BH1A	-	10.00	10.45	U	High strength dark grey silty CLAY	UU	1.96	1.51	29	198	102	170	6.6	221	110	B	
BH1A	-	14.00	14.45	U	High strength dark grey silty CLAY with occasional pockets of sand and rare decomposed shell fragments	UU	2.03	1.58	28	198	102	250	5.1	226	113	B	
BH1A	-	19.50	19.94	U	High strength dark grey silty CLAY	UU	1.97	1.54	28	198	102	300	4.5	266	133	B	
BH1A	-	22.50	22.95	U	Dark grey silty CLAY with pockets of black slightly sandy peat with occasional wood fragments becoming @ 22.65 m very high strength dark grey silty CLAY	UU	2.02	1.57	29	198	102	330	6.1	355	177	B	Test carried out on silty CLAY section from 22.65m onwards
BH2	-	3.50	3.95	U	Medium strength brown mottled orangish brown sandy silty CLAY with occasional fmc sandstone fragments	UU	1.89	1.48	28	198	102	50	5.6	117	59	B	
BH2	-	5.00	5.45	U	Medium strength dark grey slightly mottled brown slightly fine sandy silty CLAY	UU	1.96	1.53	28	198	102	70	16	101	51	C	
BH2	-	11.00	11.45	U	High strength dark grey silty CLAY	UU	2.01	1.57	28	198	102	170	14	240	120	C	
BH2	-	15.00	15.45	U	High strength dark grey silty CLAY	UU	2.00	1.54	30	198	102	210	5.6	254	127	B	

Legend
UU - single stage test (single and multiple specimens) σ3 Cell pressure Mode of failure ; B - Brittle
UUM - Multistage test on a single specimen σ1 - σ3 Maximum corrected deviator stress P - Plastic
suffix R - remoulded or recompacted cu Undrained shear strength, ½ (σ1 - σ3) C - Compound

Test Report by K4 SOILS LABORATORY
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Checked and Approved

Initials: J.P

Date: 24/02/2023

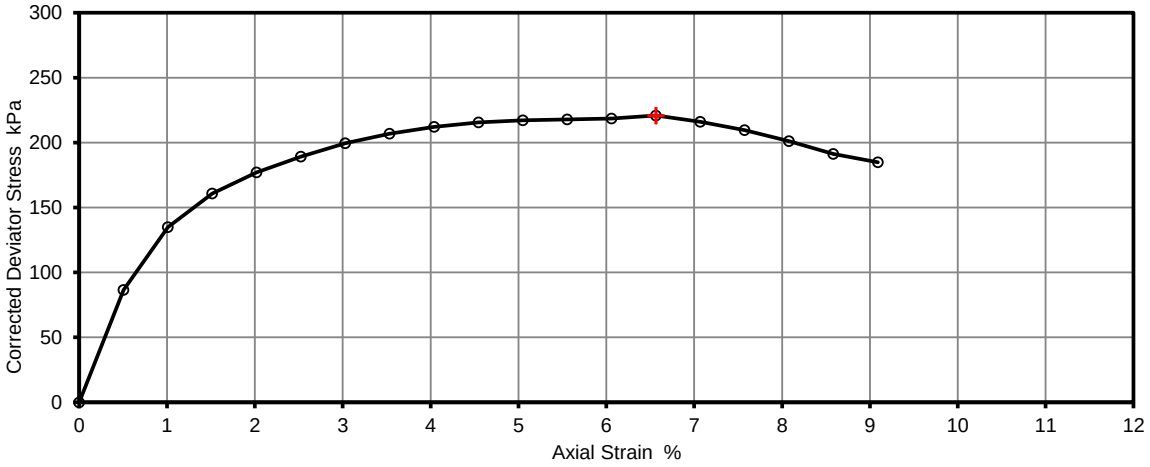
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	10.00 m
Soil Description	High strength dark grey silty CLAY			Depth Base	10.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

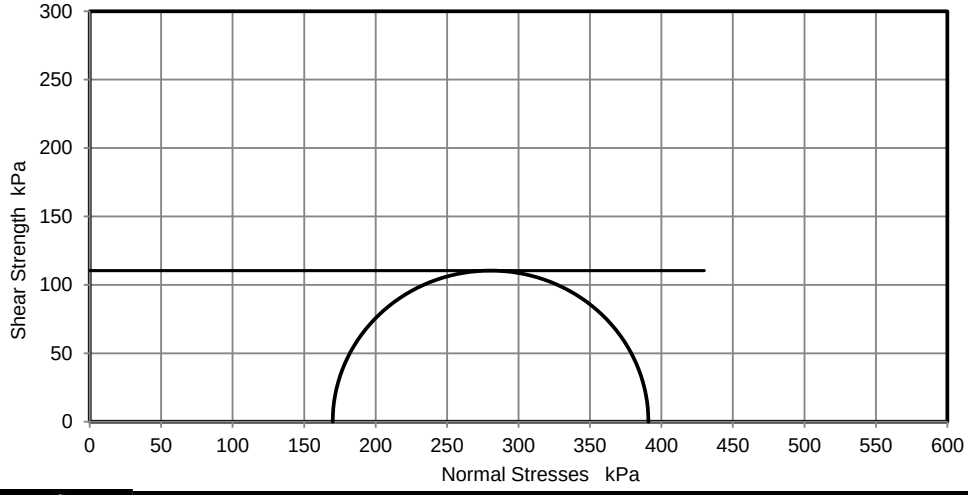
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.96	Mg/m3
Moisture Content	29	%
Dry Density	1.51	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	170	kPa
Axial Strain	6.6	%
Deviator Stress, (σ1 - σ3)f	221	kPa
Undrained Shear Strength, cu	110	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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.

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Date 24/02/2023

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

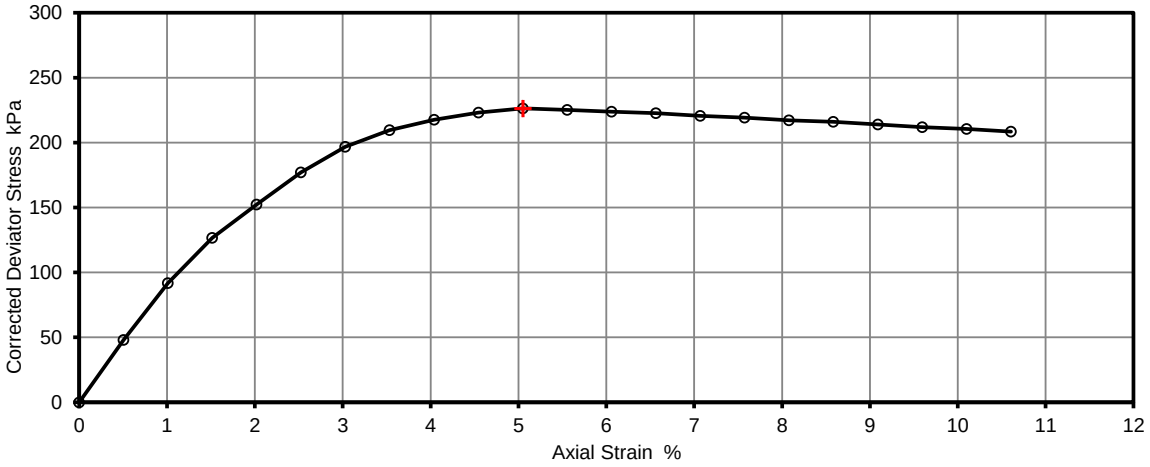
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	14.00 m
Soil Description	High strength dark grey silty CLAY with occasional pockets of sand and rare decomposed shell fragments			Depth Base	14.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

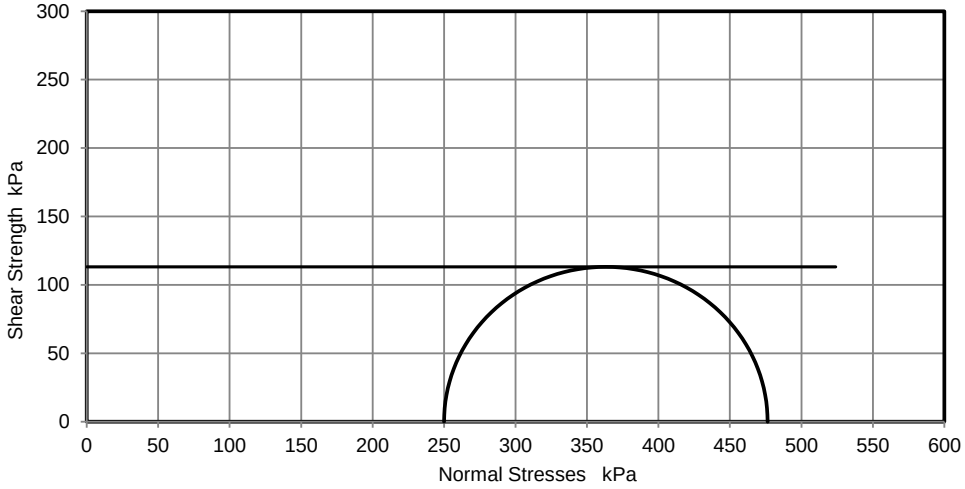
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.03	Mg/m3
Moisture Content	28	%
Dry Density	1.58	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	250	kPa
Axial Strain	5.1	%
Deviator Stress, (σ1 - σ3)f	226	kPa
Undrained Shear Strength, cu	113	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

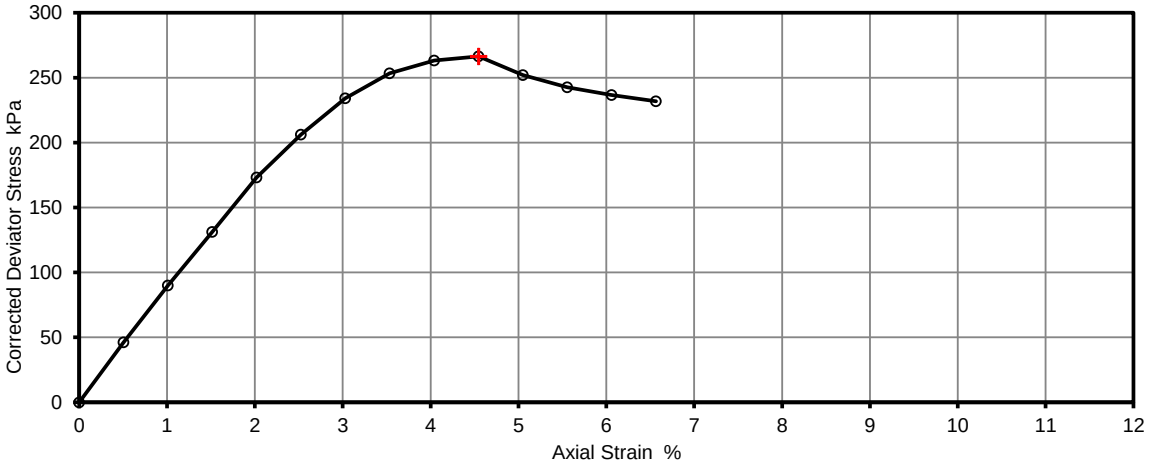
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	19.50 m
Soil Description	High strength dark grey silty CLAY			Depth Base	19.94 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

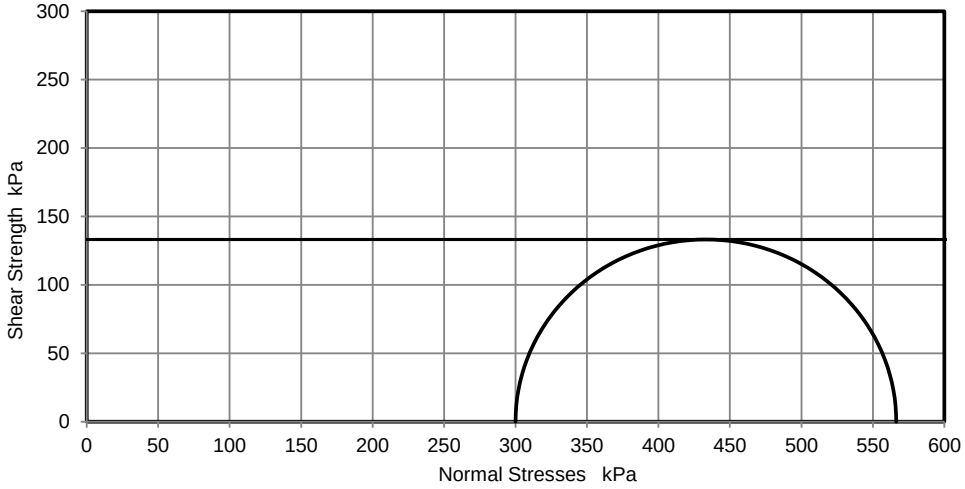
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.97	Mg/m3
Moisture Content	28	%
Dry Density	1.54	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	300	kPa
Axial Strain	4.5	%
Deviator Stress, (σ1 - σ3)f	266	kPa
Undrained Shear Strength, cu	133	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	22.50 m
Soil Description	Dark grey silty CLAY with pockets of black slightly sandy peat with occasional wood fragments becoming @ 22.65 m very high strength dark grey silty CLAY			Depth Base	22.95 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

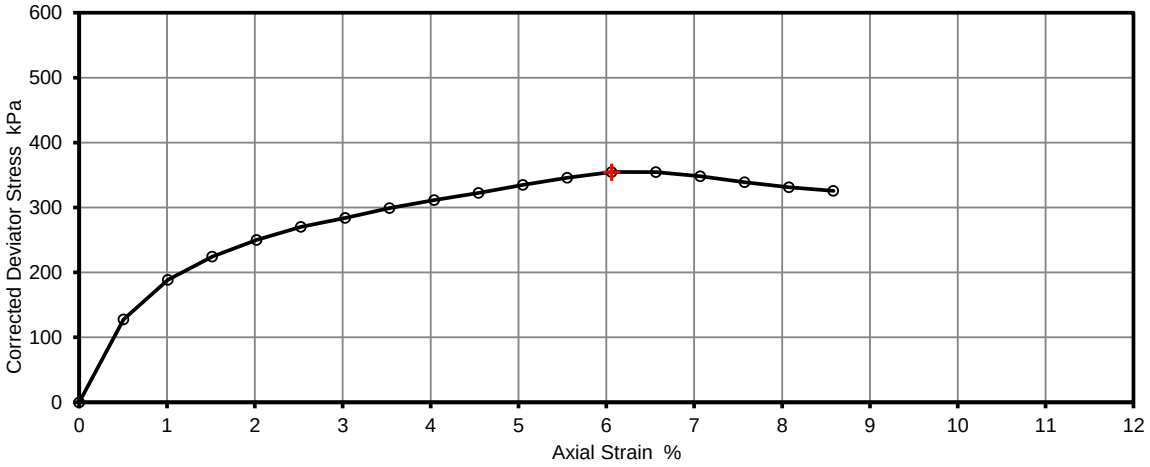
Remarks

Test carried out on silty CLAY section from 22.65m onwards

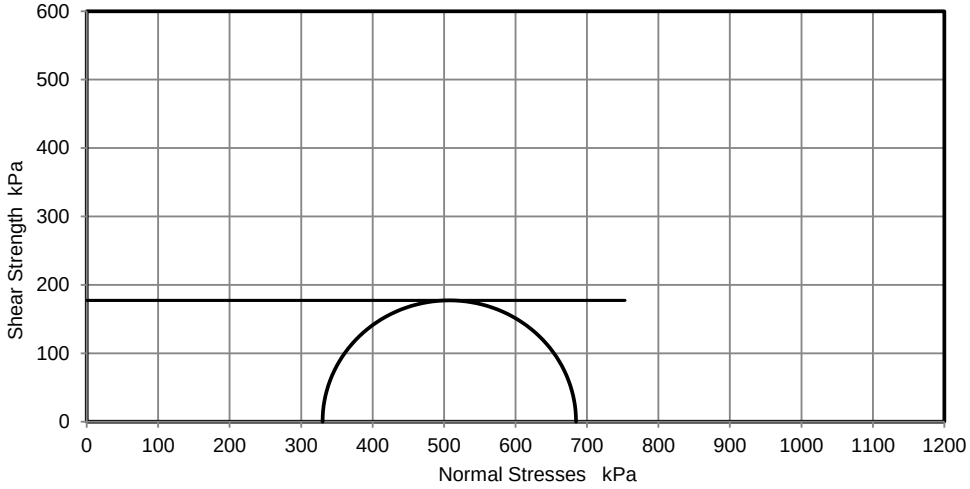
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.02	Mg/m3
Moisture Content	28	%
Dry Density	1.57	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	330	kPa
Axial Strain	6.1	%
Deviator Stress, (σ1 - σ3)f	355	kPa
Undrained Shear Strength, cu	177	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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UKAS TESTING 2519

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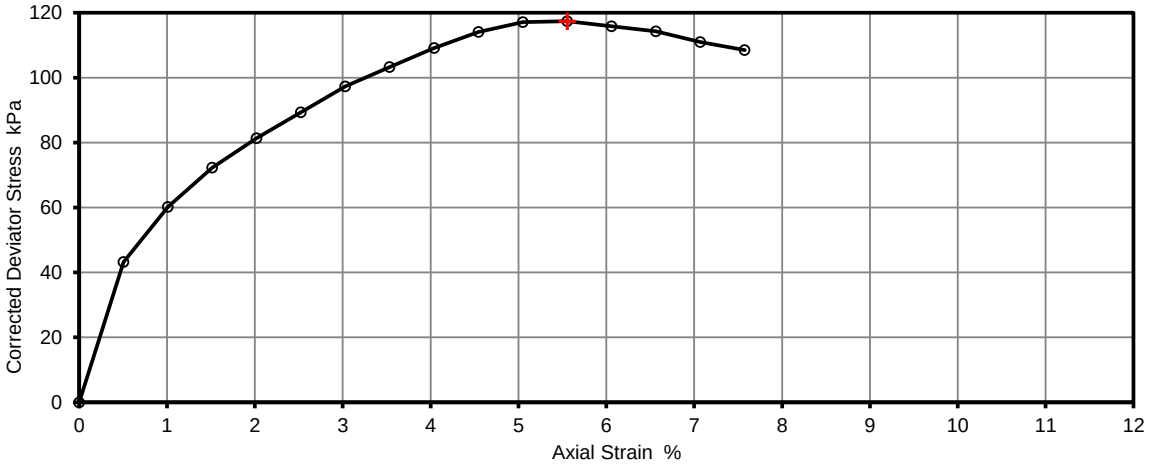
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH2
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	3.50 m
Soil Description	Medium strength brown mottled orangish brown sandy silty CLAY with occasional fmc sandstone fragments			Depth Base	3.95 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

