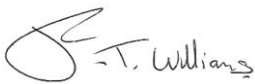


Ground Investigation Report

167 Hermitage Road, Harringay, London N4 1LZ

On behalf of Topfling

Report Reference: GWPR4712/GIR/June 2022 V1.01			Status: Final
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V1.01			
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EXECUTIVE SUMMARY	
PROPOSED DEVELOPMENT	At the time of reporting, June 2022, the proposed development was understood to comprise redevelopment of the Omega Works A site on 167 Hermitage Road. The existing building on site is to be demolished with the exception of part of the façade on Hermitage Road. The proposed development is to consist of a mixed end use which will include commercial, warehouse and residential end use within three blocks varying from 4 to 9 stories. The south-easternmost proposed structure is to have a full footprint single storey basement. The proposed basement is 58.30m long by 17.30m wide and 4.85m deep, noted to be full footprint below the proposed structure in the south.
GEOLOGY	The British Geological Survey Solid and Drift Geology Map for the Haringey area (North London Sheet No. 256) revealed that the site was underlain by bedrock deposits of the London Clay Formation, no superficial deposits were recorded. Areas of Made Ground or Reworked Ground were noted approximately 180m west and 180m east of the site. No other areas of made ground, superficial deposits or other bedrock deposits were noted within a 250m radius.
HYDROGEOLOGY	A study of the aquifer maps on the DEFRA website revealed the site was underlain by Unproductive Strata comprising bedrock deposits of the London Clay Formation. The nearest surface water feature was the New River located 200m south of the site. The New River was flowing in an westerly to easterly direction. Two reservoirs were recorded 600m south-east of the site. From analysis of hydrogeological and topographical maps the actual groundwater table was anticipated to be encountered at depth below the London Clay Formation. Some amounts of groundwater, however, may be present at shallower depths perched within Made Ground, or silty/sandy pockets of the London Clay Formation. It was considered that groundwater was flowing in a south-easterly direction toward the New River in line with local topography. Examination of the Environment Agency records showed that the site was located within a Flood Zone 1, i.e. an area with a low probability of flooding.
VOLUME CHANGE POTENTIAL	The soils of the London Clay Formation was recorded as having medium to very high volume change potential.
FOUNDATION DESIGN	Based on the investigation results and proposed development plans, including anticipated loads for this building, foundations were recommended to extend beyond 2.50m bgl. Given the anticipated required depth of strip footings, a piled foundation scheme was deemed more suitable. Indicative/guidance limit loads and settlements for a bored pile have been given within the table in section 6.3 of this report and have been based on BH2.
HEAVE ANALYSIS	The analyses of Model 2 indicated a maximum amount of heave of 20.10mm beneath the centre of the proposed development, where short term conditions of the full development were modelled. Model 3 also modelled the full development but was based on long term conditions and calculated the maximum heave to increase to ~27mm. The highest risk of movement will likely occur during the construction of the

	basement and later through long-term heave of the constructed basement.
GROUND MOVEMENT ANALYSIS AND BUILDING DAMAGE CATEGORIZATION	The results of the Ground Movement assessment can be seen in section 6.5.
SUB-SURFACE CONCRETE	The water soluble sulphate concentration for the Made Ground ranged between 26.2-1,010mg/l, with a pH range of 7.93-11.00. The total potential sulphate was 0.2958%. According to BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground' a Sulphate Design Class of DS-2 could be used for sub-surface concrete in contact with the Made Ground. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-2. The water soluble sulphate concentration for the London Clay Formation ranged between 613-2,630mg/l, with a pH range of 7.93-8.33. The total potential sulphate ranged between 0.387-1.218%. According to BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground' a Sulphate Design Class of DS-4 could be used for sub-surface concrete in contact with the London Clay Formation. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-4.

1.0 INTRODUCTION

1.1 General

Ground and Water Limited were instructed by Topfling on the 29th March 2022 to conduct a Ground Investigation Report on the site at 167 Hermitage Road, Harringay, London N4 1LZ. The scope of the investigation was detailed within the fee proposal GW-0647, dated the 24th March 2022.

1.2 Aims of the Investigation

The aim of the investigation was understood to be to supply the client and their designers with information regarding the ground conditions underlying the site to assist them in preparing an appropriate scheme for development.

The techniques adopted for the investigation were chosen considering the requirements of the client, anticipated ground conditions, and bearing in mind the nature of the site, limitations to site access and other logistical limitations.

The investigation was to be undertaken to provide parameters for the design of foundations by means of in-situ and laboratory geotechnical testing undertaken on soil samples recovered from trial holes.

The proposed development includes a basement. A Geotechnical Desk Study and Land Stability Assessment was carried out, however, a full screening and scoping for a BIA, including screening and detailed comment on surface water flooding/management or combined flooding (sourced from SFRA or similar sources), were not part of the remit of this report

In addition, a Ground Movement Assessment for the impact of the proposed development on surrounding properties and assets was in the remit of the report.

A Contamination Assessment Report (CAR) will be provided at a later date supplying information regarding contamination and waste.

1.3 Conditions and Limitations

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

This Ground Investigation Report must be read in conjunction with the following reports:

- Desk Study Report (ref. GWPR4712/DS/May 2022).
- Full-scale Contamination Assessment (ref. GWPR4712/CAR/June 2022).

1.4 Technical Glossary

Generic technical terms can be viewed within the glossary provided within Appendix B.

2.0 SITE SETTING

2.1 Site Location

The site comprised a ~3,800m² rectangular-shaped plot of land, orientated in a north-east to south-west direction, along the north-western side of Hermitage Road. The site was located in the southern portion of the borough of Haringey, North London. The national grid reference for the centre of the site was approximately TQ 32344 88096. A site location plan is given within Figure 1.