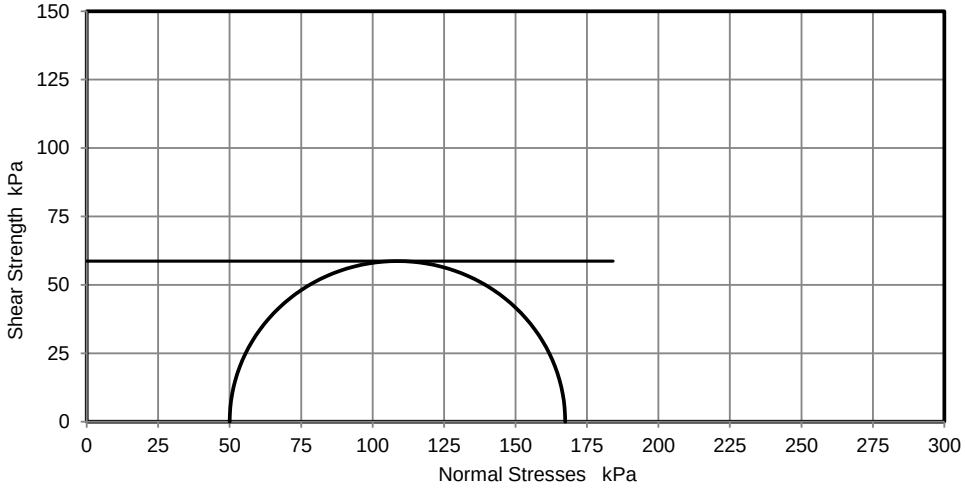
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.89	Mg/m3
Moisture Content	28	%
Dry Density	1.48	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	50	kPa
Axial Strain	5.6	%
Deviator Stress, (σ1 - σ3)f	117	kPa
Undrained Shear Strength, cu	59	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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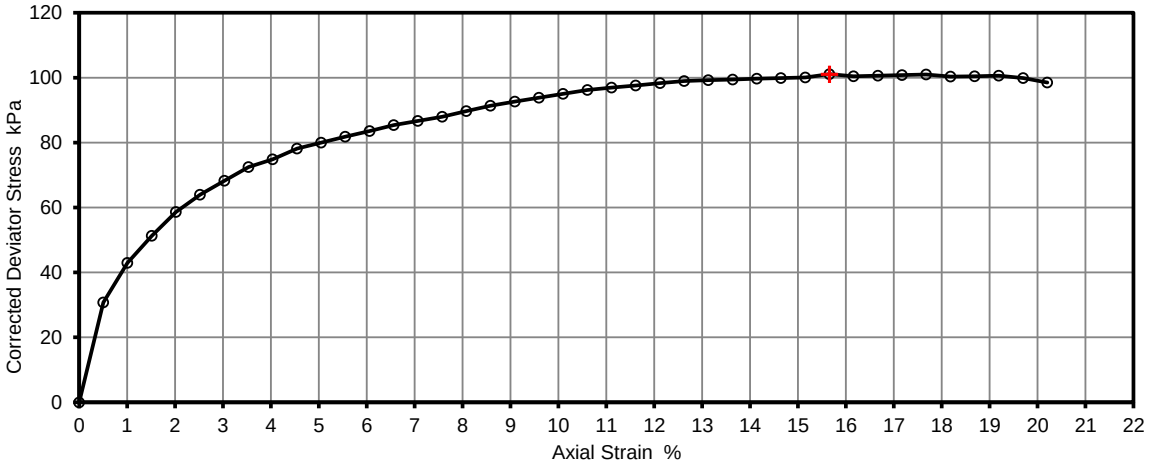
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH2
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	5.00 m
Soil Description	Medium strength dark grey slightly mottled brown slightly fine sandy silty CLAY			Depth Base	5.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

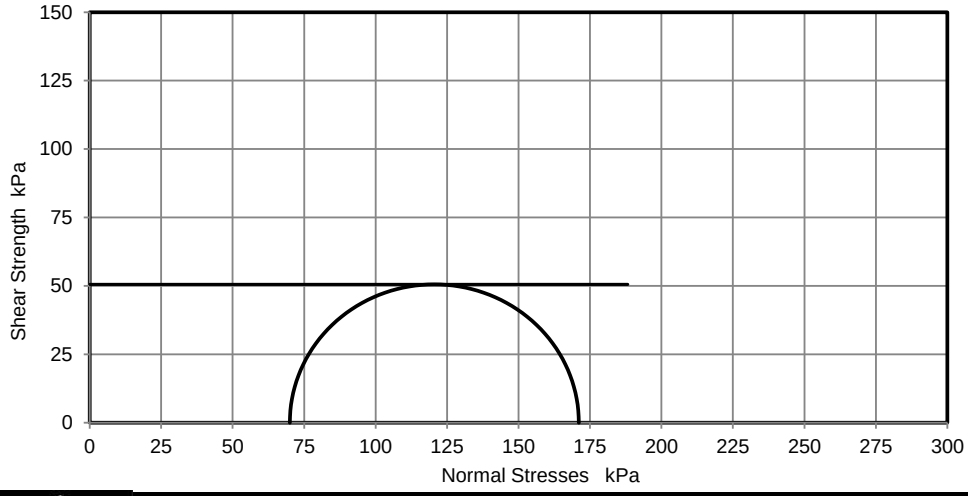
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.96	Mg/m3
Moisture Content	28	%
Dry Density	1.53	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	70	kPa
Axial Strain	16	%
Deviator Stress, (σ1 - σ3)f	101	kPa
Undrained Shear Strength, cu	51	kPa ½(σ1 - σ3)f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

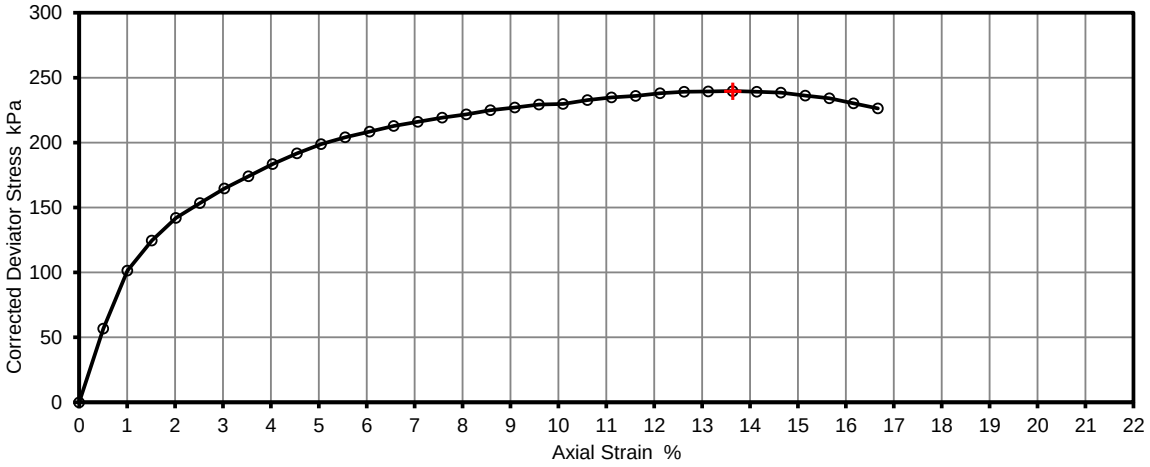
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH2
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	11.00 m
Soil Description	High strength dark grey silty CLAY			Depth Base	11.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

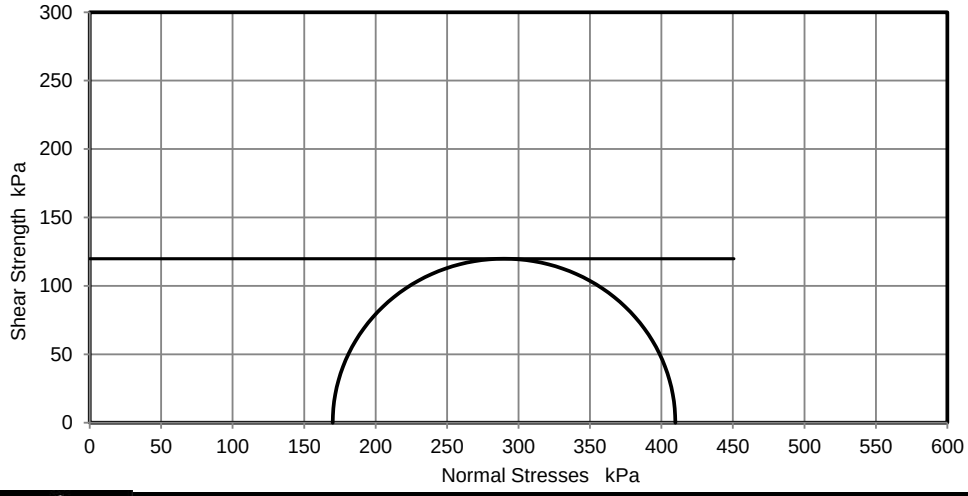
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.01	Mg/m3
Moisture Content	28	%
Dry Density	1.57	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	170	kPa
Axial Strain	14	%
Deviator Stress, (σ1 - σ3)f	240	kPa
Undrained Shear Strength, cu	120	kPa ½(σ1 - σ3)f
Mode of Failure	Compound	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

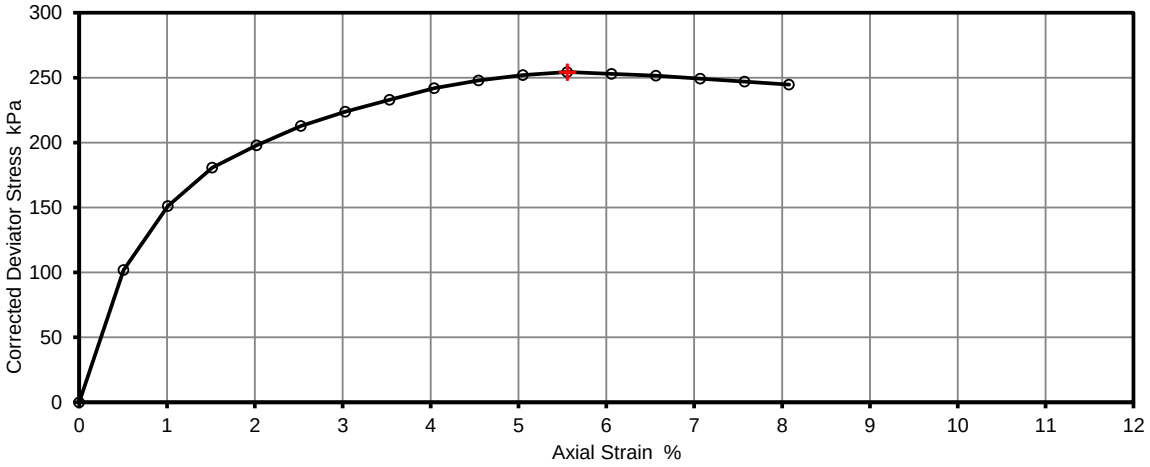
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	32976
				Borehole/Pit No.	BH2
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	15.00 m
Soil Description	High strength dark grey silty CLAY			Depth Base	15.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	15/02/2023

Remarks

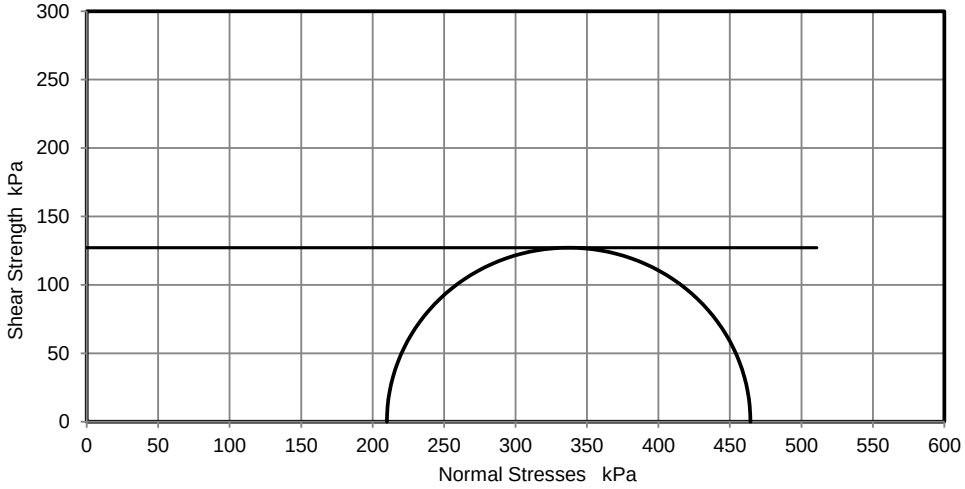
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m3
Moisture Content	30	%
Dry Density	1.54	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	210	kPa
Axial Strain	5.6	%
Deviator Stress, (σ1 - σ3)f	254	kPa
Undrained Shear Strength, cu	127	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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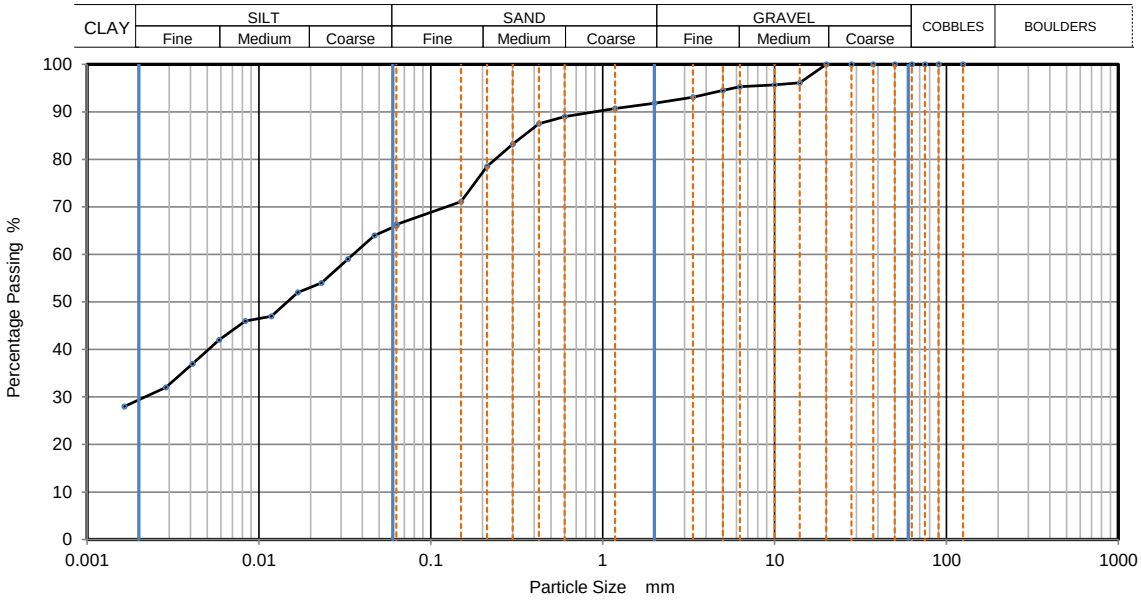
Date 24/02/2023

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

Job Ref	32976				
Borehole/Pit No.	BH1A				
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	2.00 m
Soil Description	Brown slightly gravelly slightly sandy silty CLAY with occasional fine carbonaceous deposits (gravel is fm concrete and pottery fragments)			Depth Base	- m
				Sample Type	D
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	09/02/2023
				Date tested	16/02/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	66
90	100	0.0469	64
75	100	0.0329	59
63	100	0.0231	54
50	100	0.0168	52
37.5	100	0.0118	47
28	100	0.0083	46
20	100	0.0058	42
14	96	0.0041	37
10	96	0.0029	32
6.3	95	0.0016	28
5	95		
3.35	93		
2	92		
1.18	91		
0.6	89	Particle density (assumed)	
0.425	88	2.70	Mg/m3
0.3	83		
0.212	79		
0.15	71		
0.063	66		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	8.2
Sand	25.4
Silt	37.3
Clay	29.1

Grading Analysis		
D100	mm	
D60	mm	0.0353
D30	mm	0.00224
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

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Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: **J.P**

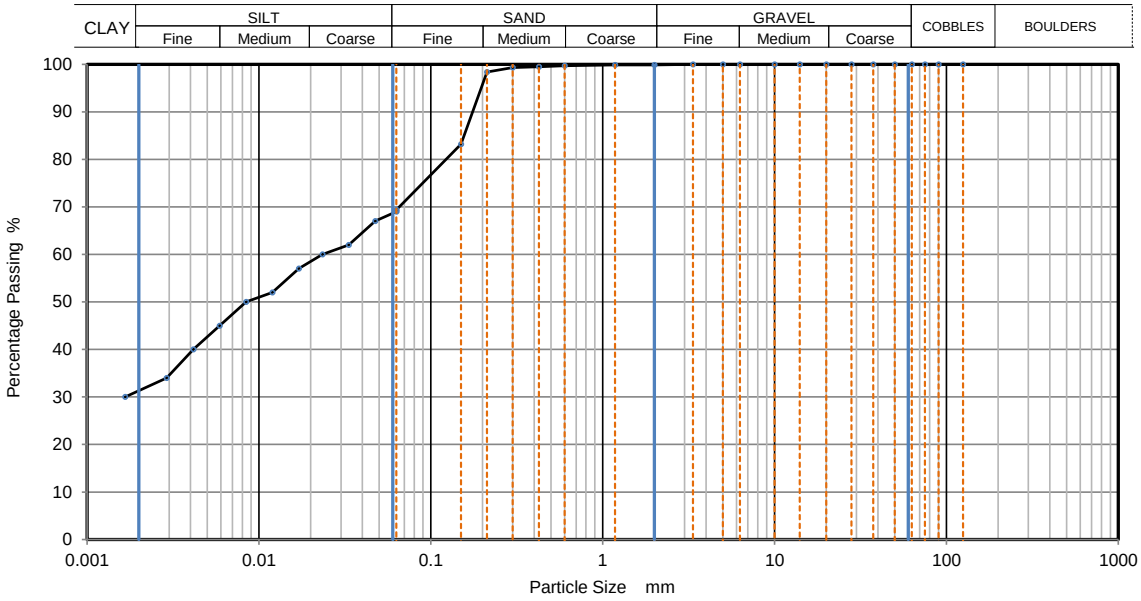
Date: 24/02/2023

2519 Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr) MSF-5-R3

PARTICLE SIZE DISTRIBUTION

				Job Ref	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	6.00 m
Soil Description	Dark grey slightly fine sandy silty CLAY with rare decomposed shell fragments			Depth Base	6.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	09/02/2023
				Date tested	17/02/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	69
90	100	0.0474	67
75	100	0.0333	62
63	100	0.0234	60
50	100	0.0170	57
37.5	100	0.0120	52
28	100	0.0084	50
20	100	0.0059	45
14	100	0.0041	40
10	100	0.0029	34
6.3	100	0.0017	30
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed)	
0.425	100	2.70 Mg/m3	
0.3	99		
0.212	98		
0.15	83		
0.063	69		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	30.5
Silt	38.2
Clay	31.2

Grading Analysis		
D100	mm	
D60	mm	0.025
D30	mm	0.00175
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: **J.P**

Date: 24/02/2023

UKAS TESTING

2519

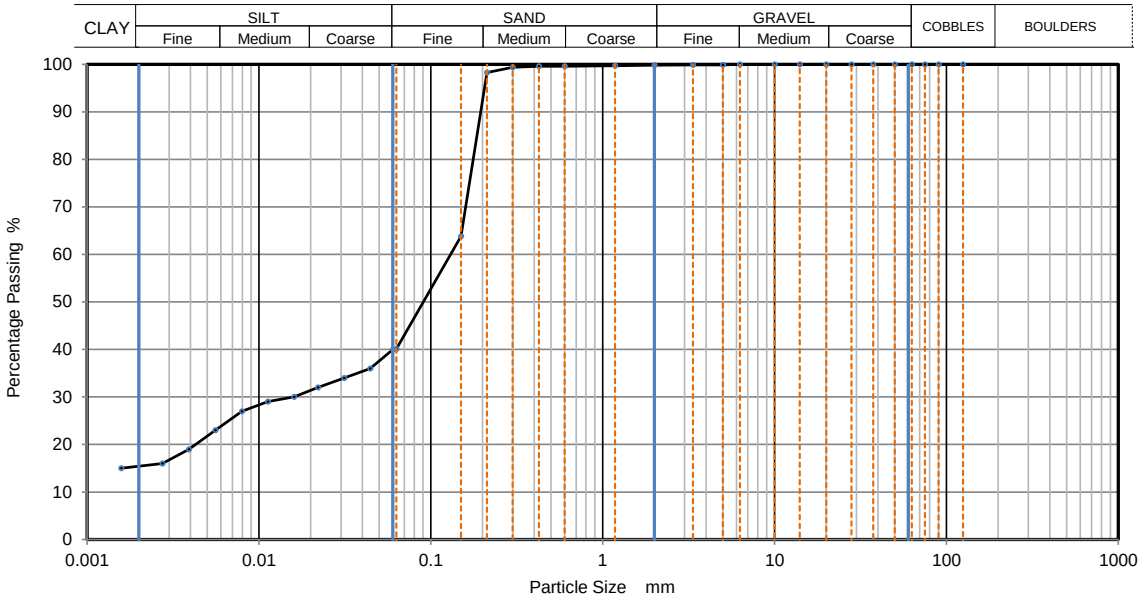
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3