2.2 Site Description

A Site Walkover was undertaken on the 3rd May 2022. A description of the site, as noted during the Site Walkover, is tabulated below.

Site Description Sheet	
Use of site	At the time of the site walkover, 3 rd May 2022, the site was predominantly used as commercial/industrial buildings within three main Building blocks referenced Omega A, B and C with other small outer buildings along the western boundary of the site.
Site topography	The site was generally flat.
Area topography	The land to the north, south and east of the site was generally flat. An area of raised ground was noted beyond the western boundary of the site.
Structures onsite	A Main warehouse two storey brick built structure occupies the central area of the site with a number of smaller extensions along the northern part of the building. A number of buildings were also located along the western boundary of the site.
Structures off-site	To the north of the site were large industrial warehouse units within the Crusader Industrial Park. To the east, south and south-west of the site were residential properties along Hermitage Road. To the west of the site were residential properties that were slightly raised compared to the site.
Use of surrounding ground	Commercial/Industrial use and residential buildings.
Boundary features	Northern Boundary: A wall with Crusader Industrial Park beyond. Eastern Boundary: An access road to the industrial park with residential houses beyond. Southern Boundary: Hermitage Road with residential houses beyond. Western Boundary: A grass embankment leading up to residential houses.
Site covering	The entire site was covered with tarmac hardstanding with small areas of unkept vegetation that's has grown around the concrete hardstanding on the northern boundary and south-western corner of the site.
Contamination sources onsite	General fly tipped material in places. Storage of old vehicles noted on site.
Contamination sources off-site	None Noted.
Vegetation onsite	Sporadic grass and small bushes along the northern boundary of the site and close to the site entrance in the south-western corner.
Vegetation off-site	Mature trees were located beyond the western boundary growing on the embankment area. Some small trees- 1-2m were located along Hermitage Road to the south of the site. No other vegetation was recorded in close proximity to the site.
Services	Drainage was noted on the south-western corner of the site along the access road. Other services were assumed going into the industrial buildings from Hermitage Road.

2.3 Proposed Development

At the time of reporting, June 2022, the proposed development was understood to comprise redevelopment of the Omega Works A site on 167 Hermitage Road. The existing building on site is to

be demolished with the exception of part of the façade on Hermitage Road. The proposed development is to consist of a mixed end use which will include commercial, warehouse and residential end use within three blocks varying from 4 to 9 stories. The south-easternmost proposed structure is to have a full footprint single storey basement. The proposed basement is 58.30m long by 17.30m wide and 4.85m deep, noted to be full footprint below the proposed structure in the south. The proposed development plans can be seen within Figures 2-9.

2.4 Slope

The site did not contain a basement/lower ground floor. The site was noted to be relatively flat and level, with no significant slopes. Based on the contour map provided within Figure 10, an online topographic map, the area where the site resides generally is flat and level with the topography generally increasing to the west and south-west of the site, however, no significant slopes, natural or man-made, greater than 7° were noted within close proximity to the site.

2.5 Nearby Assets and Subterranean Developments

A railway embankment was recorded approximately 230m north of the site. No London Underground tunnels were noted within a 250m radius of the site. A London Underground tunnel associated with the Piccadilly Line was recorded approximately 270m west of the site. The site is not in close proximity to any National Rail lines. The site was considered to be not sufficiently close to underground transport services, in order for these to affect the property and there are no approved proposals for any TfL services in the vicinity that would affect the development. The information can be found at <https://tfl.maps.arcgis.com/apps/webappviewer/index.html?id=5129c766255941d3be16a6828faa8f18>

The properties along Hermitage Road, were mainly 2 storey, terrace residential properties and 2 storey commercial/light industrial buildings. No evidence of lower ground floors or basement levels was noted during the site walkover.

2.6 Geology

The British Geological Survey Solid and Drift Geology Map for the Haringey area (North London Sheet No. 256) revealed that the site was underlain by bedrock deposits of the London Clay Formation, no superficial deposits were recorded. Areas of Made Ground or Reworked Ground were noted approximately 180m west and 180m east of the site. No other areas of made ground, superficial deposits or other bedrock deposits were noted within a 250m radius.

A BGS borehole (TQ38/516A) located ~220m south-east of the site revealed Made Ground from Ground level down to 12.00m bgl. The London Clay Formation was recorded from 12.0-42.5m bgl. The Reading beds were recorded down to 50.5m bgl with the Woolwich beds recorded below to 59.75m bgl. The Thanet sand formation was recorded below to 66.00m bgl with the upper chalk recorded from 66.00-130m bgl (base of the borehole). No groundwater was noted.

2.7 Hydrogeology and Hydrology

A study of the aquifer maps on the DEFRA website revealed the site was underlain by **Unproductive Strata** comprising bedrock deposits of the London Clay Formation.

The nearest surface water feature was the New River located 200m south of the site. The New River

was flowing in an westerly to easterly direction. Two reservoirs were recorded 600m south-east of the site.

From analysis of hydrogeological and topographical maps the actual groundwater table was anticipated to be encountered at depth below the London Clay Formation. Some amounts of groundwater, however, may be present at shallower depths perched within Made Ground, or silty/sandy pockets of the London Clay Formation. It was considered that groundwater was flowing in a south-easterly direction toward the New River in line with local topography.

Examination of the Environment Agency records showed that the site was located within a Flood Zone 1, i.e. an area with a low probability of flooding.

2.8 Radon

BRE 211 (2015) Map 5 of the London, Sussex and west Kent area indicated that the site **was not** located within an area where mandatory protection measures against the ingress of radon were likely to be required.