PARTICLE SIZE DISTRIBUTION

Job Ref	32976				
Borehole/Pit No.	BH2				
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	1.50 m
Soil Description	Brown, light grey and orangish brown fine sandy silty CLAY with rare intrusion of black possiby carbonaceous deposit			Depth Base	1.95 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	09/02/2023
				Date tested	17/02/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0603	40
90	100	0.0445	36
75	100	0.0313	34
63	100	0.0220	32
50	100	0.0160	30
37.5	100	0.0113	29
28	100	0.0079	27
20	100	0.0056	23
14	100	0.0039	19
10	100	0.0027	16
6.3	100	0.0016	15
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed)	
0.425	100	2.70 Mg/m3	
0.3	99		
0.212	98		
0.15	64		
0.063	40		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.2
Sand	59.6
Silt	25.1
Clay	15.1

Grading Analysis		
D100	mm	
D60	mm	0.13
D30	mm	0.0147
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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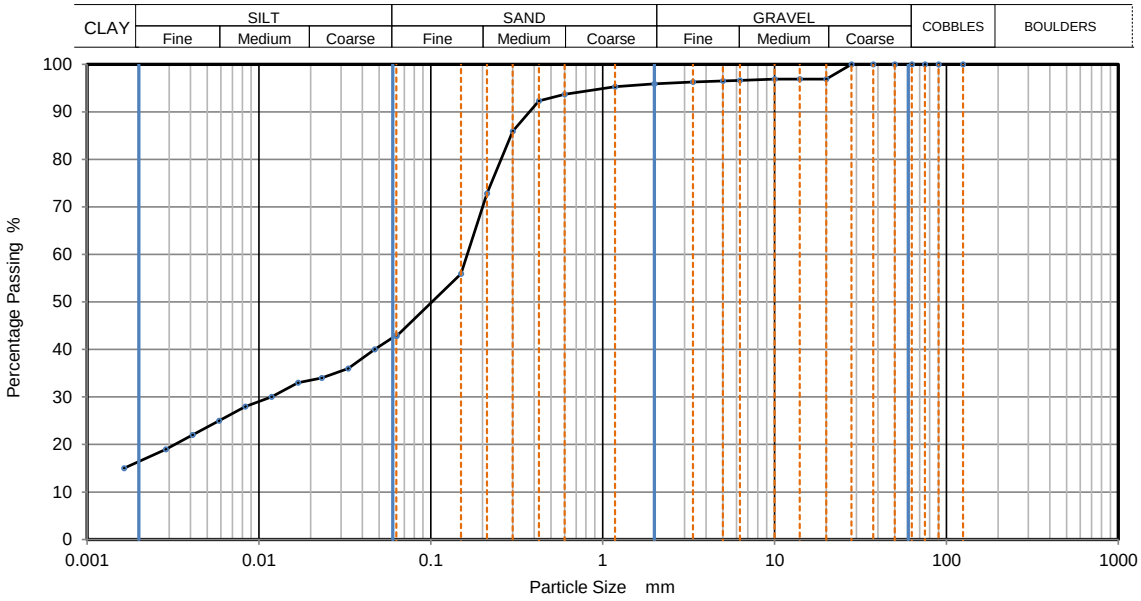
MSF-5-R3

PARTICLE SIZE DISTRIBUTION

Job Ref	32976				
Borehole/Pit No.	BH2				
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	3.50 m
Soil Description	Medium strength brown mottled orangish brown sandy silty CLAY with occasional fmc sandstone fragments			Depth Base	3.95 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	09/02/2023
				Date tested	17/02/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	43
90	100	0.0471	40
75	100	0.0330	36
63	100	0.0232	34
50	100	0.0169	33
37.5	100	0.0118	30
28	100	0.0083	28
20	97	0.0058	25
14	97	0.0041	22
10	97	0.0029	19
6.3	97	0.0016	15
5	97		
3.35	96		
2	96		
1.18	95		
0.6	94	Particle density (assumed)	
0.425	92	2.70 Mg/m3	
0.3	86		
0.212	73		
0.15	56		
0.063	43		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	4.1
Sand	53.1
Silt	26.5
Clay	16.3

Grading Analysis		
D100	mm	
D60	mm	0.163
D30	mm	0.0123
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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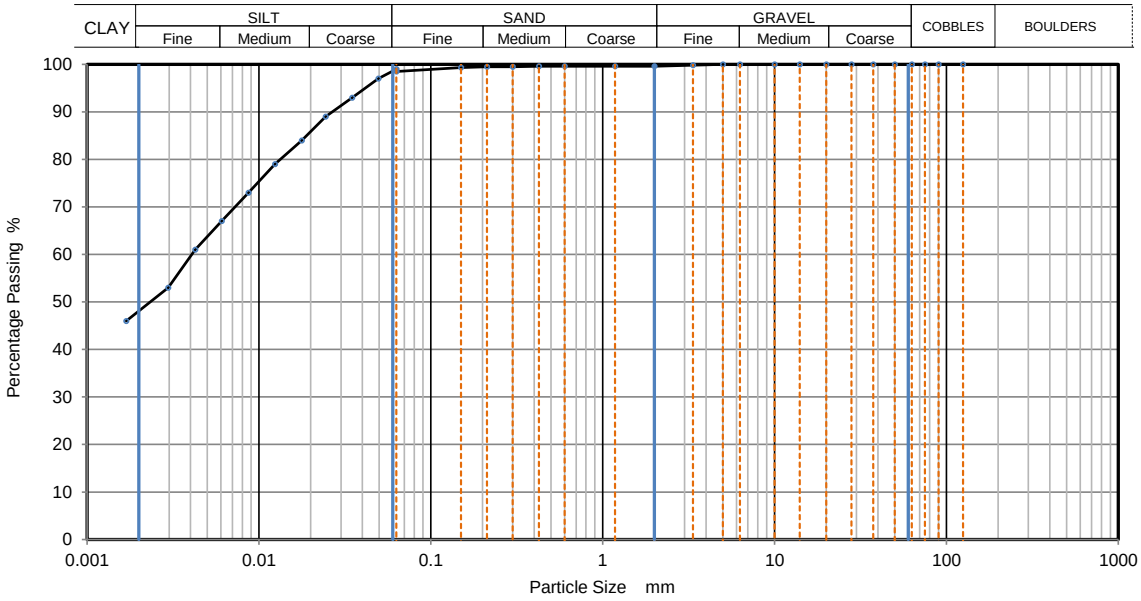
MSF-5-R3

PARTICLE SIZE DISTRIBUTION

Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	13.00 m
Soil Description	Dark grey silty CLAY			Depth Base	13.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	09/02/2023
				Date tested	17/02/2023

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	99
90	100	0.0494	97
75	100	0.0348	93
63	100	0.0244	89
50	100	0.0177	84
37.5	100	0.0124	79
28	100	0.0087	73
20	100	0.0061	67
14	100	0.0043	61
10	100	0.0030	53
6.3	100	0.0017	46
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed)	
0.425	100	2.70 Mg/m3	
0.3	100		
0.212	100		
0.15	99		
0.063	99		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.4
Sand	1.1
Silt	50.4
Clay	48.1

Grading Analysis		
D100	mm	
D60	mm	0.00411
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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MSF-5-R3

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
32976	31 Daleham Gardens	Samples received	03/02/2023
		Schedule received	08/02/2023
Project No.	Client	Project started	09/02/2023
2023-002-SIM-DAL	Geofirma	Testing Started	21/02/2023

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
BH1A	-	1.00	-	D	Greyish brown slightly sandy gravelly silty CLAY with slag and pottery fragments (gravel is fmc and angular to sub-angular)	28					
BH1A	-	1.50	-	D	Brownish grey silty CLAY with frequent lenses of yellowish brown silt	28					
BH1A	-	2.00	-	D	Brown slightly gravelly slightly sandy silty CLAY with occasional fine carbonaceous deposits (gravel is fm concrete and pottery fragments)	37	88	50	17	33	Sample washed to obtain test fraction
BH1A	-	3.00	-	D	Greyish brown slightly sandy silty CLAY with brick fragments and rare fmc sub-angular and tabular gravel	38					
BH1A	-	3.50	-	D	Grey silty CLAY	31					
BH1A	-	5.00	-	D	Grey silty CLAY with rare fine sub-angular gravel	28	98	51	18	33	
BH1A	-	6.00	6.45	U	Dark grey slightly fine sandy silty CLAY with rare decomposed shell fragments	29	100	49	16	33	
BH1A	-	10.00	10.45	U	High strength dark grey silty CLAY	29					
BH1A	-	14.00	14.45	U	High strength dark grey silty CLAY with occasional pockets of sand and rare decomposed shell fragments	28					
BH1A	-	19.50	19.94	U	High strength dark grey silty CLAY	28					
BH1A	-	22.50	22.95	U	Dark grey silty CLAY with pockets of black slightly sandy peat with occasional wood fragments becoming @ 22.65 m very high strength dark grey silty CLAY	28					
BH2	-	1.00	-	D	Orangish brown fine sandy silty CLAY with traces of roots and rootlets	28	100	43	18	25	

UKAS TESTING

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3, 4.4 and 5.0
These results only apply to the items tested

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Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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Checked and Approved

Initials **J.P**

Date: 24/02/2023

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
32976	31 Daleham Gardens	Samples received	03/02/2023
		Schedule received	08/02/2023
Project No.	Client	Project started	09/02/2023
2023-002-SIM-DAL	Geofirma	Testing Started	21/02/2023

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
BH2	-	1.50	1.95	U	Brown, light grey and orangish brown fine sandy silty CLAY with rare intrusion of black possiby carbonaceous deposit	15					
BH2	-	2.00	-	D	Yellowish brown slightly sandy very silty CLAY	16					
BH2	-	2.50	-	D	Brownish grey silty CLAY with frequent lenses of yellowish brown silt	21					
BH2	-	3.00	-	D	Orangish brown and occasional grey fine sandy silty CLAY	19	100	47	18	29	
BH2	-	3.50	3.95	U	Medium strength brown mottled orangish brown sandy silty CLAY with occasional fmc sandstone fragments	27					
BH2	-	4.00	-	D	Brown slightly sandy very silty CLAY	27					
BH2	-	5.00	5.45	U	Medium strength dark grey slightly mottled brown slightly fine sandy silty CLAY	28	100	54	18	36	
BH2	-	11.00	11.45	U	High strength dark grey silty CLAY	28					
BH2	-	15.00	15.45	U	High strength dark grey silty CLAY	30					

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3, 4.4 and 5.0
These results only apply to the items tested

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Date: 24/02/2023

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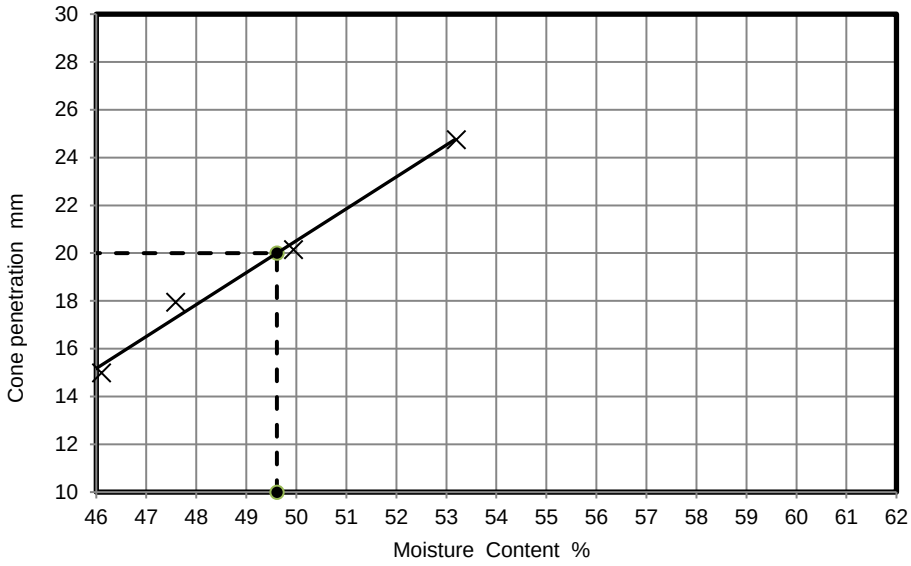
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

				Job No.	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	2.00 m
Soil Description	Brown slightly gravelly slightly sandy silty CLAY with occasional fine carbonaceous deposits (gravel is fm concrete and pottery fragments)			Depth Base	- m
				Sample Type	D
				Samples received	03/02/2023
				Schedules received	08/02/2023
				Project Started	09/02/2023
				Date Tested	21/02/2023

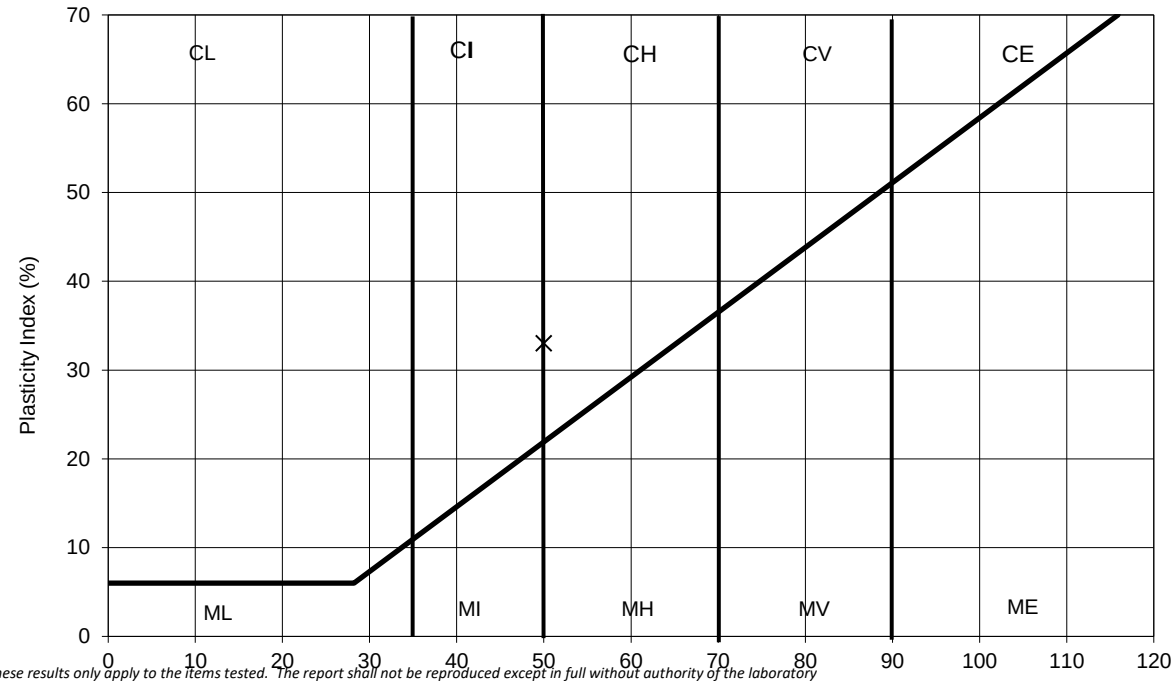


NATURAL MOISTURE CONTENT	**37**	**%**
% PASSING 425µm SIEVE	**88**	**%**
LIQUID LIMIT	**50**	**%**
PLASTIC LIMIT	**17**	**%**
PLASTICITY INDEX	**33**	**%**

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 24/02/2023

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UKAS TESTING

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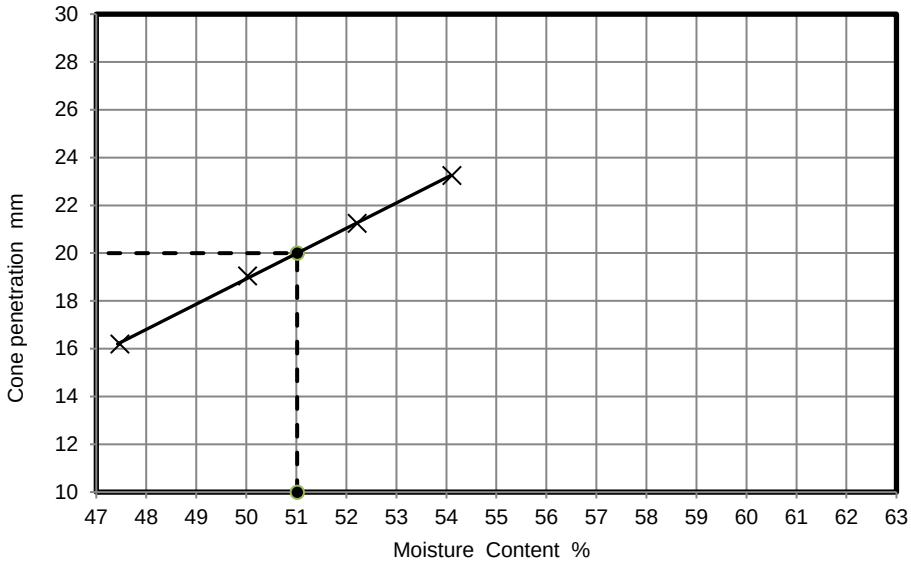
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

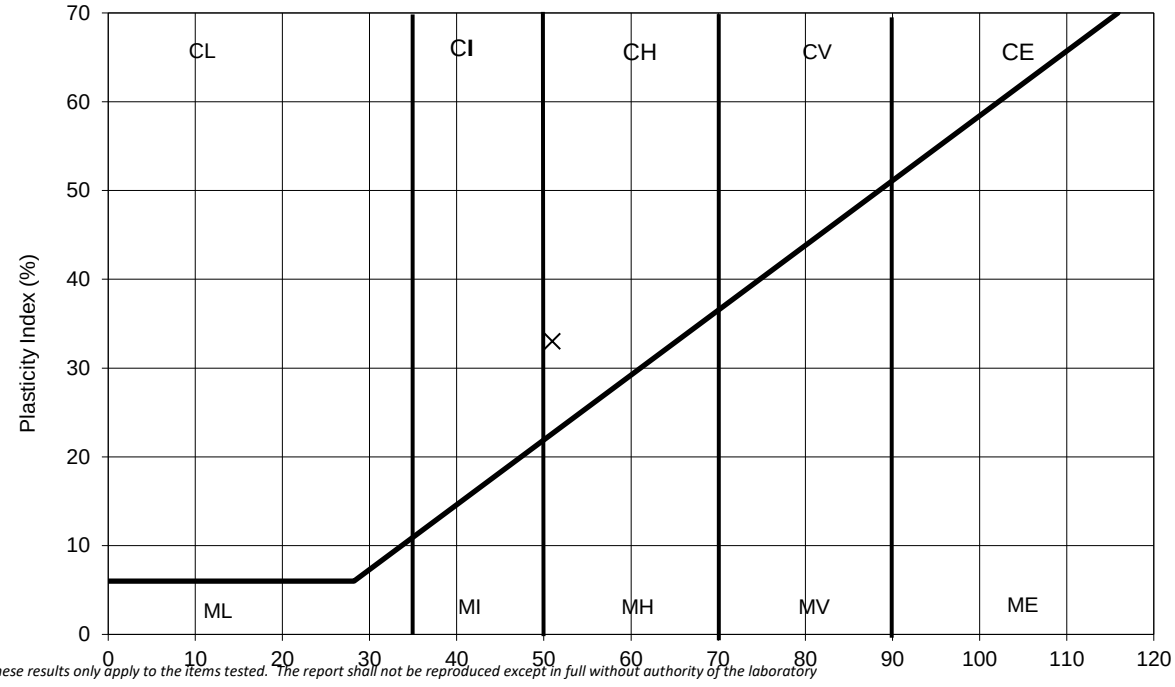
				Job No.	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	5.00 m
Soil Description	Grey silty CLAY with rare fine sub-angular gravel			Depth Base	- m
				Sample Type	D
				Samples received	03/02/2023
				Schedules received	08/02/2023
				Project Started	09/02/2023
				Date Tested	21/02/2023