A review of the freely available Public Health England radon database, UK Radon, indicated that the site was located within a 1km grid square, where the maximum radon potential of <1% was recorded. Basic radon protection measures are required in areas where more than 3% of houses are at or above the Action Level.

The site was in an area where a risk assessment was not required.

It is proposed that the development includes radon resistant waterproofing within the basement which will sever any pathway between the soils and receptor, thus mitigation against any negligible radon ingress. As the pathway is broken, no further investigation (monitoring) is required. If further results show that a vapor resistant membrane is required, then that would be sufficient for radon protection as well.

Section 6.12 of BRE211 (2015) states the following regarding basements/lower ground floors:

"It is important to ensure that basements and other occupied spaces below ground level are suitably protected against radon. These areas are more at risk because walls are in contact with the ground as well as the floor. For a house with a basement under the entire house, the area in contact with the ground could be several times that of a similar house without a basement. This, coupled with reduced natural ventilation below ground level, increases the risk of elevated radon levels. All basements are at increased risk of elevated levels of radon, regardless of geographic location.

Where a new basement is to be created, or an existing cellar converted, waterproofing will be required. A well-constructed waterproofing should be designed to protect against radon also. Guidance and recommendations on basement waterproofing are contained in BS 8102:2009[14], which also advises that radon be taken into account in the design and implementation of waterproofing schemes. Below-ground waterproofing and radon management are specialist activities that can conflict. It is recommended that dual

protection systems are designed and installed by specialists who are suitably qualified in both waterproofing and radon management.

Internally located cavity drain membrane systems are often used to provide belowground waterproofing. Some cavity drain membrane systems are certificated as providing an effective barrier to radon gas. However, using these to line the internal surfaces of a basement could cause the gas to be simply displaced up the cavity into the ground floor accommodation. It is therefore important to ensure that the basement wall membrane fully closes the cavity at its head where it meets the radon barrier within the ground floor or external cavity wall above ground. The cavity behind the membrane could be used later as part of a subfloor depressurisation system.

If the ground around a basement is likely to be waterlogged, there is little benefit in installing a radon sump as subfloor depressurisation is unlikely to work continuously. As with all radon-protective measures installed during construction, the first aim should be to provide a passive solution. This should also be the aim with basement protection.”

2.9 Available Unexploded Ordnance (UXO) Map Review

A review of the data available on www.zeticauxo.com/ revealed the site was located within the London high-risk area associated with unexploded ordnance (UXO). The London area is further separated into 25No. categories based on bombing densities, where green is indicated for areas having <10 bombs dropped per km² and red is indicated for areas having >150 bombs dropped per km². The site is situated within the orange area, ~one third through the spectrum. A Luftwaffe Bombing Target site was located approximately 900m south of the site.

A Preliminary UXO report from Groundsure can be viewed in Appendix C, which classified the site as having low to medium risk based on Indicative British/Allied UXO Risk, and high risk based on Indicative German UXO risk.

2.10 Historical Landfill Tool Review

A review of the data available on www.groundsure.io revealed no areas of historical landfills or authorised landfills within a 500m radius of the site.

3.0 SITE WORKS

3.1 Scope of Works

Site works were undertaken between the 3rd May and 12th May 2022 and comprised the drilling of the 4No. Cable Percussion Boreholes (BH1-BH4) to depths of between 1.90 – 25.45m bgl. Standard Penetration Tests (SPTs) were conducted at 1.00m intervals from ground level to 5.00m and at 1.50m intervals from 5.00m to the base of the boreholes. BH3 was terminated early due to a concrete obstruction.

A combined groundwater and ground-gas monitoring standpipe was installed within BH1, BH2 and BH4. The installation and backfill information can be viewed below.

Combined Ground-gas and Groundwater Monitoring Well Construction						
Trial Hole	Type of Installation	Depth of Installation (m bgl)	Thickness of slotted piping with gravel filter pack (m)	Depth of plain piping with bentonite seal (m bgl)	Response Zone (m bgl)	Piping internal diameter (mm)
BH1	Standpipe	8.00	7.00	1.00	1.00 – 8.00	50
BH2	Standpipe	5.00	4.00	1.00	1.00 – 5.00	50
BH4	Standpipe	5.00	4.00	1.00	1.00 – 5.00	50

Additionally, 8No. Trial Pit Foundation Exposures (TP1-TP8) were hand excavated on the 3rd May 2022, to depths of between 0.40-1.50m bgl.

The approximate location of the trial hole locations can be seen within Figure 11.

Prior to commencing the ground investigation, a walkover survey was carried out to identify the presence of underground services and drainage. Where underground services/drainage were suspected and/or positively identified, the exploratory position was relocated away from these areas.

As a further precautionary measure, the boreholes were hand excavated to 1.00m below the local ground level (bgl) and scanned with a Cable Avoidance Tool (CAT scanner) to minimise the risk to services.

Upon completion of the drilling works, the trial holes were backfilled and made good, in relation to the surrounding area.

3.2 Sampling Procedures

Small disturbed samples were recovered from the trial holes at the depths shown on the trial hole records. Soil samples were generally retrieved from each change of strata and/or at specific areas of concern. Samples were also taken at approximately 0.5m intervals during broad homogenous soil horizons.

A selection of samples were despatched for geotechnical testing purposes. A programme of chemical laboratory testing, scheduled by Ground and Water Limited and carried out by an accredited chemical testing laboratory, was undertaken on soils samples recovered from the trial holes.

4.0 ENCOUNTERED GROUND CONDITIONS

4.1 Soil Conditions

The trial holes were logged by a Ground and Water Limited representative, generally in accordance with BS EN 14688 'Geotechnical Investigation and Testing – Identification and Classification of Soil'.

The ground conditions encountered within the trial holes constructed on the site did generally conform to that anticipated from examination of the geology map. A capping of Made Ground was noted to overlie the bedrock London Clay Formation.

The succession of conditions and description of soils encountered in the trial holes in descending order is tabulated below.

Summary of Strata Encountered (BH1-BH4)			
Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
MADE GROUND: Concrete	GL	0.20-0.30	0.20-0.30
MADE GROUND: A black, brown, gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse sub-angular of brick, clinker, concrete, flint, bituminous material and ash.	0.00-0.30	1.90 – 3.00	1.70 – 2.80
LONDON CLAY FORMATION: A dark brown, grey slightly silty CLAY with pockets of selenite crystals and pockets of fine to medium sub-angular gravels of claystone.	1.90 – 3.00	>15.45 – >25.45	>12.45 – >22.75

Summary of Strata Encountered (TP1-TP8)			
Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
MADE GROUND: CONCRETE (TP1 and TP4)	GL	>0.40	>0.40
MADE GROUND: A black, brown, grey, orange, gravelly sandy SILT/sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse sub-angular of brick, clinker, concrete, flint, glass, bituminous material and ash.	GL	>0.70->1.00	>0.70->1.00
LONDON CLAY FORMATION: Orangish grey, brown slightly gravelly sandy CLAY. Sand is fine. Gravel is fine sub-angular of flint. (TP7 Only)	0.80	>1.00	>0.20

For details of the composition of the soils encountered at particular points, reference must be made to the individual trial hole logs within Appendix D of this report. A trial hole location plan can also be viewed within Figure 11.

4.2 Foundation Exposures

The hand excavation of 8No. Foundation Exposures (TP/FE1 – TP/FE8) was undertaken across the site. A tabulated summary showing the depth and width of each foundation can be viewed below, as well as the bearing stratum. Diagrams of each foundation exposure can be viewed within Figures 12 – 17.

Summary of Foundations Encountered			
Trial Hole	Depth of Foundation (m bgl)	Width at the Base of Foundation (mm)	Bearing Stratum
TP1 (External Wall)	N/A	Not Observed	Made Ground
TP2(External Wall)	0.650	Does not step out	Made Ground

Summary of Foundations Encountered			
Trial Hole	Depth of Foundation (m bgl)	Width at the Base of Foundation (mm)	Bearing Stratum
TP3 (External Wall)	0.70	Does not step out	Made Ground
TP4 (External Wall)	N/A	Not Observed	Made Ground
TP5 (External Wall)	0.30	500	Made Ground
TP6 (External Wall)	0.60	250	Made Ground
TP7 (External Wall)	1.10	350	London Clay Formation
TP8 (External Wall)	0.70	300	Made Ground

4.3 Roots Encountered

Fresh roots were recorded to 2.70m bgl in BH1, 0.80m bgl in TP3 and 0.50m bgl in TP7. No roots were recorded in the remaining trial holes. The depths of root penetration can be seen tabulated below.

Summary of Root Penetration	
Trial Hole	Fresh Root Depth (m bgl)
BH1	2.70
BH2	None recorded
BH3	None recorded
BH4	None recorded
TP1	None Recorded
TP2	None Recorded
TP3	0.80
TP4	None Recorded
TP5	None Recorded
TP6	None Recorded
TP7	0.50
TP8	None recorded

It must be noted that the chance of determining actual depth of root penetration through a narrow diameter borehole is low. Roots may be found to greater depths at other locations on the site, particularly close to trees and/or trees that have been removed both within the site and its close environs.

4.4 Groundwater Conditions

A groundwater seepage was noted at a depth of 2.40m and 6.60 bgl in BH1, 15.80m bgl in BH2 and 11.00m bgl in BH4. No groundwater was noted in the remaining boreholes. It should be noted that groundwater strikes may be obscured by the drilling/excavation process.

Summary of Groundwater Ingresses	
Trial Hole	Fresh Root Depth (m bgl)
BH1	2.40 and 6.60
BH2	15.80
BH3	None recorded
BH4	11.00
TP1	None Recorded
TP2	None Recorded
TP3	None Recorded

Summary of Groundwater Ingresses	
Trial Hole	Fresh Root Depth (m bgl)
TP4	None Recorded
TP5	None Recorded
TP6	None Recorded
TP7	None Recorded
TP8	None recorded

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was undertaken in May 2022 when groundwater levels are likely to be decreasing from their annual maximum (highest elevation). Exact groundwater levels may only be determined through long term measurements from monitoring wells installed on-site.

Groundwater monitoring was undertaken on one occasion to date. The results can be seen tabulated below.

Groundwater Observations			
Date	Trial Hole	Water Level	Final Well Depth
08/06/2022	BH1	2.90	7.70
	BH2	1.60	5.20
	BH4	3.50	5.00

4.5 Obstructions

A possible concrete slab was encountered at an approximate depth of 1.90m bgl during the drilling of BH3, resulting in no further drilling. It should also be noted that a concrete slab/obstruction was recorded in both TP1 and TP4 at a depth of 0.40m bgl, which halted further excavation.

No other artificial or natural sub-surface obstructions were noted during construction of the trial holes.

5.0 IN-SITU AND LABORATORY TESTING

5.1 In-Situ Strength Testing

Standard Penetration Tests (SPTs) were undertaken as part of the site investigation. The results of the SPT's have not been amended to consider hammer efficiency, rod lengths and overburden pressure in accordance with Eurocode 7. The test results are presented on the borehole logs within Appendix D. An interpretation of the in-situ geotechnical testing results is given in the table below.