NATURAL MOISTURE CONTENT	**28**	**%**
% PASSING 425µm SIEVE	**98**	**%**
LIQUID LIMIT	**51**	**%**
PLASTIC LIMIT	**18**	**%**
PLASTICITY INDEX	**33**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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UKAS TESTING

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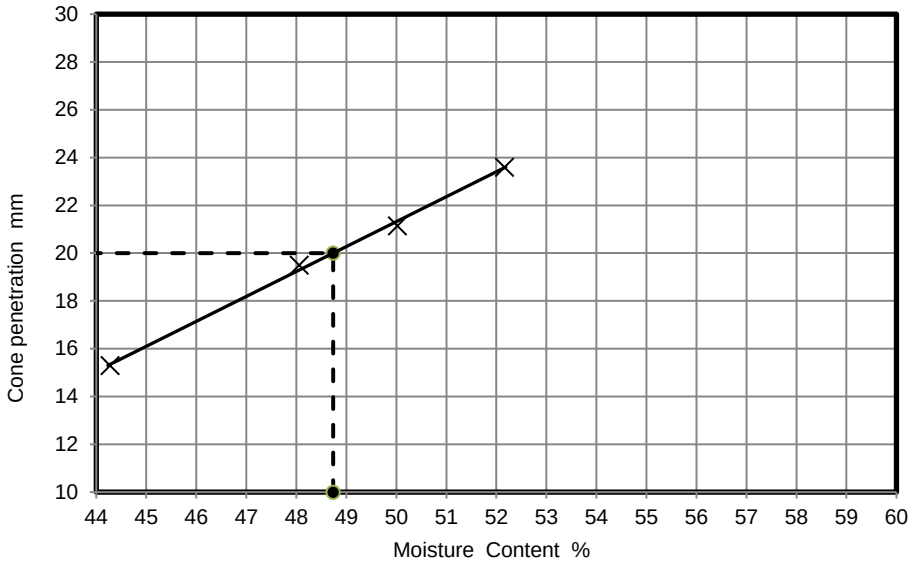
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

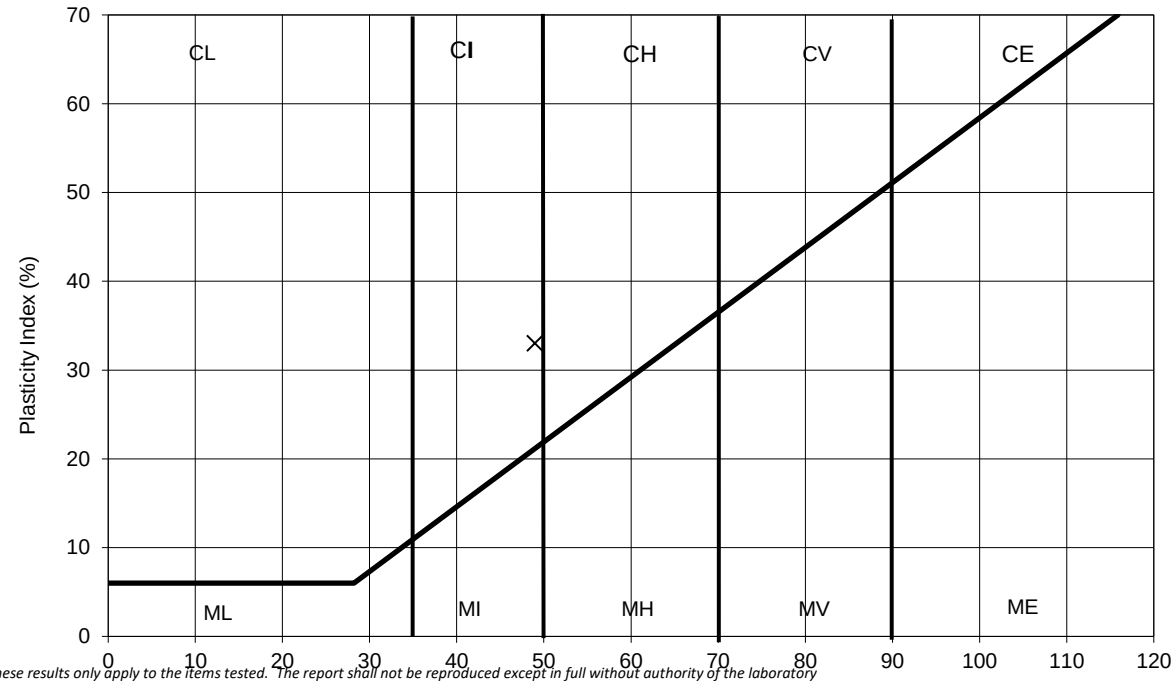
				Job No.	32976
				Borehole/Pit No.	BH1A
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	6.00 m
Soil Description	Dark grey slightly fine sandy silty CLAY with rare decomposed shell fragments			Depth Base	6.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
				Project Started	09/02/2023
				Date Tested	21/02/2023



NATURAL MOISTURE CONTENT	**29**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**49**	**%**
PLASTIC LIMIT	**16**	**%**
PLASTICITY INDEX	**33**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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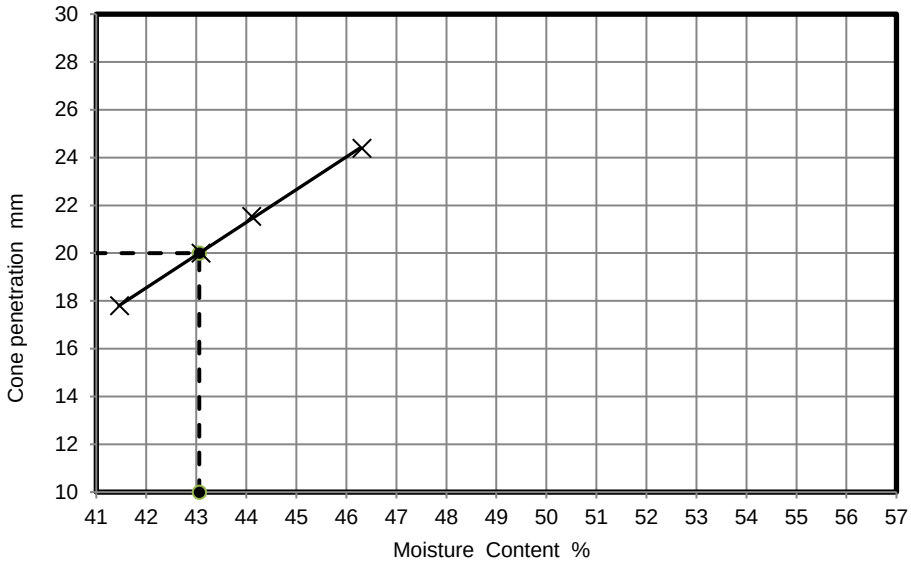
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	1.00 m
Soil Description	Orangish brown fine sandy silty CLAY with traces of roots and rootlets			Depth Base	- m
				Sample Type	D
				Samples received	03/02/2023
				Schedules received	08/02/2023
				Project Started	09/02/2023
				Date Tested	21/02/2023

Job No. 32976

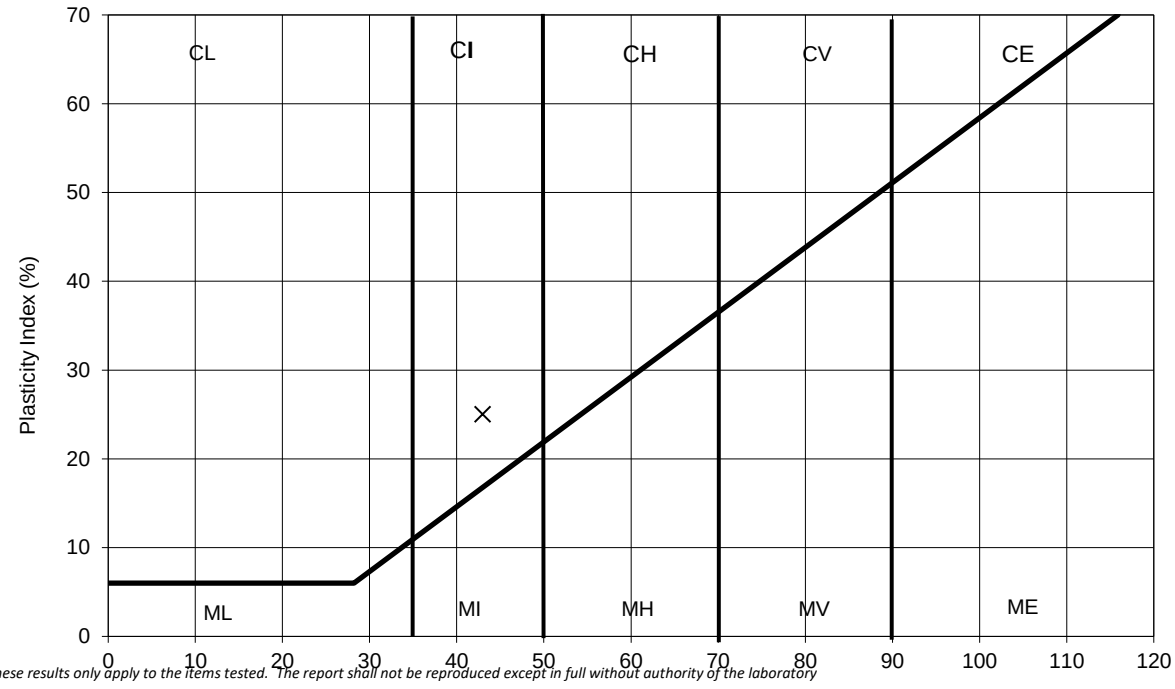
Borehole/Pit No. BH2



NATURAL MOISTURE CONTENT	**28**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**43**	**%**
PLASTIC LIMIT	**18**	**%**
PLASTICITY INDEX	**25**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 24/02/2023

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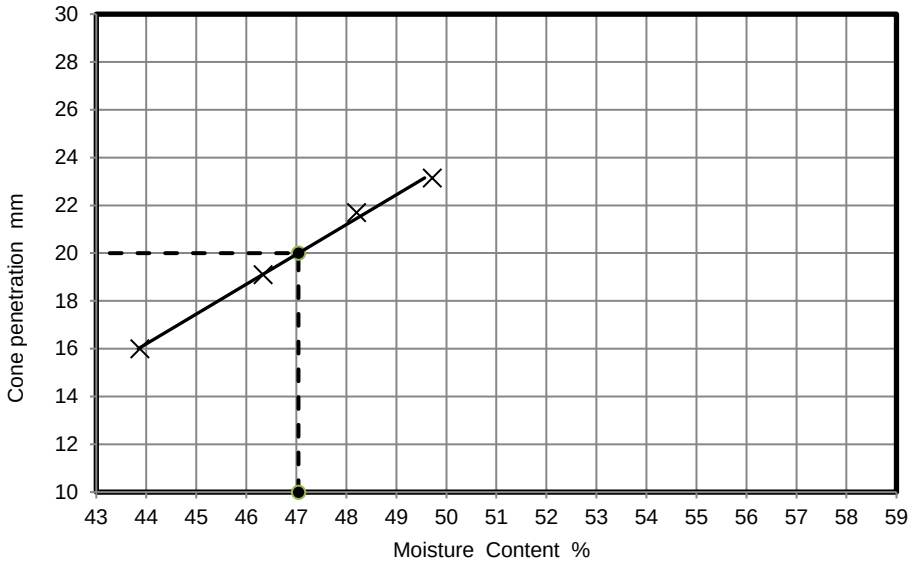
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

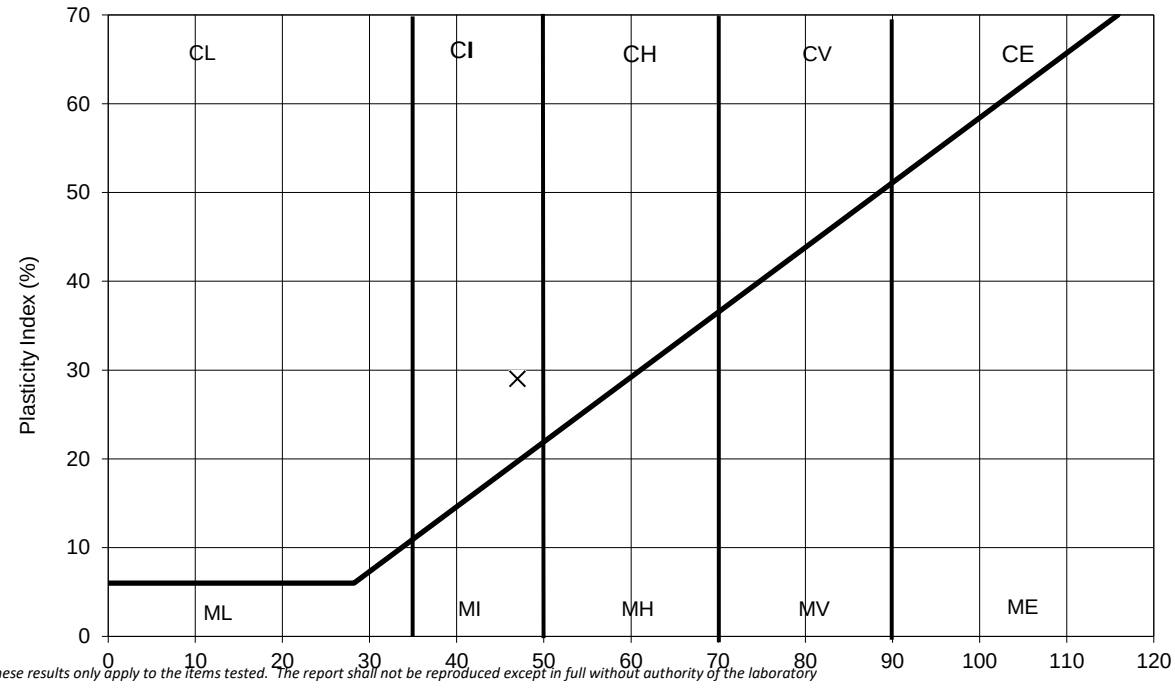
				Job No.	32976
				Borehole/Pit No.	BH2
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	3.00 m
Soil Description	Orangish brown and occasional grey fine sandy silty CLAY			Depth Base	- m
				Sample Type	D
				Samples received	03/02/2023
				Schedules received	08/02/2023
				Project Started	09/02/2023
				Date Tested	21/02/2023



NATURAL MOISTURE CONTENT	**19**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**47**	**%**
PLASTIC LIMIT	**18**	**%**
PLASTICITY INDEX	**29**	**%**

Remarks

PLASTICITY INDEX



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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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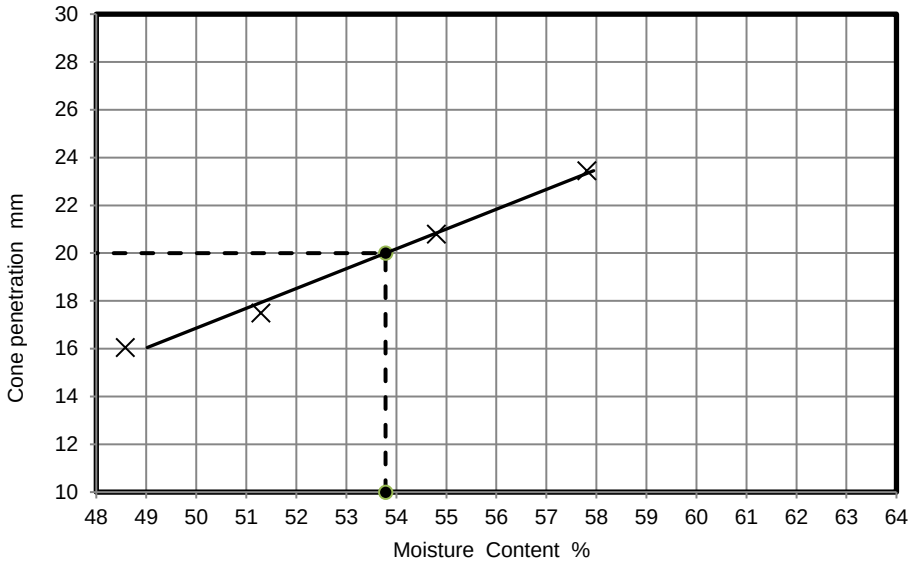
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

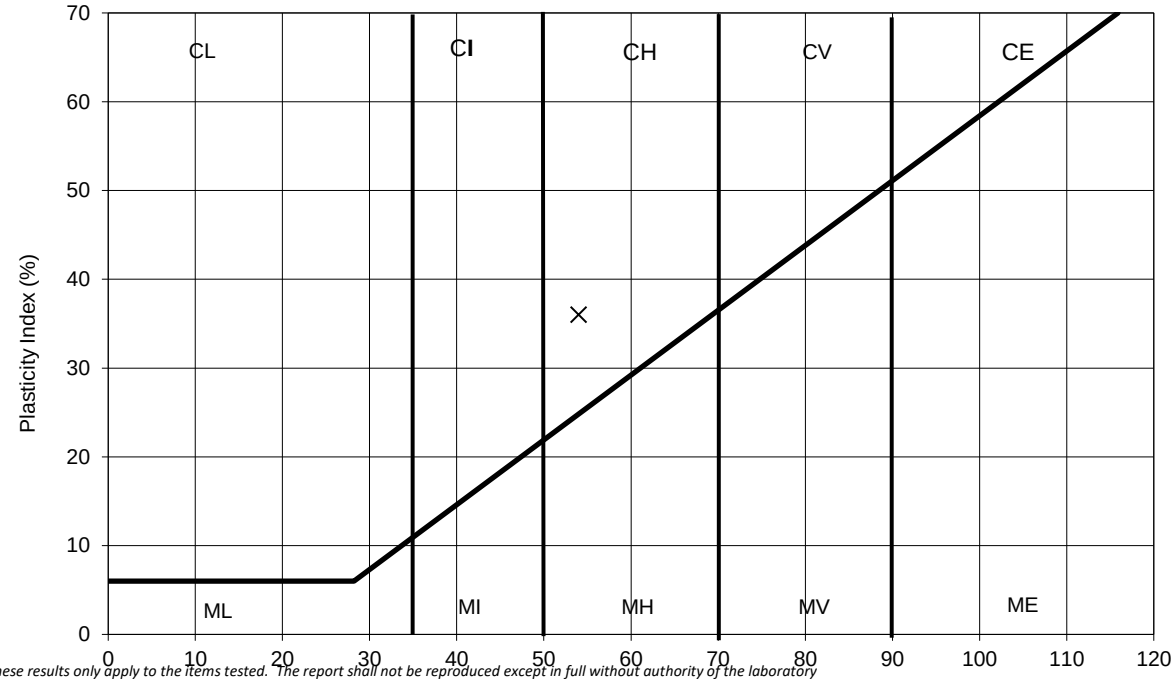
				Job No.	32976
				Borehole/Pit No.	BH2
Site Name	31 Daleham Gardens			Sample No.	-
Project No.	2023-002-SIM-DAL	Client	Geofirma	Depth Top	5.00 m
Soil Description	Medium strength dark grey slightly mottled brown slightly fine sandy silty CLAY			Depth Base	5.45 m
				Sample Type	U
				Samples received	03/02/2023
				Schedules received	08/02/2023
				Project Started	09/02/2023
				Date Tested	21/02/2023