Interpretation of In-situ Geotechnical Testing Results				
Strata	SPT "N" Blow Counts	Equivalent Undrained Shear Strength (Cu) (kPa)	Cohesive Soil Type (Cu)	Trial Hole/s
London Clay Formation (Cohesive) (Soft Spots)	6-7	30-35	Low	BH1/3.00-3.45m bgl BH4-3.20-4.65m bgl
London Clay Formation (Cohesive)	8-50	40-250	Medium to extremely High	BH1/4.00->25.45m bgl BH2/2.70->25.45m bgl BH4/5.20->15.45m bgl

It must be noted that field measurements of undrained shear strength (Cu) are dependent on a number of variables including disturbance of sample, method of investigation and also the size of specimen or test zone.

5.2 Geotechnical Laboratory Testing

A programme of geotechnical laboratory testing, scheduled by Ground and Water Limited and carried out by an accredited geotechnical testing laboratory was undertaken on samples recovered. Details of the specific tests used in each case are given below.

Standard Methodology for Laboratory Geotechnical Testing		
Test	Standard	Number of Tests
Atterberg Limit Tests	BS1377:2016:Part 2:Clauses 3.2, 4.3 & 5	10
Water Soluble Sulphate and pH Test	BS1377:2018:Part 3:Clause 5	3
BRE Special Digest 1 Tests	BRE Special Digest 1 "Concrete in Aggressive Ground (BRE, 2005).	3

5.2.1 Atterberg Limit Testing

A précis of Atterberg limit testing undertaken can be seen tabulated below. The test results are presented within Appendix E.

Atterberg Limit Tests Results Summary							
Stratum	Moisture Content (%)	Passing 425 µm sieve (%)	Modified PI (%)	Soil Class	Consistency Index (Ic)	Volume Change Potential	
						BRE	NHBC
London Clay Formation	24-38	100	34.00-63.00	CH-CV	Firm-Stiff	Medium-Very-High	Medium-High
- NP – Non-plastic - BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results) - Soil Classification based on British Soil Classification System. - Consistency Index (Ic) based on BS EN ISO 14688-2:2018.							

5.2.2 Moisture Deficit Assessment

The results of the Atterberg Limit tests were analysed to determine the Liquidity Index of the samples, to give an indication as to whether the samples recovered showed a moisture deficit as well assessing their degree of consolidation. Liquid Limit analyses was undertaken to assess whether there were any potentially significant moisture deficits within the samples tested.

A potential moisture deficit was noted within BH2 at 10.40m bgl caused by lithology (overconsolidated clays), rather than root uptake from nearby vegetation.

6.0 ENGINEERING CONSIDERATIONS

6.1 Soil Characteristics and Foundation Considerations

A summary of the soil characteristics following the intrusive site investigation and laboratory testing and the relevant foundation considerations has been provided below. The following information from the ground investigation was considered pertinent to the design of foundations.

- Foundations should be taken through any Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.
- The design and construction of the basement and associated structural elements would need to take into account the volume change potential of the respective soils.
- The loads of proposed foundations should not exceed the allowable bearing capacity of the soils they are founding upon.
- Foundations must not be placed within fresh root penetrated and/or desiccated soils with volume change potential. It is recommended that foundations are taken at least 300mm into non-fresh root penetrated strata if the soils have volume change potential, or into soils of no volume change potential.
- The influence of trees on or surrounding the site will need to be taken into account in final design (NHBC Standards Chapter 4. 2) (tree rings).
- Any water ingress must be prevented from entering foundation trenches and excavations must be kept dry and either concreted or blinded as soon after excavation as possible. If water were allowed to accumulate within the excavation for even a short period of time, an increase in heave occur. The shear strength will also be reduced, resulting in lower bearing capacities, resulting in increased settlements. Instability issues may arise within the foundation trenches, in case of perched water being present.
- Final designs for the foundations should be carried out by a suitably qualified Engineer based on the findings of this investigation and with reference to the anticipated loadings, serviceability requirements for the structure and the developments proximity to former, present, and proposed trees.

6.2 Piled Foundations Main Structures

Given the results of the ground investigation, a piled foundation system was deemed more suitable.

The construction of a piled foundation is a specialist job, and the advice of a reputable contractor, familiar with the type of ground and groundwater conditions encountered on this site, should be sought prior to finalising the foundation design. The actual pile working load will depend on the particular type of pile and method of installation adopted.

The foundation would comprise a piled foundation with reinforced ground beams or a piled slab. In general, for the cumulative pile capacity calculations, shaft friction over desiccated levels should be ignored and piles should not be terminated within desiccated soils where moisture recovery following tree removal could occur.

Indicative/guidance limit loads and settlements for a bored pile have been given within the table below have been based on BH2. An allowance for negative skin friction to occur within the top 3.00m

of the soil has been included within the calculations where it could pass through any Made Ground, and root penetrated soils. An adhesion factor of 0.45m has been applied to all natural cohesive units.

The bearing values may be limited by the maximum permissible stress allowable on a concrete pile. To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

The Classic Theory considers a Factor of safety of ~2.5, which is already incorporated in the table below. Please note that the Total Vertical limit Load calculated is not just the accumulation of the Tip Load and Lateral Load, while it incorporates a factor of safety of its own. The FOS however for the total vertical load on its own is ~2.7, incorporated below.

Bored Pile – Limit Loads and Settlement Parameters						
Depth (m bgl)	Diameter (m)	Limit States (kN)			Settlement (Poulos Davis (1968))	
		Tip	Lateral	Total	Load (kN)	Total (Elastic + Rigid) (cm)
10.00	0.30	28.08	132.73	144.90	140	0.215
	0.45	63.17	199.10	226.48	220	0.3916
	0.60	112.31	265.46	314.15	310	0.4138
15.00	0.30	52.64	337.37	365.27	360	0.3211
	0.45	118.43	506.05	568.82	>500	0.2973
	0.60	210.54	674.74	786.32	>500	0.3551
20.00	0.30	68.33	663.83	698.58	>500	0.3226
	0.45	153.75	995.74	1073.94	>500	0.2621
	0.60	273.33	1327.65	1466.68	>500	0.1966
*The allowable individual pile loads should generally be limited to 500kN in a concrete pile and for the method adopted. Various contractors will have their own requirements.						

It should be noted that this indicative pile design is for the foundations of structures which do not have a basement. Piled foundations as part of a piled basement should be designed by a piling specialist.

The loads above are indicative and the advice of a specialist piling contractor should be sought. The analysis was focused on the geotechnical aspects and the capacity of the soils. The actual pile loads permitted may be further limited for structural reasons (i.e. the concrete strength and the overall structural capacity of the pile, buckling etc). The structural engineer and the piling contractor are to perform the final design.

The bearing values given in the table above are applicable to single piles. Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of approximately 0.8 and a calculation made to check the factor of safety against block failure.

The piles will need to be designed in accordance with the volume change potential of the soils encountered, depth of desiccation and root penetration. Temporary casing may be required where the upper portion of the pile passes through the Made Ground, particularly where perched water is encountered, to prevent necking of the concrete.

6.3 Geotechnical Analysis Basement

This section of the report states suitable geotechnical parameters for the soils encountered as well as analysis the bearing capacity of the soils for the proposed basement on site. A settlement/heave

analysis was also undertaken following the construction of the proposed development using Pdisp from Oasys.

6.3.1 Geotechnical Parameters for Modelling-Basement

Following a literature review from well documents publications, the short-term and long-term Young's Modulus (E short term and E') has been produced. The parameters, shown below, were used when undertaking the settlement/heave analysis within Pdisp.

Summary of Geotechnical Parameters							
Geological Strata	Depth (m bgl)		Short-term Young's Modulus (E_u short term) (kPa)		Long-term, Young's Modulus (E' long term) (kPa)		Poisson's Ratio
	Top	Base	Top	Base	Top	Base	
Made Ground	0.00	2.70	10,000	10,000	10,000	10,000	0.45
London Clay Formation (cohesive)	2.70	3.65	10,000	30,000	10,000	22,500	0.45
	3.65	4.65	30,000	37,500	22,500	28,125	0.45
	4.65	5.65	37,500	45,000	28,125	33,750	0.45
	5.65	7.15	45,000	56,250	33,750	42,187.50	0.45
	7.15	8.65	56,250	63,750	42,187.50	47,812.50	0.45
	8.65	10.15	63,750	82,500	47,812.50	61,875	0.45
	10.15	11.65	82,500	101,250	61,875	70,875	0.45
	11.65	13.15	101,250	112,500	70,875	84,375	0.45
	13.15	14.65	112,500	146,250	84,375	109,687.5	0.45
	14.65	16.15	146,250	187,500	109,687.5	140,625	0.45
	16.15	17.60	187,500	157,000	140,625	118,125	0.45
	17.60	19.15	157,000	176,250	118,125	132,187.50	0.45
	19.15	20.65	176,250	172,500	132,187.50	129,375	0.45
	20.65	22.15	172,500	191,250	129,375	143,437.5	0.45
	22.15	23.65	191,250	195,000	143,437.5	146,250	0.45
	23.65	25.15	195,000	187,500	146,250	140,625	0.45
	25.15	42.50	187,500	276,300	140,625	207,225	0.45

Made Ground

Made Ground was modelled between ground level and 2.70m bgl. A short-term and long-term Young Modulus (E_u and E') of 10MPa was suitable and on the conservative side, regarding Made Ground encountered on site. A Poisson's Ratio of 0.45 was considered suitable for these soils, given their variable nature.

London Clay Formation

Cohesive soils of the London Clay Formation were encountered from 2.70m bgl to >25.00m bgl during site works but inferred as extending to ~42.50m bgl based on BGS borehole records.

Where SPT "N" Values were undertaken, the C_u could be calculated by multiplying by 5, as stated by Stroud (1974). Where the London Clay Formation was inferred, a design line was taken from "*Burland JB, Standing, JR, and Jardine, FM (2001) Building response to tunnelling, case studies from construction of the Jubilee Line Extension CIRIA Special Publication 200*". The equation was undrained shear strength = (depth into the LCF x 8) + 50.

The relationship between E_u and C_u is generally dependent on strain levels. For small strains, a ratio of 750 can be adopted based on well documented publications. This is also reflected for the London Clay Formation, after extensive research, within graphs depicting strains and E_u/C_u ratios included in

“Burland JB, Standing, JR, and Jardine, FM (2001) Building response to tunnelling, case studies from construction of the Jubilee Line Extension CIRIA Special Publication 200”. A Poisson’s Ratio of 0.45 was considered suitable for these soils, given their cohesive nature.

Long-Term Conditions

A ratio of E' to E_u of ~ 0.75 was considered a sensible approach for this stage in the design, for cohesive soils. For Made Ground, it was considered suitable for E' and E_u to be equal, given that these soils are more permeable and to limit the level of anticipated Young Modulus at a representative value.

6.3.2 Settlement/Heave Analysis

Analyses of vertical ground movements, using the Mindlin analysis method within Pdisp software, was undertaken to assess the potential movements resulting from changes of net vertical pressure changes. Geotechnical parameters noted in the previous section of this report were used for the model. A rigid boundary at depth was considered at 42.50m bgl, for calculation purposes. The inputs and outputs of this analysis can be viewed within Appendix F.

Three representative stages of construction, in terms of the net change in vertical pressure, have been modelled. These were considered to adequately approximate the movements rising from the basement construction.