NATURAL MOISTURE CONTENT	**28**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**54**	**%**
PLASTIC LIMIT	**18**	**%**
PLASTICITY INDEX	**36**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 24/02/2023

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

APPENDIX D –

INSITU CBR TEST RESULTS

	In Situ California Bearing Ratio (CBR)			Job Ref	32972
				CBR No.	CBR1
Site Name	31 Daleham Gardens, Finchley, London, NW3 5BU			Depth m	0.30
Project No.	2023-002-SIM-DAL	Client	Geofirma	Date of Test	02/02/2023
Soil Description	Brown slightly sandy silty CLAY with occasional rootlets and traces of fine brick fragments				
Test Method	BS1377 : Part 9 : 1990, clause 4.3			CBR Test Number	1

Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm

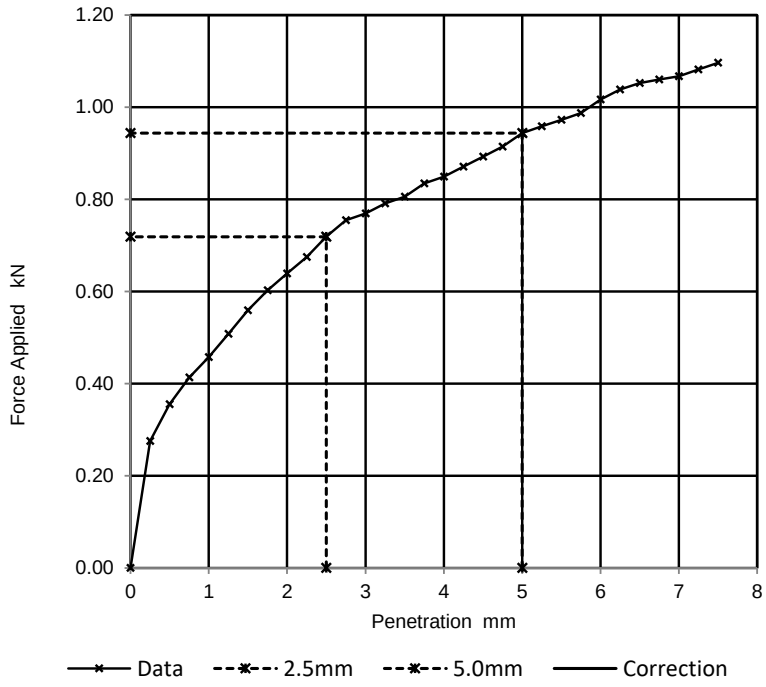
Rate if Strain	1.00	mm/min
Mass of Surcharge	4.5	kg
Proving Ring Factor	7.26	N/div

Temperature	11	0C
Environmental Conditions	Partly sunny	

Readings

Penetration of Plunger mm	Force on Plunger: Dial Reading	Force on Plunger: Load kN
0.00	0	0.00
0.25	38	0.28
0.50	49	0.36
0.75	57	0.41
1.00	63	0.46
1.25	70	0.51
1.50	77	0.56
1.75	83	0.60
2.00	88	0.64
2.25	93	0.68
2.50	99	0.72
2.75	104	0.76
3.00	106	0.77
3.25	109	0.79
3.50	111	0.81
3.75	115	0.83
4.00	117	0.85
4.25	120	0.87
4.50	123	0.89
4.75	126	0.91
5.00	130	0.94
5.25	132	0.96
5.50	134	0.97
5.75	136	0.99
6.00	140	1.02
6.25	143	1.04
6.50	145	1.05
6.75	146	1.06
7.00	147	1.07
7.25	149	1.08
7.50	151	1.10

Force versus Penetration Plot



Remarks

Results

Curve correction applied	CBR Values, % Penetration 2.5mm	CBR Values, % Penetration 5mm	CBR Value	Moisture Content %
No	5.4	4.7	**5.4**	23

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved
Initials: **J.P**
Date: 10/02/2023

In Situ California Bearing Ratio (CBR)

				Job Ref	32972
				CBR No.	CBR2
Site Name	31 Daleham Gardens, Finchley, London, NW3 5BU			Depth m	0.30
Project No.	2023-002-SIM-DAL	Client	Geofirma	Date of Test	02/02/2023
Soil Description	Brown slightly sandy silty CLAY with occasional rootlets and traces of fine brick fragments				
Test Method	BS1377 : Part 9 : 1990, clause 4.3			CBR Test Number	2

Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm

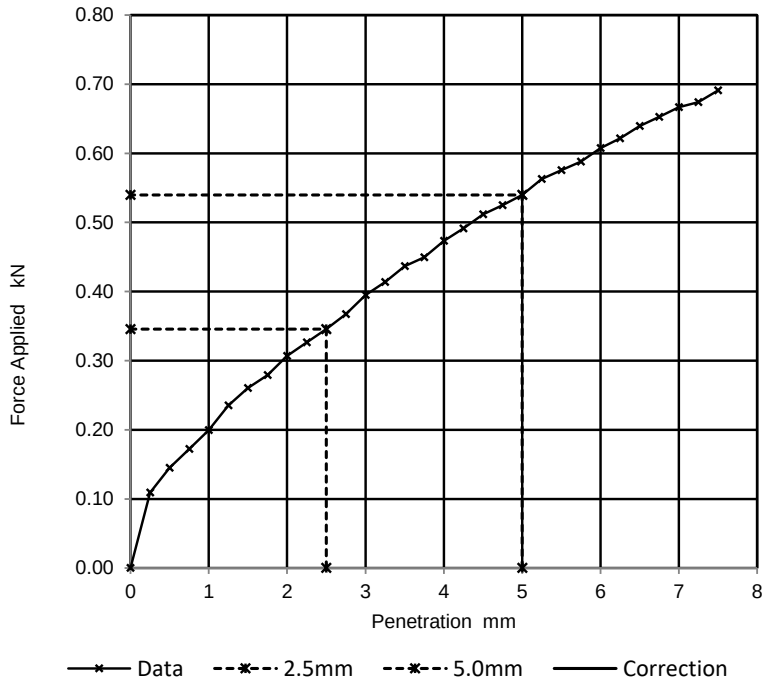
Rate if Strain	1.00	mm/min
Mass of Surcharge	4.5	kg
Proving Ring Factor	0.42	N/div

Temperature	11	0C
Environmental Conditions	Partly sunny	

Readings

Penetration of Plunger mm	Force on Plunger: Dial Reading	Force on Plunger: Load kN
0.00	0	0.00
0.25	260	0.11
0.50	345	0.14
0.75	410	0.17
1.00	475	0.20
1.25	560	0.24
1.50	620	0.26
1.75	665	0.28
2.00	730	0.31
2.25	777	0.33
2.50	823	0.35
2.75	875	0.37
3.00	940	0.39
3.25	985	0.41
3.50	1040	0.44
3.75	1070	0.45
4.00	1127	0.47
4.25	1170	0.49
4.50	1218	0.51
4.75	1250	0.53
5.00	1285	0.54
5.25	1340	0.56
5.50	1370	0.58
5.75	1400	0.59
6.00	1446	0.61
6.25	1480	0.62
6.50	1523	0.64
6.75	1554	0.65
7.00	1587	0.67
7.25	1605	0.67
7.50	1645	0.69

Force versus Penetration Plot



Remarks

Results

Curve correction applied	CBR Values, % Penetration 2.5mm	CBR Values, % Penetration 5mm	CBR Value	Moisture Content %
No	2.6	2.7	**2.7**	25

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

Initials: **J.P**

Date: 10/02/2023

In Situ California Bearing Ratio (CBR)

				Job Ref	32972
				CBR No.	CBR3
Site Name	31 Daleham Gardens, Finchley, London, NW3 5BU			Depth m	0.40
Project No.	2023-002-SIM-DAL	Client	Geofirma	Date of Test	02/02/2023
Soil Description	Brown slightly sandy silty CLAY with occasional rootlets and traces of fine brick fragments				
Test Method	BS1377 : Part 9 : 1990, clause 4.3			CBR Test Number	3

Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm

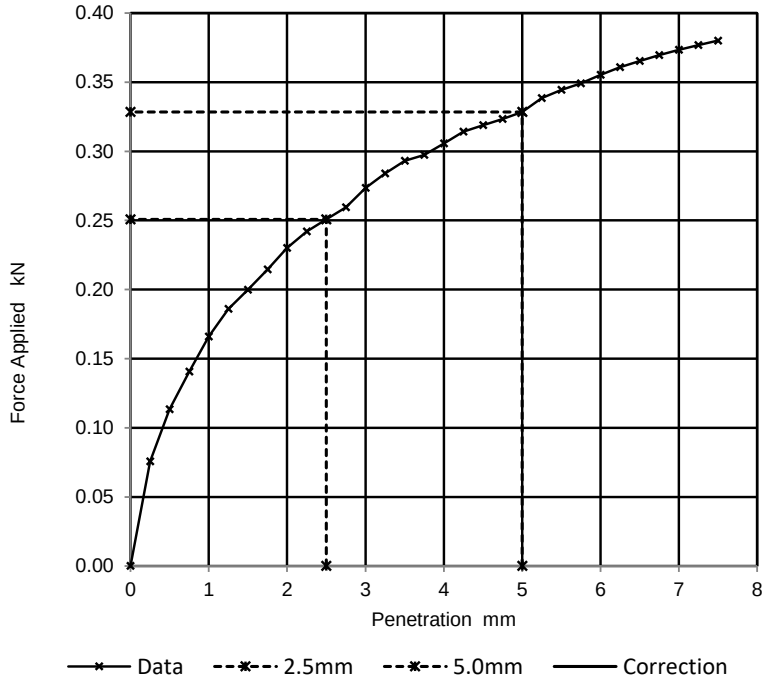
Rate if Strain	1.00	mm/min
Mass of Surcharge	4.5	kg
Proving Ring Factor	0.42	N/div

Temperature	11	0C
Environmental Conditions	Partly sunny	

Readings

Penetration of Plunger mm	Force on Plunger: Dial Reading	Force on Plunger: Load kN
0.00	0	0.00
0.25	180	0.08
0.50	270	0.11
0.75	335	0.14
1.00	395	0.17
1.25	443	0.19
1.50	476	0.20
1.75	511	0.21
2.00	548	0.23
2.25	576	0.24
2.50	597	0.25
2.75	618	0.26
3.00	651	0.27
3.25	676	0.28
3.50	698	0.29
3.75	708	0.30
4.00	728	0.31
4.25	748	0.31
4.50	759	0.32
4.75	770	0.32
5.00	782	0.33
5.25	806	0.34
5.50	820	0.34
5.75	831	0.35
6.00	846	0.36
6.25	859	0.36
6.50	870	0.37
6.75	880	0.37
7.00	889	0.37
7.25	897	0.38
7.50	905	0.38

Force versus Penetration Plot



Remarks

Results

Curve correction applied	CBR Values, % Penetration 2.5mm	CBR Values, % Penetration 5mm	CBR Value	Moisture Content %
No	1.9	1.6	**1.9**	27

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

Initials: **J.P**

Date: 10/02/2023

In Situ California Bearing Ratio (CBR)

				Job Ref	32972
				CBR No.	CBR4
Site Name	31 Daleham Gardens, Finchley, London, NW3 5BU			Depth m	0.00
Project No.	2023-002-SIM-DAL	Client	Geofirma	Date of Test	02/02/2023
Soil Description	Dark grey sandy silty CLAY				
Test Method	BS1377 : Part 9 : 1990, clause 4.3			CBR Test Number	4

Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm

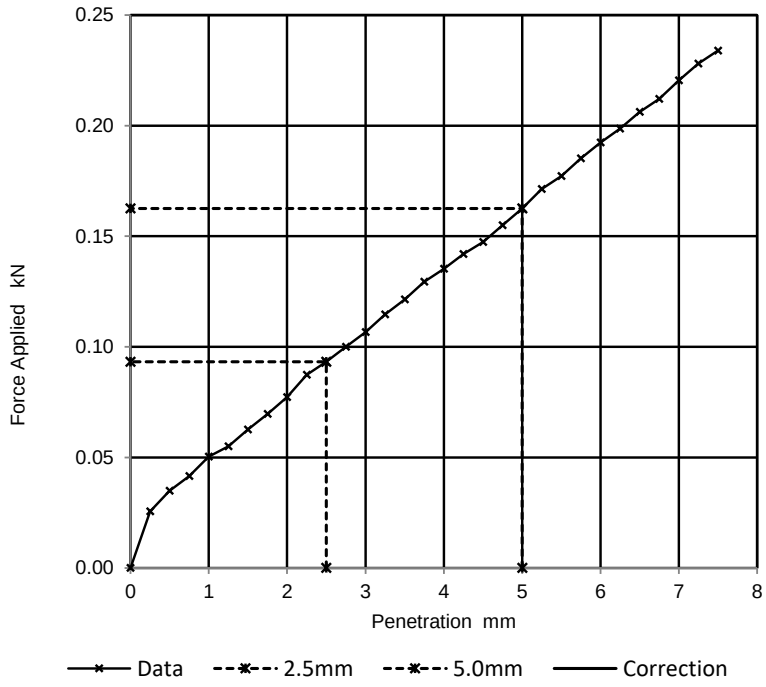
Rate if Strain	1.00	mm/min
Mass of Surcharge	4.5	kg
Proving Ring Factor	0.42	N/div

Temperature	11	0C
Environmental Conditions	Partly sunny	

Readings

Penetration of Plunger mm	Force on Plunger: Dial Reading	Force on Plunger: Load kN
0.00	0	0.00
0.25	61	0.03
0.50	83	0.03
0.75	99	0.04
1.00	120	0.05
1.25	131	0.06
1.50	149	0.06
1.75	166	0.07
2.00	184	0.08
2.25	208	0.09
2.50	222	0.09
2.75	238	0.10
3.00	254	0.11
3.25	273	0.11
3.50	289	0.12
3.75	308	0.13
4.00	322	0.14
4.25	338	0.14
4.50	351	0.15
4.75	369	0.15
5.00	387	0.16
5.25	408	0.17
5.50	422	0.18
5.75	441	0.19
6.00	458	0.19
6.25	473	0.20
6.50	491	0.21
6.75	505	0.21
7.00	525	0.22
7.25	543	0.23
7.50	557	0.23

Force versus Penetration Plot



Remarks

Results

Curve correction applied	CBR Values, % Penetration 2.5mm	CBR Values, % Penetration 5mm	CBR Value	Moisture Content %
No	0.71	0.81	**0.81**	39

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved
Initials: **J.P**
Date: 10/02/2023

	In Situ California Bearing Ratio (CBR)			Job Ref	32972
				CBR No.	CBR5
Site Name	31 Daleham Gardens, Finchley, London, NW3 5BU			Depth m	0.00
Project No.	2023-002-SIM-DAL	Client	Geofirma	Date of Test	02/02/2023
Soil Description	Dark grey sandy silty CLAY				
Test Method	BS1377 : Part 9 : 1990, clause 4.3			CBR Test Number	5

Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm

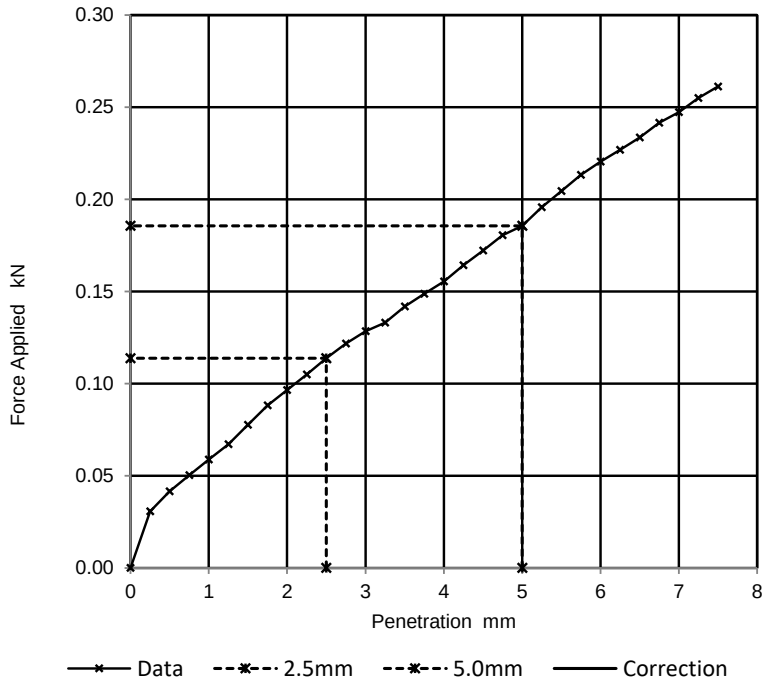
Rate if Strain	1.00	mm/min
Mass of Surcharge	4.5	kg
Proving Ring Factor	0.42	N/div

Temperature	11	0C
Environmental Conditions	Partly sunny	

Readings

Penetration of Plunger mm	Force on Plunger: Dial Reading	Force on Plunger: Load kN
0.00	0	0.00
0.25	73	0.03
0.50	99	0.04
0.75	120	0.05
1.00	140	0.06
1.25	160	0.07
1.50	185	0.08
1.75	210	0.09
2.00	230	0.10
2.25	250	0.11
2.50	271	0.11
2.75	290	0.12
3.00	306	0.13
3.25	317	0.13
3.50	338	0.14
3.75	354	0.15
4.00	370	0.16
4.25	391	0.16
4.50	410	0.17
4.75	430	0.18
5.00	442	0.19
5.25	466	0.20
5.50	487	0.20
5.75	508	0.21
6.00	525	0.22
6.25	540	0.23
6.50	556	0.23
6.75	575	0.24
7.00	589	0.25
7.25	607	0.25
7.50	622	0.26

Force versus Penetration Plot



Remarks

Results

Curve correction applied	CBR Values, % Penetration 2.5mm	CBR Values, % Penetration 5mm	CBR Value	Moisture Content %
No	0.86	0.93	**0.93**	36

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved
Initials: **J.P**
Date: 10/02/2023

In Situ California Bearing Ratio (CBR)

				Job Ref	32972
				CBR No.	CBR6
Site Name	31 Daleham Gardens, Finchley, London, NW3 5BU			Depth m	0.45
Project No.	2023-002-SIM-DAL	Client	Geofirma	Date of Test	02/02/2023
Soil Description	Brown slightly sandy silty CLAY with occasional rootlets and traces of fine brick fragments				
Test Method	BS1377 : Part 9 : 1990, clause 4.3			CBR Test Number	6

Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm

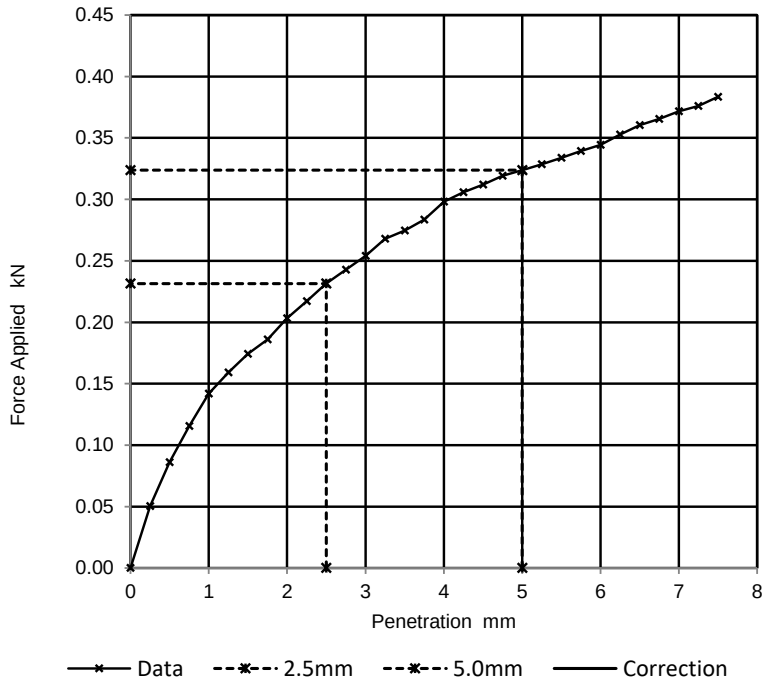
Rate if Strain	1.00	mm/min
Mass of Surcharge	4.5	kg
Proving Ring Factor	0.42	N/div

Temperature	11	0C
Environmental Conditions	Partly sunny	

Readings

Penetration of Plunger mm	Force on Plunger: Dial Reading	Force on Plunger: Load kN
0.00	0	0.00
0.25	120	0.05
0.50	205	0.09
0.75	275	0.12
1.00	338	0.14
1.25	379	0.16
1.50	415	0.17
1.75	443	0.19
2.00	484	0.20
2.25	517	0.22
2.50	551	0.23
2.75	578	0.24
3.00	605	0.25
3.25	638	0.27
3.50	654	0.27
3.75	675	0.28
4.00	710	0.30
4.25	728	0.31
4.50	743	0.31
4.75	760	0.32
5.00	771	0.32
5.25	782	0.33
5.50	795	0.33
5.75	808	0.34
6.00	820	0.34
6.25	840	0.35
6.50	858	0.36
6.75	870	0.37
7.00	885	0.37
7.25	895	0.38
7.50	913	0.38

Force versus Penetration Plot



Remarks

Results

Curve correction applied	CBR Values, % Penetration 2.5mm	CBR Values, % Penetration 5mm	CBR Value	Moisture Content %
No	1.8	1.6	**1.8**	34

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved
Initials: **J.P**
Date: 10/02/2023

APPENDIX E –

CHEMICAL TEST RESULTS

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	23-46814
Issue:	1
Date of Issue:	24/02/2023
Contact:	James Phaure
Customer Details:	K4 Soils Laboratory Ltd Unit 8 Watford HertfordshireWD18 9RU
Quotation No:	Q22-03477
Order No:	32976
Customer Reference:	32976
Date Received:	17/02/2023
Date Approved:	24/02/2023
Details:	31 Daleham Gardens
Approved by:	

Mike Varley, General Manager

Sample Summary

Report No.: 23-46814, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
312684	BH1A 1.00	Not Provided	17/02/2023	Sandy clayey loam	a
312685	BH1A 3.50	Not Provided	17/02/2023	Clay	a
312686	BH1A 22.50	Not Provided	17/02/2023	Sandy clayey loam	a
312687	BH2 13.00	Not Provided	17/02/2023	Clay	a

Results Summary

Report No.: 23-46814, issue number 1

			ELAB Reference	312684	312685	312686	312687
			Customer Reference				
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	BH1A	BH1A	BH1A	BH2
			Sample Depth (m)	1.00	3.50	22.50	13.00
			Sampling Date	Not Provided	Not Provided	Not Provided	Not Provided
Determinand	**Codes**	**Units**	**LOD**				
Soil sample preparation parameters							
Moisture Content	N	%	0.1	17.8	21.3	21.9	19.3
Material removed	N	%	0.1	13.1	< 0.1	12.1	< 0.1
Description of Inert material removed	N		0	Stones/Brick	None	Stones/Wood	None
Anions							
Water Soluble Sulphate	M	g/l	0.02	0.62	0.22	0.21	0.07
Inorganics							
Total Sulphur	N	%	0.01	0.24	0.50	0.28	0.63
Acid Soluble Sulphate (SO4)	U	%	0.02	0.53	0.09	0.09	0.05
Miscellaneous							
pH	M	pH units	0.1	10.4	8.7	8.7	9.1

Method Summary

Report No.: 23-46814, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	23/02/2023	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	23/02/2023	115	Ion Chromatography
Water soluble anions	M	Air dried sample	22/02/2023	172	Ion Chromatography
Total organic carbon/Total sulphur	N	Air dried sample	21/02/2023	216	IR

Tests marked N are not UKAS accredited

2683

Report Information

Report No.: 23-46814, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.

ELAB are unable to provide an interpretation or opinion on the content of this report.

The results relate only to the sample received.

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

Jaime Wils
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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 : 23-16525

Project / Site name:	31 Daleham Gardens	**Samples received on:**	07/02/2023
Your job number:	2023-002-SIM-DAL	**Samples instructed on/ Analysis started on:**	08/02/2023
Your order number:		**Analysis completed by:**	20/02/2023
Report Issue Number:	1	**Report issued on:**	21/02/2023
Samples Analysed:	1 10:1 WAC sample		

Signed:

Dominika Warjan
Junior Reporting 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.

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

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Waste Acceptance Criteria Analytical Results

Report No:	**23-16525**						
					Client:	**GEOFIRMA**	
Location	**31 Daleham Gardens**						
Lab Reference (Sample Number)	2578826 / 2578827				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	01/02/2023				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP3						
Depth (m)	0.10						
Solid Waste Analysis							
TOC (%)**	5.0				3%	5%	6%
Loss on Ignition (%) **	10.1				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	35				500	--	--
Total PAH (WAC-17) (mg/kg)	4.64				100	--	--
pH (units)**	8.1				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	6.4				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0090			0.0642	0.5	2	25
Barium *	0.0187			0.134	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0014			0.010	0.5	10	70
Copper *	0.058			0.42	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0101			0.0723	0.5	10	30
Nickel *	0.0033			0.024	0.4	10	40
Lead *	0.0030			0.022	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.023			0.16	4	50	200
Chloride *	2.4			17	800	15000	25000
Fluoride*	0.16			1.2	10	150	500
Sulphate *	7.3			53	1000	20000	50000
TDS*	180			1300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	38.6			276	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.4						
Dry Matter (%)	71						
Moisture (%)	29						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation ** = MCERTS accredited

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

Analytical Report Number : 23-16525
Project / Site name: 31 Daleham Gardens

* 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 *
2578826	TP3	None Supplied	0.1	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-16525
Project / Site name: 31 Daleham Gardens

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270.	L064-PL	D	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 at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031	W	ISO 17025

Analytical Report Number : 23-16525
Project / Site name: 31 Daleham Gardens

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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Analytical Report Number : 23-16521

Project / Site name:	31 Daleham Gardens	**Samples received on:**	07/02/2023
Your job number:	2023-002-SIM-DAL	**Samples instructed on/ Analysis started on:**	08/02/2023
Your order number:		**Analysis completed by:**	17/02/2023
Report Issue Number:	1	**Report issued on:**	17/02/2023
Samples Analysed:	2 soil samples		

Signed:

Adam Fenwick
Technical Reviewer
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: 23-16521
Project / Site name: 31 Daleham Gardens

Lab Sample Number				2578805	2578806
Sample Reference				BH1 A	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				0.30	0.50
Date Sampled				02/02/2023	02/02/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	18	23
Total mass of sample received	kg	0.001	NONE	1.4	1.4
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	JSW	JSW
General Inorganics					
pH - Automated	pH Units	N/A	MCERTS	6.8	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Total Phenols					
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.18
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.59
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.59
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.44
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.44
Benzo(b)fluoranthene & Benzo(k)fluoranthene	mg/kg	0.1	ISO 17025	< 0.1	0.99
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.53
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.31
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.37
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	4.44
Heavy Metals / Metalloids					
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	9.6
Barium (aqua regia extractable)	mg/kg	1	MCERTS	34	50
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.73	0.41
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	2.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	36	12
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	12
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	32	48
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.61	1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	9.9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	39	82
Monoaromatics & Oxygenates					
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0

Analytical Report Number: 23-16521
Project / Site name: 31 Daleham Gardens

Lab Sample Number				2578805	2578806
Sample Reference				BH1 A	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				0.30	0.50
Date Sampled				02/02/2023	02/02/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	12
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	12

TPH-CWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	< 10	14

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

Analytical Report Number : 23-16521
Project / Site name: 31 Daleham Gardens

* 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 *
2578805	BH1 A	None Supplied	0.3	Brown clay and sand.
2578806	BH2	None Supplied	0.5	Brown loam with vegetation.

Analytical Report Number : 23-16521
Project / Site name: 31 Daleham Gardens

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	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
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
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	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

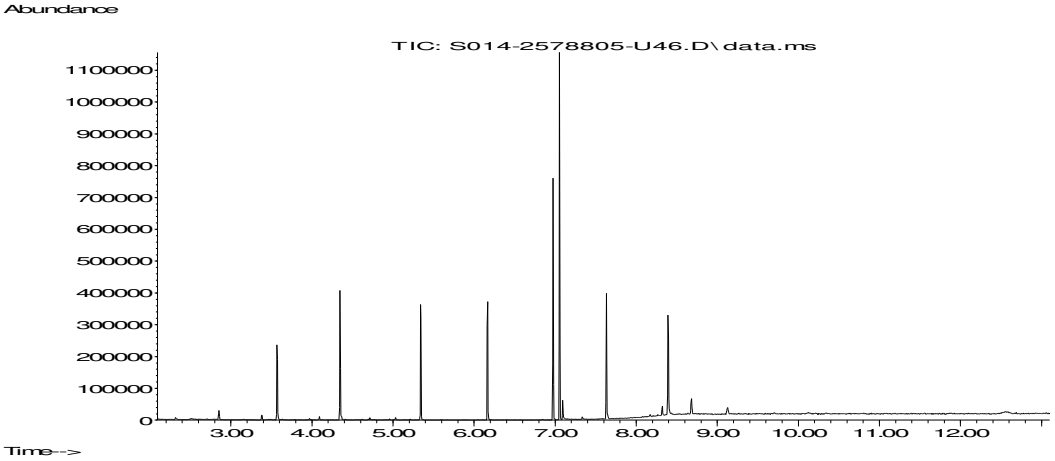
Analytical Report Number : 23-16521
Project / Site name: 31 Daleham Gardens

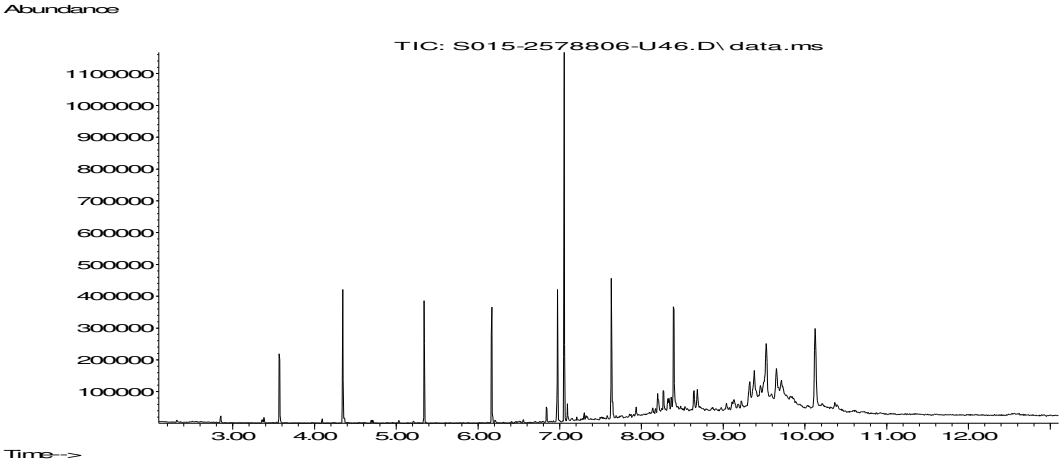
Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



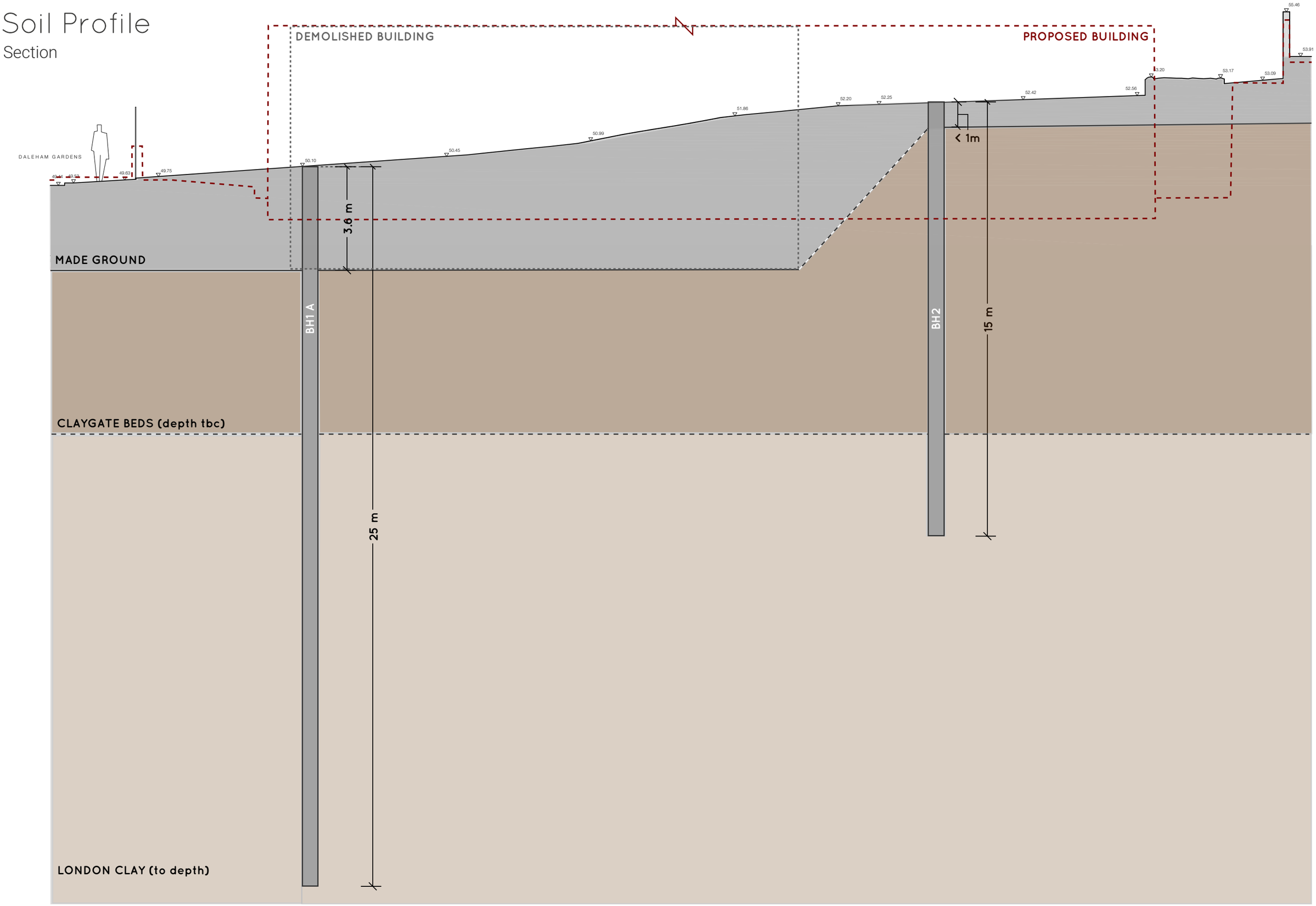


APPENDIX F –

RELEVANT DRAWINGS

Soil Profile

Section



PROJECT: DALEHAM GARDENS
SKETCH No: 1803-XX-SK-01

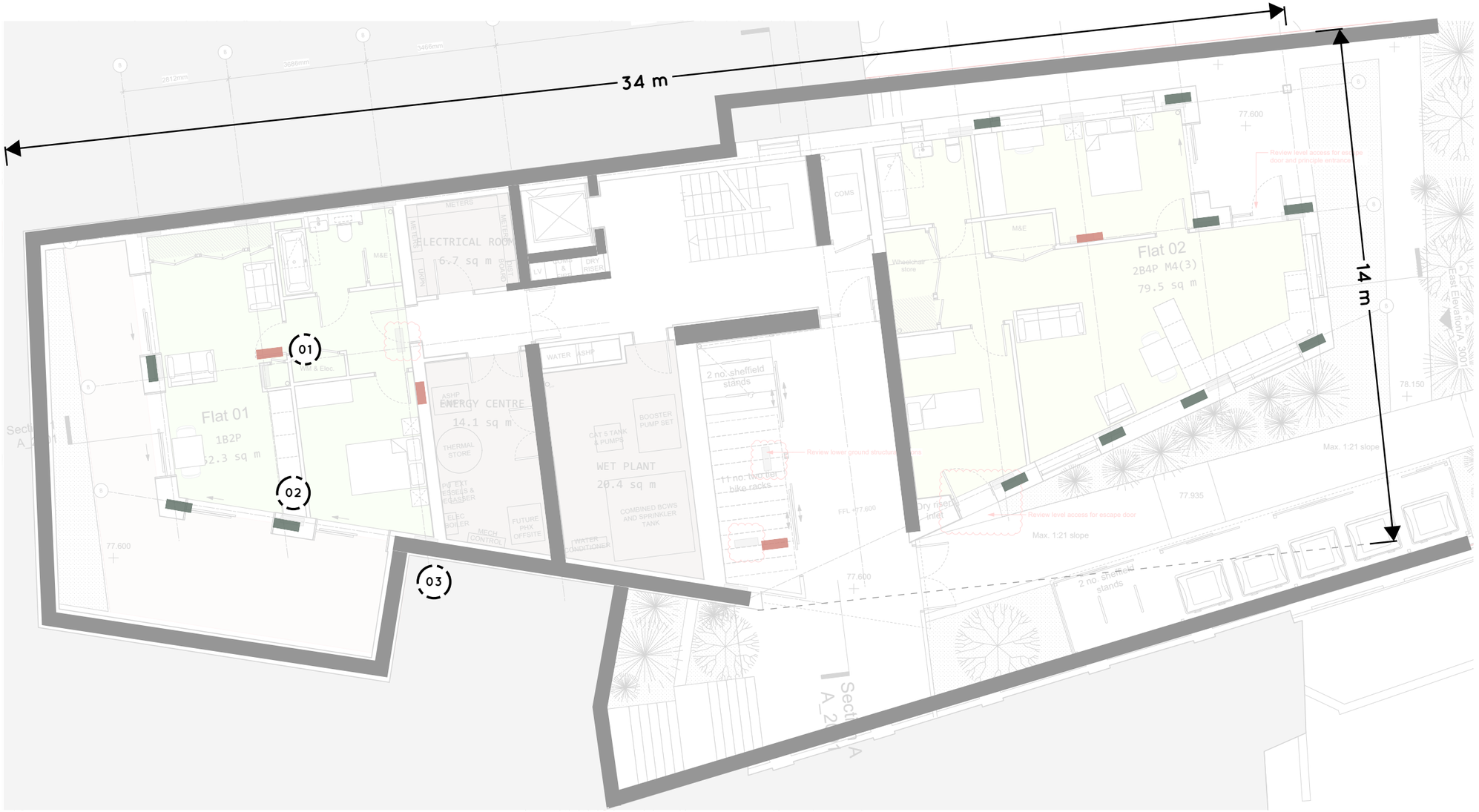
REV: 00
DATE: 06/03/23

TITLE: SOIL PROFILE SECTION
DRAWN BY (CHECK): EC (AC)