- **Stage 1:** Demolition of the existing structures across the site, as well as the mass excavation of the basement void, with short term conditions;
- **Stage 2:** All previous loads/load removals, as well as loads associated with the construction of the basement slab, with short term conditions. The basement is fully constructed from this stage onwards;
- **Stage 3:** All previous loads/load removals, for long-term conditions.

The existing building on site which is to be demolished has been modelled and will have an overburden pressure release of 90kN/m^2 .

Given the overall rectangular shape of the basement, the excavation was based on a rectangle using the maximum length and width of the basement. This was considered conservative and will ensure accurate results. The overburden pressure release following the excavation and removal of soils was based on a specific weight of soil of 19kN/m . Based on a proposed basement depth of 4.85m bgl, an overburden pressure release of 92.15kN/m^2 . The overburden pressure release was modelled at 4.85m bgl.

The “live” load of the basement has been supplied by the clients structural engineer which is 7.50kN/m^2 . The “dead” load of the slab was unknown at the time of reporting and was assumed to be 10kN/m^2 . For the basement slab the live and dead loads have been added together, totalling 17.50kN/m^2 . All loads were modelled at 4.85m bgl.

A tabulated summary of all applied loads, at each stage/model, can be viewed below.

Summary of Net Bearing Pressure Changes for PDisp Analysis		
Description	Applied Load (+ive)/ Load Removal (-ive) (kN/m ²)	
	Stage 1	Stage 2 and Stage 3
Demolition Load at surface level (0.00m bgl)	-90.00	-90.00
Mass Excavation Void (4.85m bgl)	-92.15	-92.15
Construction of Basement Slabs (4.85m bgl)		17.50

The method stated above was considered to comprise a comprehensive and reasonably conservative approach, in order to estimate the maximum potential heave and settlements.

A tabulated summary concluding the amount of soil displacement shown at the basement depth within the contour plots can be viewed below. It should be noted that the soil displacement between models are not cumulative values; therefore, the amount of soil displacement between models should not be added together as each model shows each construction stage individually.

Settlement/Heave Analysis	
Model	Soil Displacement
Model 1	5.60 – 22.00mm heave. No settlement
Model 2	5.09 – 20.10mm heave. No settlement
Model 3	6.81 – 27.00mm heave. No settlement

Diagrammatic representation can be viewed within Appendix F.
Please note that the above figures should not be added together (or be superimposed) and that they represent anticipated movements at different accumulated stages of construction, in order to approach and test all expected combinations of loading regimes (models).

The analyses of Model 2 indicated a maximum amount of heave of 20.10mm beneath the centre of the proposed development, where short term conditions of the full development were modelled. Model 3 also modelled the full development but was based on long term conditions and calculated the maximum heave to increase to ~27mm. The highest risk of movement will likely occur during the construction of the basement and later through long-term heave of the constructed basement.

6.3.3 Piled Foundations Basement Structure

Based on the scheme of the proposed development, various piles were to be used, for foundation, retaining and heave/stability purposes (tension).

The construction of a piled foundation and piled wall is a specialist job, and the advice of a reputable contractor, familiar with the type of ground and groundwater conditions encountered on this site, should be sought prior to finalising the foundation design. The actual pile working load will depend on the particular type of pile and method of installation adopted.

The foundation would comprise a piled foundation with reinforced ground beams or a piled slab. In general, for the cumulative pile capacity calculations, shaft friction over desiccated levels should be ignored and piles should not be terminated within desiccated soils where moisture recovery following tree removal could occur.

The actual pile loads permitted may be limited for structural reasons (i.e. the concrete strength and

the overall structural capacity of the pile, buckling etc). The structural engineer and the piling/specialist contractor are to perform the final design.

Where piles are to be constructed in groups the bearing value of each individual pile should be reduced and a calculation made to check the factor of safety against block failure.

The piles will need to be designed in accordance with the volume change potential of the soils encountered, depth of desiccation and root penetration. Temporary casing may be required where the upper portion of the pile passes through the Made Ground or shallow granular soils, particularly where perched water/groundwater is encountered, to prevent necking of the concrete.

6.3.4 Additional Comments

Regarding the bulk basement construction, care will need to be taken to ensure that the slab is protected through accommodating heave. Heave protection measures will need to be incorporated.

The final design of the basement structure will also need to take into account environmental factors, such as ventilation/protection against ground gas; however, investigation into this was not included within the scope of this report.

Final designs for the foundations should be carried out by a suitably qualified Engineer based on the findings of this investigation and with reference to the anticipated loadings, serviceability requirements for the foundations. A Structural Engineer will also need to review the anticipated ground movements and assess their potential impact on the existing structure and neighbouring properties. It must be noted that finalised construction will aid the structural stability of the neighbouring party walls, reducing the risk of the seasonal movements noted during the structural works.

6.4 Retaining Walls, Excavations and Stability

Shallow excavations in the Made Ground are likely to be marginally stable at best. Long, deep excavations, through these strata and into the underlying London Clay Formation are likely to become unstable.

Appropriate propping and support should be incorporated during construction of the basement.

The excavation of the basement must not affect the integrity of the adjacent structures beyond the boundaries. The excavation must be supported by suitably designed retaining walls. It is considered unlikely that battering the sides of the excavation, casting the retaining walls and then backfilling to the rear of the walls would be suitable given the close proximity of the party walls.

The retaining walls for the basement will need to be constructed based on the soils encountered with an appropriate angle of shear resistance (Φ') and effective cohesion (C') for the ground conditions encountered, regarding long-term considerations, as well using an appropriate undrained shear strength C_u for short-term considerations.