SIMPLE WORKS, UNIT 301, 203/213
MARE ST STUDIOS, LONDON, E8 3JS

COLUMNS AND WALLS FOUNDATION ESTIMATED LOADS

FOR PILED FOUNDATIONS OR SHALLOW FOUNDATIONS (IF SUITABLE)



NOTES:
ASSUMED PILE DIAMETER: 450mm U.N.O.
ASSUMED PILE LENGHT: 15m TBC BY SOIL SPECIALIST
PILED RETAINING WALL ASSUMED ALL AROUND

ASSUMED DEPTH OF PILE CAPS: 1000mm

PILES ASSUMED SLEEVED TO ORIGINAL BASEMENT (DEMOLISHED) FOUNDING LEVEL

ESTIMATED LOADINGS (UNFACTORED):

(01)
WORST CASE - INTERNAL COLUMN
DL = 465 kN, LL = 210 kN

(02)
EXTERNAL COLUMN
DL = 465 kN, LL = 115 kN

(03)
RETAINING WALL
DL = 111 kN/m, LL = 23 kN/m

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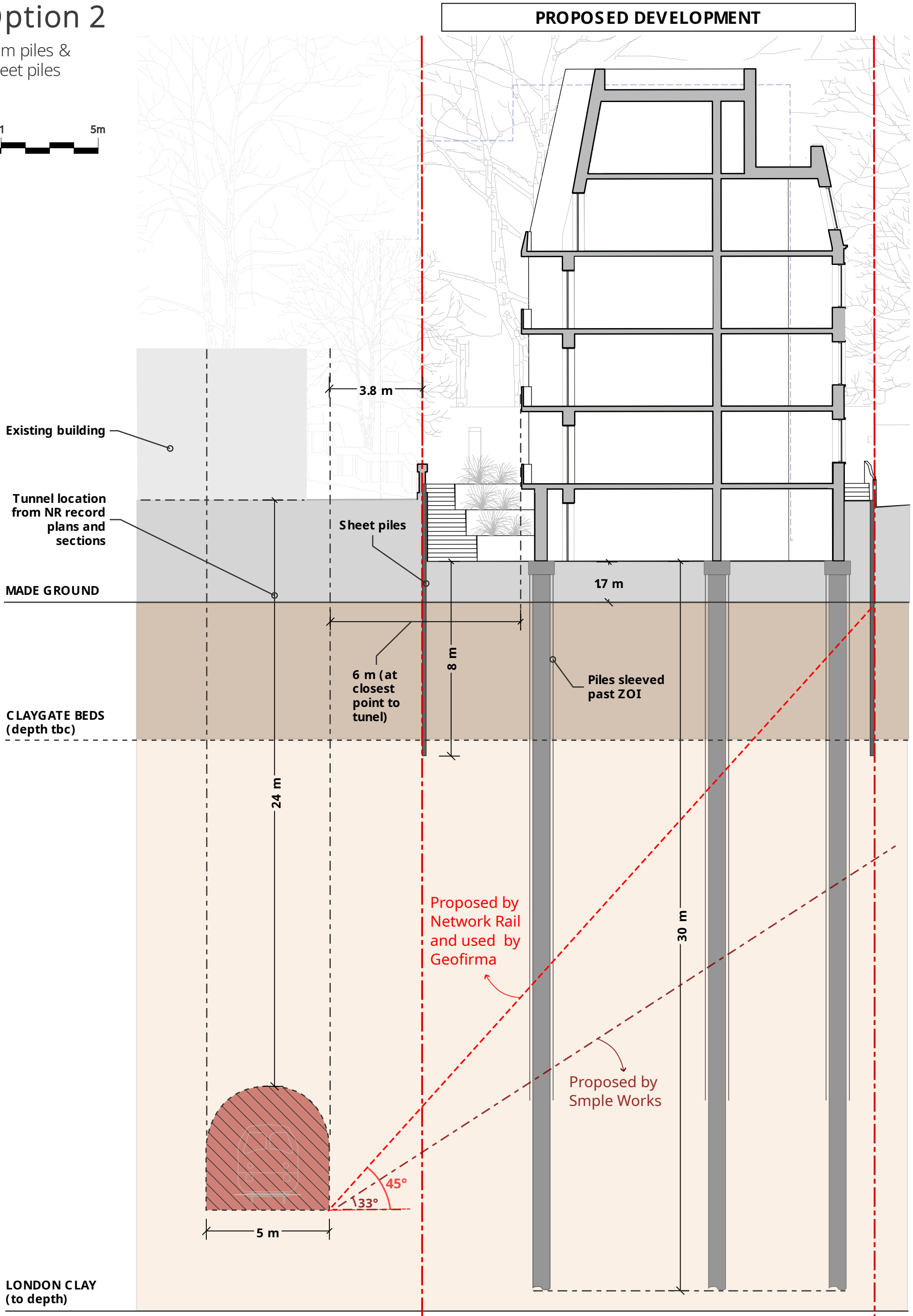
MARE ST STUDIOS, LONDON, E8 3JS

Option 2

30m piles &
sheet piles

0 1 5m



Drawing done by simple works and modified by GEOFRIMA Ltd

SIMPLE WORKS, UNIT 301, 203/213
MARE ST STUDIOS, LONDON, E8 3J S

APPENDIX G –

SITE PHOTOGRAPHS

SITE PHOTOGRAPH 1

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

SITE PHOTOGRAPH 2

		GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project Title	31 Daleham Gardens, London NW3 5BU	
Project No	2023/002/SIM/DAL	

SITE PHOTOGRAPH 3

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

SITE PHOTOGRAPH 4

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

SITE PHOTOGRAPH 5

Project Title	31 Daleham Gardens, London NW3 5BU
Project No	2023/002/SIM/DAL

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

SITE PHOTOGRAPH 6

Project Title	31 Daleham Gardens, London NW3 5BU
Project No	2023/002/SIM/DAL

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

SITE PHOTOGRAPH 7

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

SITE PHOTOGRAPH 8

Project Title	31 Daleham Gardens, London NW3 5BU	GEOFIRMA GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS
Project No	2023/002/SIM/DAL	

APPENDIX H –

GAS AND GROUNDWATER MONITORING RESULTS

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

GAS AND GROUNDWATER MONITORING RESULTS

Contract Name :	31 Daleham Gardens
Contract No :	2023-002-SIM-DAL
Date :	6.2.23

Background Readings:																
	O_2% v/v :	20.4	CO_2% v/v :	0.0	CH_4% v/v :	0.0	Weather Conditions :	Sunny Warm					Equipment Used:	Technician:		
	H_2S ppm :	0	CO ppm :	0	Pressure Trend :	Stable	Ground Conditions :	Damp					GFM436	ES		

Location	Date	Atmospheric Pressure (mb)	Differential Pressure (mb)	O_2(% v/v)		CO_2 (% v/v)		CH_4 (% v/v)		H_2S (ppm)	CO (ppm)	Gas Flow Rate (l/hr)		VOC (ppm)	Depth to LNAPL	Water Depth	Depth to DNAPL	Total Depth
				Low	Steady	High	Steady	High	Steady	Peak	Peak	Peak	Steady	Peak	(mbgl)	(mbgl)	(mbgl)	(mbgl)
BH2	6.2.23	1032	0.00	16.3	16.3	3.4	3.3	0.0	0.0	0	0	0.0	0.0	0.0	n.a.	5.49	n.a.	5.50
BH1a		1032	0.00	12.3	14.2	0.1	0.1	0.0	0.0	0	10	0.0	0.0	0.0	n.a.	3.25	n.a.	10.20
BH2	9.3.23	982	0.00	14.5	14.5	5.4	5.4	0.0	0.0	0	0	0.0	0.0	0.0	n.a.	DRY	n.a.	5.50
BH1a		982	0.00	18.9	18.9	0.2	0.2	0.0	0.0	0	0	0.0	0.0	0.0	n.a.	3.20	n.a.	10.20

APPENDIX I –

DEMOLITION RECYCLING REPORT

Demolition Recycling Report

Site Name:	Daleham Gardens
Address:	31 Daleham Gardens, London, NW3 5BU
Date:	22nd December 2021
Audit By:	Karl Larcombe
Audit Details	This report was completed by Karl Larcombe of M&M Demolition Co Ltd. Senior Project Manager

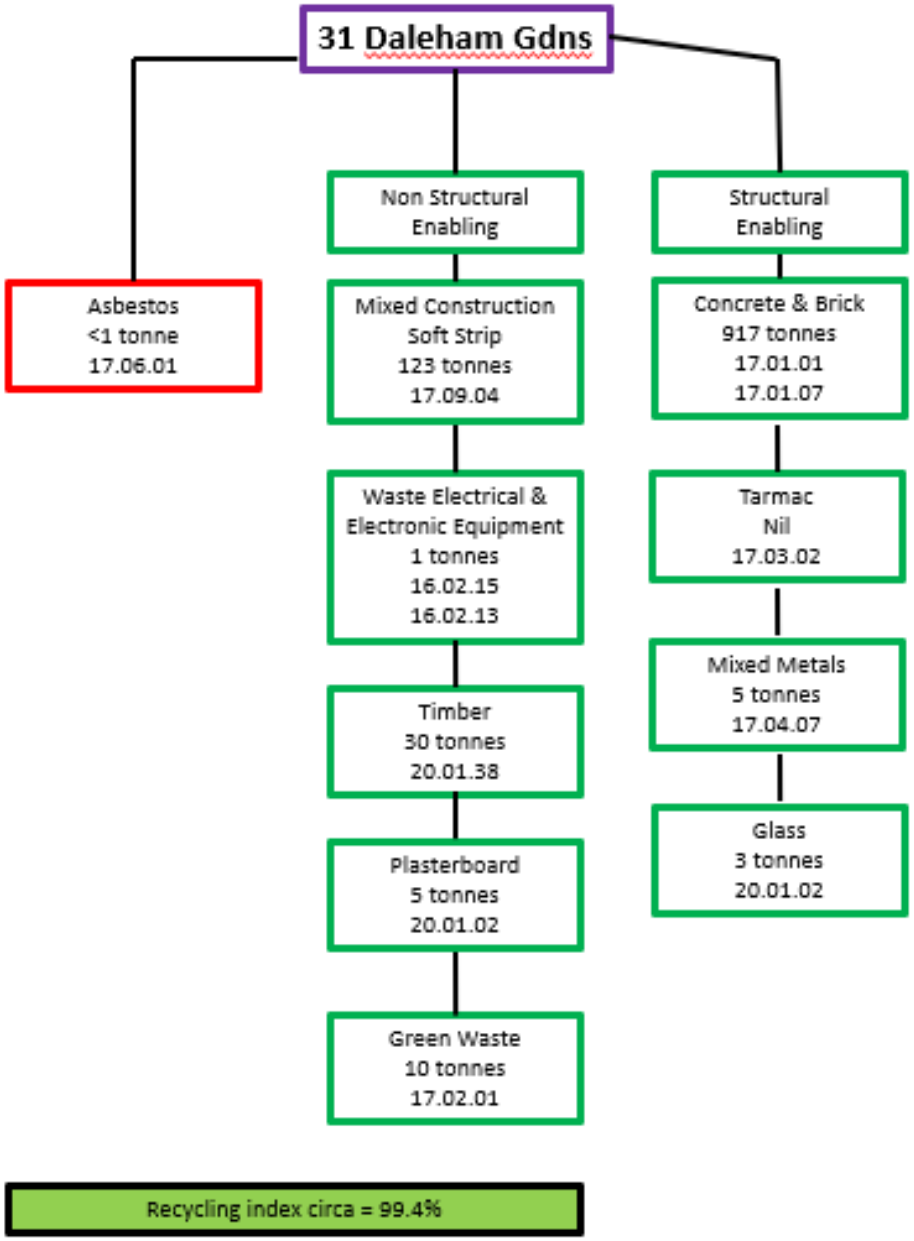
M & M Demolition Co Ltd were contracted by Camden Council to demolish the severely fire damaged property at 31 Daleham Gardens. M & M Demolition managed to achieve recycling return of 99.4% of the demolition materials for this project. These figures are based on the waste carriers average recycling returns with only a small percentage of the general construction waste and the asbestos being used as landfill. The majority of the waste, hardcore and concrete, is processed with a crushing plant and used to produce recycled aggregate. M & M Demolition are able to recycle aggregate on site using their own mobile crushing plant should the client require this within their package.

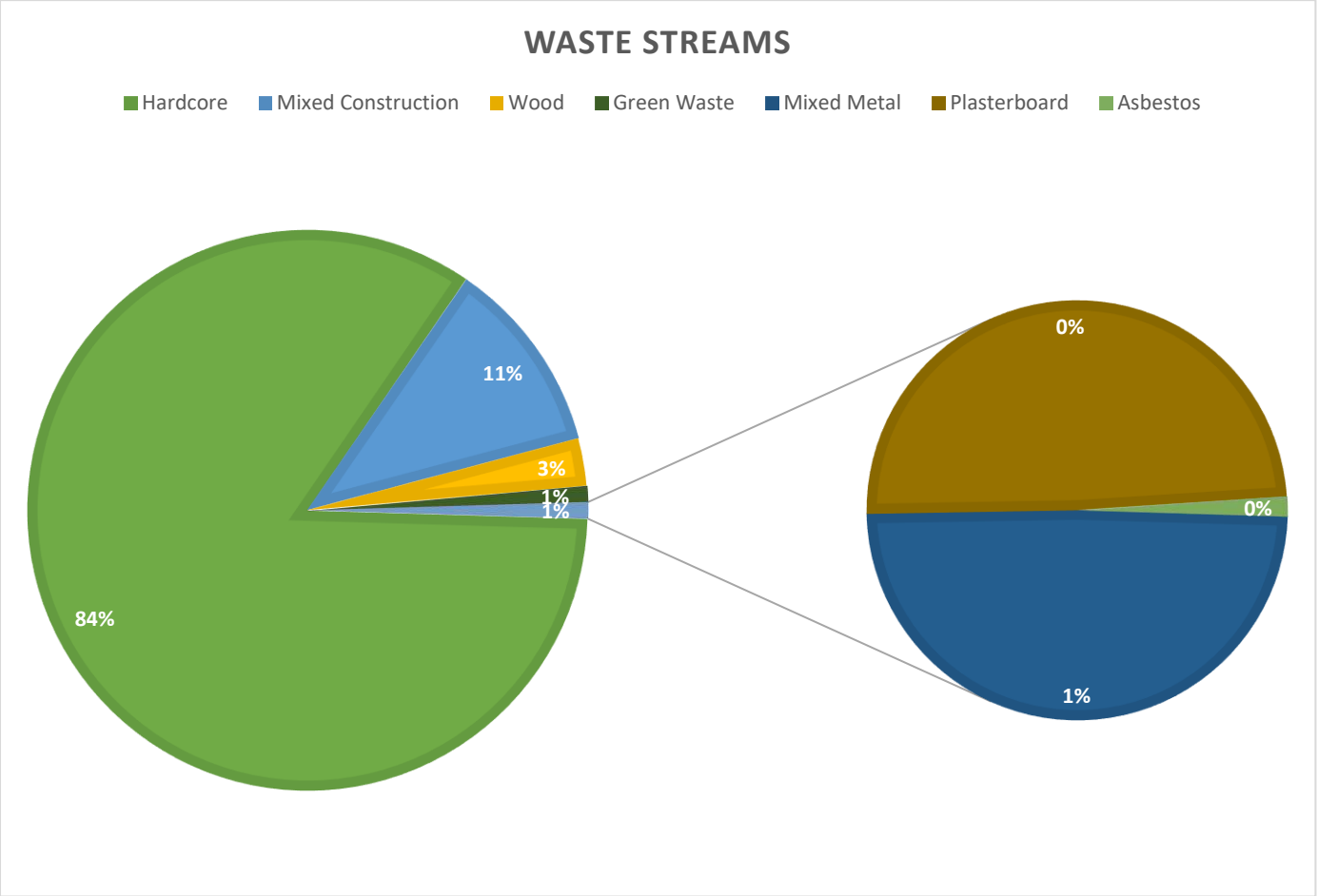
Due to the severity of the fire damage and structural instability of the property, the recognised process of soft stripping the building prior to structural demolition was not possible. To segregate the demolition spoil into separate waste streams, the hardcore produced from mechanical demolition was processed by hand picking and mechanically using the selector grab attachment separating the mixed construction waste (plastic, wood, paper etc.) and metal from the hardcore. The mixed construction waste was loaded into 40 yard Roll On Roll Off bins and sent to a transfer station for further segregation. The metal waste was loaded into a 40 yard Roll On Roll Off bin and sent to EMR's yard for re-cycling. Hardcore and concrete was loaded into 8 wheeled tipper lorries and sent away for crushing. Asbestos waste was removed prior to demolition wrapped and removed from site by our licensed asbestos contractor ECT Environmental.

Waste Carriers on Project		
Product	**Carriers Name**	**Waste Carrier License**
Mixed Metal	EMR LTD	CBDU188448
Mixed Construction Waste	Manns Waste	CBDU83142
Green Waste	Manns Waste	CBDU83142
Mixed Construction Waste	Rhino Waste	CBDU112723
Hardcore	RMS Haulage	CBDU149396
Hardcore	O'Donovan	CBDU116673
Asbestos	ECT Environmental	CB/CBDU650625

Segregation Arrangements	Applicable	Notes & Details	Application of recycled material	Associated Issues
Plasterboard / Gypsum	Yes	Non-hazardous, fully recycled	A closed loop recycling solution.	None
Glass	Yes	Non-hazardous, fully recycled	A closed loop recycling solution	None
Cables	Yes	Non-hazardous, fully recycled	Plastic and copper separated to make plastic furniture etc and new cable	None
Contaminated Metals (Dangerous Substances)	No	Hazardous – treatment of residual and then fully recycled.	N/A	
Refrigerators / Air Cond.	No	Non-hazardous if re-purposed, fully recycled	A closed loop recycling solution.	None
WEEE	Yes	Hazardous / Non-hazardous, fully recycled	Products stripped to make new electrical components and plastic recycled.	None
Solvents, Paints, Chemicals	No	Hazardous, recovered and treated / re-used.	N/A	
Concrete	Yes	Non-hazardous, fully recycled	Crushed to make aggregate for building	None
Tarmac	No	Non-hazardous, fully recycled	Crushed and reused for hardstanding	None
Canteen Waste	Yes	Non-hazardous, fully recycled	Used to make compost	None
Mixed Construction Waste	Yes	Non-hazardous, fully recycled	Sent to Transfer Station sorted into separate waste streams, Wood shredded for Fibre Board Plastic recycled into carpets, plastic furniture. Paper and cardboard recycled into egg boxes, car insulation, dust masks etc. can be turned into biofuel for energy	None
Mixed Metals	Yes	Non-hazardous, fully recycled	Shredded and melted down to metal plates etc	None
Timber / Doors	Yes	Non-hazardous, fully recycled	Shredded to reform into MDF or similar material	None
Mineral Oils	No	Treatment, disposal and re-use	A Closed loop recycling solution	

Items containing CFCs / HFCs	No	Recovery, treated, fully recycled	N/A	
Fluorescent Tubes	No	Hazardous, recovered, treated and recycled	Mercury and glass separated and reused to make fluorescent tubes	None
Mix of concrete, bricks, tiles and rubble.	Yes	Non-hazardous, fully recycled	Crushed to make aggregate for building	None
Soils & Stones	No	Non-hazardous, fully recycled	N/A	
Asbestos	Yes	Hazardous non-recyclable	Sent to Licensed Tip	None
Green Waste	Yes	Non-hazardous Fully recycled	Recycled board, compost, bio-fuel	None





Recycling Index Circa 99.4%

Daleham Gardens				WASTE LOG			
				Conveyance note		Disposal Site	
Date	Carrier Registration	Haulier	Veh Reg	Waste Description	E W Code	Name	Ticket No
21-Oct-21	CB/CBDU650625	ECT	CR19 LSU	Doors & debris	17 06 01	CM13 3HD	3105
10-Nov-21	CBDU112723	Rhino Waste	LN68 ZPX	General Waste	17 09 04	EPR/FB3203LL/A001	33711
15-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138129
16-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138209
17-Nov-21	CBDU112723	Rhino Waste	LN68 ZNX	General Waste	17 09 04	EPR/FB3203LL/A001	34186
17-Nov-21	CBDU112723	Rhino Waste	LN68 ZNX	General Waste	17 09 04	EPR/FB3203LL/A001	34187
17-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138332
18-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138333
22-Nov-21	CBDU149396	RMS Ltd	EA66 BHZ	Hardcore	17 01 07	EPR/KB3136AM	630657
22-Nov-21	CBDU149396	RMS Ltd	EY68 YPA	Hardcore	17 01 07	EPR/KB3136AM	631716
24-Nov-21	CBDU149396	RMS Ltd	EY20 YTD	Hardcore	17 01 07	EPR/KB3136AM	625461
24-Nov-21	CBDU149396	RMS Ltd	EY64 CCE	Hardcore	17 01 07	EPR/KB3136AM	635705
24-Nov-21	CBDU149396	RMS Ltd	EY15 BYL	Hardcore	17 01 07	EPR/KB3136AM	634206
24-Nov-21	CBDU149396	RMS Ltd	EY20 YTB	Hardcore	17 01 07	EPR/KB3136AM	633713
24-Nov-21	CBDU149396	RMS Ltd	E65 BZU	Hardcore	17 01 07	EPR/KB3136AM	633424
24-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138813
25-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138814
29-Nov-21	CBDU83142	MANNS Waste	EY71 SYW	General Waste	17 09 04	EPR/HP3098VH	138975
29-Nov-21	CBDU149396	RMS Ltd	EJ68 TGK	Hardcore	17 01 07	EPR/KB3136AM	626094
29-Nov-21	CBDU149396	RMS Ltd	EK19 UUV	Hardcore	17 01 07	EPR/KB3136AM	631586
29-Nov-21	CBDU149396	RMS Ltd	EU66 XEX	Hardcore	17 01 07	EPR/KB3136AM	631372
29-Nov-21	CBDU149396	RMS Ltd	EH19 UMA	Hardcore	17 01 07	EPR/KB3136AM	636824
29-Nov-21	CBDU149396	RMS Ltd	EK19 UVJ	Hardcore	17 01 07	EPR/KB3136AM	626838
30-Nov-21	CBDU116673	O'Donovan	KT19 JPV	Hardcore	17 01 07	N15 4QF	325380
30-Nov-21	CBDU116673	O'Donovan	KW17 YMR	Hardcore	17 01 07	N15 4QF	330081
30-Nov-21	CBDU116673	O'Donovan	GR18 XCM	Hardcore	17 01 07	N15 4QF	329756
30-Nov-21	CBDU116673	O'Donovan	WP15 EOO	Hardcore	17 01 07	N15 4QF	327446
30-Nov-21	CBDU116673	O'Donovan	YN16 FTL	Hardcore	17 01 07	N15 4QF	329851

31 Daleham Gardens					Import Log	

Date	Carrier Registration	Haulier	Veh Reg	Material Description	Collection Point	Ticket No
08-Dec-21	CBDU116673	O'Donovan	EK19 UWN	6F2	N15 4QF	326399
08-Dec-21	CBDU116673	O'Donovan	496 JOE	6F2	N15 4QF	319081
08-Dec-21	CBDU116673	O'Donovan	EK19 UWL	6F2	N15 4QF	320076
08-Dec-21	CBDU116673	O'Donovan	KR68 UDU	6F2	N15 4QF	319160
13-Dec-21	CBDU116673	O'Donovan	EY18 HBF	6F2	N15 4QF	328810
13-Dec-21	CBDU116673	O'Donovan	GF18 ZTU	6F2	N15 4QF	327584
13-Dec-21	CBDU116673	O'Donovan	GF18 ZTP	6F2	N15 4QF	329244
13-Dec-21	CBDU116673	O'Donovan	GF18 ZTP	6F2	N15 4QF	329246
14-Dec-21	CBDU93685	LYNCH	EX21 HVT	Top Soil	UB9 4DF	T4818211214065230
14-Dec-21	CBDU93685	LYNCH	EX21 HVT	Top Soil	UB9 4DF	T4818211214102645
14-Dec-21	CBDU93685	LYNCH	EX21 HVT	Top Soil	UB9 4DF	T4818211214085115
14-Dec-21	CBDU93685	LYNCH	KR69 OSY	Top Soil	UB9 4DF	377337
14-Dec-21	CBDU93685	LYNCH	KR69 OSY	Top Soil	UB9 4DF	377338
14-Dec-21	CBDU93685	LYNCH	KR69 OSY	Top Soil	UB9 4DF	377339
14-Dec-21	CBDU93685	LYNCH	KR69 OSW	Top Soil	UB9 4DF	381987
14-Dec-21	CBDU93685	LYNCH	KR69 OSW	Top Soil	UB9 4DF	381988

31 Daleham Gardens			M&M DEMOLITION		Import Log	

Date	**Carrier Registration**	**Haulier**	**Veh Reg**	**Material Description**	**Collection Point**	**Ticket No**

HEALTH AND SAFETY FILE/POST DEMOLITION WORKS REPORT (CDM 2015)

Project Name: 31 Daleham Gardens, Belsize Park, London, NW3 5BU

The Professional Team					
Client:	**London Borough of Camden**		**Principal Contractor:**		**M&M Demolition Co Ltd**
Construction Consultants:	**Heritage Surveys Ltd**	**Quantity Surveyors:**	**Heritage Surveys Ltd**	**Principal Designer:**	**Bailey Garner (Health and Safety) Ltd**

Description of the Site	
Original Site Use & Description:	**M&M Demolition Ltd were contracted by London Borough of Camden to demolish the severely fire damaged property at 31 Daleham Gardens, Belsize Park, NW3 5BU.** **The site is located within a residential area in the London Borough of Camden the site will be sold to others for future Re-Development.**
Site Location:	**31 Daleham Gardens, Belsize Park, London, NW3 5BU**
Description of Works Carried Out:	• **Site Set Up & Welfare** • **Rodent Survey** • **CCTV Survey** • **Dilapidation Survey** • **Disconnection of Services** • **Tree Protection Works** • **Installation of Environmental Monitors** • **Asbestos Removal Works** • **Erection of Demolition Scaffolding** • **Mechanical Demolition of Structure** • **Removal of All Scaffolding** • **Reclaiming Red Bricks** • **Removal of Slabs and Foundations** • **Site Clearance Works** • **Formation of Site Levels** • **Removal of High Level Hoarding** • **Soil and Seeding** • **Erection Boundary Fence** • **Erection of Site Hoarding Front of the Site**

Access to Work Site:	**Via Main Site Temporary Entrance Vehicular Gates at the front of the Site**
Date of Possession of the Site and Completion Date:	**18th October, 2021 to 17th December, 2021**
Description of Completed Works	
Description of Completed Works:	• Site Set Up & Welfare • Rodent Survey • CCTV Survey • Dilapidation Survey • Disconnection of Services • Tree Protection Works • Installation of Environmental Monitors • Asbestos Removal Works • Erection of Demolition Scaffolding • Mechanical Demolition of Structure • Removal of All Scaffolding • Reclaiming Red Bricks • Removal of Slabs and Foundations • Site Clearance Works • Formation of Site Levels • Removal of High Level Hoarding • Soil and Seeding • Erection Boundary Fence • Erection of Site Hoarding Front of the Site
Remaining Site Hazards and Location:	**None Known**
Remaining Installed Temporary Works:	**Site Hoarding – Design and Calculations Attached.** 

Description of Completed Works (continued)	
Remaining Scaffolding:	**Not Applicable**
Waste Materials moved from Site	
Hazardous Wastes:	**Asbestos Containing Materials** **Hazardous Waste Consignment Note Attached.**
Non-hazardous Wastes:	**General Waste & Metal** **Waste Log Attached.**
Waste Removal Contractors details	
Hazardous Wastes:	**ECT Environmental Ltd – Waste Consignent Note Attached**
Non-hazardous Wastes:	**Rhino – General Waste Away From Site** **Manns Waste – General Waste Away From Site** **RMS – Hardcore & Concrete Away From Site** **O'Donovan - Hardcore & Concrete Away From Site** **EMR – Scrap Metal Away From Site** **Waste Log Attached.**
Final Site Conditions:	**The Site was left Clean and Tidy and as per the clients requirements.**

	 **<u>Remaining Structures</u>** New Boundary Fencing 
Noted Structural Defects: (on site and adjacent properties)	**Not Applicable**
Services:	**Services Disconnected by prior to demolition works commencing.**

	Electrical Disconnection Certificate Attached. **Gas Disconnection Certificate Attached.** **BT Disconnection Email Attached.** **Water – Turned off stop valve outside the Boundary.**
Remaining Licences and Notices in Force:	**Not Applicable**
Final Site Condition Acceptance/Sign off date:	**Site Handover 17.12.2021**
Documents and Drawings Submitted with this Report	
Waste Disposal	**Waste Log Attached**
Isolation & Disconnection Certificates	**Attached**

This report has been compiled in accordance with our requirements of the Construction (Design & Management) Regulations 2015 (CDM2015). The information forms our contribution to the Health and Safety File which is submitted to our client on completion of our works.

For: London Borough of Camden

Name: Matthew P Saunders

Signature:

Title: Director

M&M Demolition Co Ltd

Date: 17th December, 2021

Clinic

31 Daleham Gardens
Three Storey Brick Building

Private Flats
Three Storey Brick Building

Private Property

Private Gardens

Grass

Soil

Paving

Concrete

Pallets

Shed

Canopy

Stump

Rubble Pile

Stone Wall 0.3h

Retaining Wall 1.2h

Retaining Wall 0.8h

Wall 0.2h

Wall 1.6h

Unable to Survey
Due to Scaffolding

Hoarding 3h

No Access

Herras 2h

Shrubs 2h

Structurual Damage to
Corner of Wall

Unable to Determine Thickness
of Rear Wall

40m

41.6m

21.3m

15.2m

76.2m

Scale 1:200 (m)

0 2 4 6 8 10

32a

32b

Geofirma Ltd
Cardinal Point
Park Road
Rickmansworth
Hertfordshire
WD31RE

geofirmaconsultants.co.uk

Appendix D - Project risk register

MAJOR INJURY OR ILL HEALTH	H	M	M	L						
MINOR INJURY OR ILL HEALTH	M	M	L	L						
NO INJURY OR ILL HEALTH	L	L	L	L						

CDM DESIGN RISK ASSESSMENT FORM

Simple Works, Unit 301 Mare St Studios, London, E8 3LY										
DOCUMENT REF.	SW_CDM_DESIGN_HAZARD_RISK_ASSESSMENT_FORM_REV 00									
PROJECT NAME	Daleham Gardens		PREPARED BY	AC		DATE	27/01/2023			
PROJECT NO.	1803		APPROVED BY	PI		DATE	27/01/2023			

REF. NO.	HAZARD DESCRIPTION	RISK LEVEL BEFORE DESIGN MITIGATION (H / M / L)	MITIGATION MEASURES	RISK LEVEL AFTER DESIGN MITIGATION (H / M / L)	SIGNIFICANT RESIDUAL RISK COMMENTS / ADDITIONAL INFO FOR THE CONTRACTOR & OTHERS AND METHOD OF CONVEYANCE E.G. ON DRAWINGS
1. DESIGN STAGE					
1.1	NETWORK RAIL TUNNEL TO SOUTH OF SITE MAY IMPACT DESIGN AND APPROVAL PROCESS COULD LEAD TO DELAYS	H	APPROVALS WITH NETWORK RAIL WILL BE REQUIRED WHICH WILL MITIGATE ANY RISK	L	
1.2	PROPOSED SUPER IMPOSED DEAD LOADINGS (FINISHES) CURRENTLY UNCONFIRMED AND ASSUMED	L	THE FLOOR BUILD UPS AND FINISHES TO BE AGREED IN THE NEXT STAGES TO ENSURE THE STRUCTURE CAN BE DESIGNED TO ACCOMODATE THIS. CHANGES TO THESE AFTER ISSUE OF TENDER INFORMATION WOULD HAVE THE POTENTIAL TO CAUSE A REDESIGN AFFECTING STRUCTURAL ZONES AND CONSTRUCTION PROGRAMMING.	L	
1.3	PROPOSED SUPER IMPOSED DEAD LOADINGS (FINISHES) CURRENTLY UNCONFIRMED AND ASSUMED	L	THE CLADDING LOADS TO BE AGREED IN THE NEXT STAGES	L	
1.4	RISK OF CONTAMINATION ON SITE	M	GEOTECHNICAL INVESTIGATIONS HAVE BEEN CARRIED OUT AND A CONTAMINATION ASSESSMENT WAS INCLUDED. THE RECOMMENDATIONS ARE INCLUDED IN THE REPORT	L	
1.5	DESIGN PARAMETERS FOR SUB STRUCTURE UNKNOWN	M	GEOTECHNICAL INVESTIGATION HAVE BEEN CARRIED OUT TO DETERMINE REQUIRED PARAMETERS. THE FULL REPORT IS IN THE REPORT	L	
1.6	BASEMENT IMPACT ASSESSMENT IS REQUIRED FOR PLANNING	M	A BASEMENT IMPACT ASSESSMENT REPORT HAS BEEN PREPARED FOR SUBMISSION WITH PLANNING. AN INDPENDENT REVIEW OF THIS HAS BEEN CARRIED OUT AND SUITABLE TIME ALLOWANCE SHOULD BE MADE FOR RESOLVING ANY COMMENTS POST PLANNING	L	
1.7	RISK OF OBSTRUCTIONS FROM REMAINS OF DEMOLISHED BUILDING IF NOT FULLY REMOVED AT TIME OF DEMOLITION	M	SURVEY TO CONFIRM IF ENTIRE FOOTPRINT OF BUILDING WAS REMOVED	L	
1.8	ATTENUATION ON SITE WILL BE REQUIRED TO ACHIEVE SURFACE RUN OFF RATE	M	LOCATION OF ATTENUATION TANKS LIKELY TO BE IMPACTED BY NETWORK RAIL REQUIREMENTS. BLUE ROOFS TO BE CONSIDERED IN DESIGN	M	
1.9	DRAINAGE CONNECTIONS FOR THE NEW DEVELOPMENT	M	SOME OF THE EXISTING CONNECTIONS MAY BE REUSEABLE. CCTV SURVEY UPDATES ARE BEING UNDERTAKEN TO ESTABLISH CONNECTIONS	L	
1.10	RETAINING WALLS MAY REQUIRE MINIMUM OFFSETS FROM SURROUNDING STRUCTURES WHICH MAY IMPACT THE SIZE OF LIGHTWELLS AND BUILDING LOCATIONS	L	FURTHER DESIGN ITREATION SHOULD MITIGATE THE RISK OF THIS	L	
1.11	DESIGN ASSUMES TIMBER IS NOT ACCEPTABLE WITHIN EXTERNAL BUILD UPS FOR FAÇADE WHEN OBTAINING GLA FUNDING. IF RULES CHANGE THE DESIGN MAY BE REVISED TO UTILISE MORE TIMBER	L	SITUATION AND RULES SHOULD BE MONITORED	L	
1.12	RISK OF DEEPER DISTRIBUTION OF MADEGROUND AROUND THE SITE	M	FURTHER GEOTECHNICAL INVESTIGATIONS WILL BE REQUIRED TO EXPLORE GROUND IMPROVEMENTS AND CHEK THE EXTENT OF THE MADE GROUND TO DEVELOP THE RAFT DESIGN IN THE NEXT STAGES	L	
2. CONSTRUCTION STAGE					
2.1	UNIDENTIFIED SERVICES WITHIN THE FOOTPRINT	M	GPR SURVEY TO BE UNDERTAKEN IN ADVANCE AND CONTRACTOR TO EXCAVATE IN 300mm INCREMENTS AND STOP TO CHECK THERE ARE NO BURIED SERVICES	L	
2.2	CONTAMINATION ON SITE	M	WAC TESTING SHOULD BE CARRIED OUT IN ADVANCE OF STARTING	L	
2.3	DISCOVERY OF UXOs	M	CONTRACTOR TO UNDERTAKE NECESSARY ASSESSMENTS AND SURVEYS TO MINIMISE RISK	L	
2.4	DAMAGE TO TREES TO BE RETAINED DURING CONSTRUCTION	M	REFER TO ARBORICULTURAL REPORT FOR MITIGATION OF RISK FOR TREES	L	
2.5	OPEN EXCAVATIONS	M	CONTRACTOR TO ENSURE ALL EXCAVATIONS ARE CARRIED OUT SAFELY	L	
2.6	EXCESSIVE CONSTRUCTION LIVE LOAD OR LOADING BEFORE CONCRETE SLAB HAS SUFFICIENTLY CURED.	M	A SITE MANAGEMENT SYSTEM CONTROLLING ACCESS AND STORAGE OF MATERIALS/EQUIPMENT TO BE IMPLEMENTED BY CONTRACTOR	L	
2.7	DUST AND OTHER PARTICULATES PRODUCED DURING CONSTRUCTION WORKS, PARTICULARY CONCRETING	M	MEASURES SHOULD BE TAKEN ON SITE TO LIMIT DUST INCLUDING SUPRESSION SYSTEMS	L	
2.8	DEMO/CONSTRUCTION VIBRATIONS CAUSING DAMAGE TO SURROUNDING STRUCTURES	M	VIBRATION LIMITS AS PER BEST PRACTICE, CONTRACTOR TO AGREE THESE	L	
2.9	WASTE ACCEPTANCE CRITERIA NOT MET	M	CONTRACTOR TO PERFORM FURTHER TESTING PRIOR TO REMOVAL OF ANY SOIL OFF SITE TO CLASSIFY THE SITE SOILS TO BE TRANSPORTED	L	
3. MAINTENANCE & USE					
3.1	LONG TERM CREEP OF TIMBER ELEMENTS IF EXPOSED TO HIGH LEVELS OF MOISTURE	M	ALL TIMBER ELEMENTS TO BE PROTECTED FROM MOISTURE INGRESS. WATERPROOFING BY OTHERS.	L	
3.2	LONG TERM RISK OF MOVEMENT TO SOIL DUE TO NEIGHBOURING TREES	M	TREES OF HIGH WATER CONTENT REMOVED FROM THE SCHEME CLOSE TO THE PROPOSED DWELLINGS	L	
3.3	MAINTENANCE STRATEGY FOR EXTERNAL ENVELOPE WILL BE REQUIRED WHICH TAKES ACCOUNT OF BUILDING FORM	M	O&M MANUAL TO BE PREPARED	L	

Appendix E - Architect's Drawings