The overlying Made Ground needs to be considered in the design of the basement. A conservative value of C_u will need to be considered.

Based on the ground conditions encountered within the boreholes the following parameters tabulated below could be used in the design of retaining walls, for a long-term consideration. These have been designed based on the in-situ strength testing profile recorded, results of geotechnical classification tests and reference to literature.

Retaining Wall/Basement Design Parameters					
Strata	Unit Volume Weight (kN/m ³)	Cohesion Intercept (c') (kPa)	Angle of Shearing Resistance (°)	Ka (Rankine)	Kp (Rankine)
Made Ground	~19	0	12	0.66	1.52
London Clay Formation	~20 – 22	0 – 5	24 – 28	0.36 – 0.42	2.37 – 2.77

It should be noted that the Ka and Kp values presented in the table, are shown for guidance and they are derived from the Rankine theory for soil pressures. The values for angles of internal friction provided are considered to be characteristic values of the soils encountered.

According to C760, a design method (e.g. EC7) should be adopted and followed through the whole design process. In addition, the following considerations should be considered during the design process:

- Appropriate consideration of groundwater levels.
- Surcharge pressure equivalent to the pressures of any adjacent buildings.
- Surcharge pressures from potential piling work platforms and heavy plant traffic.

Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported before excavations are entered by personnel.

Ground Instability Recommendations

No significant instability issues related with soils are expected and no instability issues were observed during the ground investigation. If instability is noted, the following could be applied for good workmanship and mitigation of any risk. It should be noted that these are indicative.

- Where soft/loose spots are encountered, trench sheets should be left in. Alternatively, a back prop with precast lintels or sacrificial boards should be installed. If the soil support to the ends of the lintels is insufficient, brace the ends of the PC lintels with 150x150 C24 timbers and prop with Acrows diagonally back to the ground.
- Where voids are present, trench sheeting with 75mm diameter holes should be installed, to allow the concrete to flow behind the trench sheeting thereby filling any voids encountered in soils behind.
- Prior to casting, a layer of DPM should be installed between trench sheeting (or PC lintels) and new concrete. The lintels should be cut into the soil by 150mm either side of the pin. A site stock of a minimum of 10 lintels should be present to prevent delays due to ordering.

Specific measures should be included in a competent Construction Method Statement for the works on this site by the structural engineer and the contractor.

6.5 Ground Movement Analysis

The ground movement assessment, in accordance with CIRIA C760 and resulting damage assessment can be viewed within this section.

6.5.1 Models

Multiple models were created to assess soil displacement and the resulting damage to surrounding assets. The inputs and outputs of this analyses can be viewed within Appendix G.

The walls of surrounding properties were modelled at ground floor level (0.00 along the z-axis).

One rectangular excavation was modelled to the basement depth (4.85m bgl), to create an overall excavation similar to that of the basement, based on the maximum length and width of the proposed basement.

Based on the ground conditions encountered, an assessment using the CIRIA curves for stiff clay was undertaken. For Model 1, two user generated curves were created, combining the ground movement curves for installation and excavation, for both horizontal and vertical ground movement. soil displacement. For Model 2, the same ground movement curves were used, whilst also inputting vertical Pdisp displacements following the full basement construction (Stage 4). A tabulated summary showing which CIRIA curves and Pdisp results were used can be viewed below.

Summary of XDisp Analysis Assessments					
Model	PDisp Results	Vertical CIRIA Curves		Horizontal CIRIA Curves	
		Installation Curve	Excavation Curve	Installation Curve	Excavation Curve
1	N/A	Installation of a secant bored pile wall in stiff clay (CIRIA)	Excavation in front of a high stiffness wall in stiff clay (CIRIA)	Installation of a secant bored pile wall in stiff clay (CIRIA)	Excavation in front of high stiffness wall in stiff clay (CIRIA)
2	Stage 4 Vertical Displacements	Installation of a secant bored pile wall in stiff clay (CIRIA)	Excavation in front of a high stiffness wall in stiff clay (CIRIA)	Installation of a secant bored pile wall in stiff clay (CIRIA)	Excavation in front of a high stiffness wall in stiff clay (CIRIA)

6.5.2 Analyses

Once the analysis was undertaken, Xdisp segments areas of hogging, sagging and negligible movement along each wall, and gave each segment a category of damage; however, as the wall was thought to act as one structurally, these segments were combined and a damage category for the wall as a whole was given.

The following parameters have been used to inform all assessments.

- Given limitations of the software, a conservative assessment was undertaken assuming that all properties and levels were relative to the ground level.
- The method of basement construction is understood to be traditional underpinning;
- A high wall stiffness has been assumed;
- In the permanent case the wall should be propped at high level;

In terms of damage assessment, the widely accepted Burland et al, 1977 method was used for combined segments along structural features.

It was considered that the construction design from the structural engineer will account for any damage resulting from predicted soil displacement on the actual building, as advised in this report.

It was not considered ideal to assess party walls, due to the walls being 0.00m away from the basement excavation; given this limitation, the party walls are not discussed further within the report. The party walls should be further assessed by a structural engineer and would need to be designed in alignment with the basement.

6.5.3 Results

The following table summarises all walls which were assessed in at least one of the analysis as having Category 1 (Very Slight) damage, or greater. All other walls were assessed as having Category 0 (Negligible) damage for all assessments.

Damage Assessment of Property/Feature Reference			
Wall Reference		Damage Category	
		Analysis 1	Analysis 2
B34	Front Wall of Omega B Works	1	0
B35	Rear Wall of Omega B Works	1	2
B42	Side Wall Proposed Building A	0	1
B44	Side Wall Proposed Building A	0	2
Diagrammatic representation can be viewed within Appendix G.			

6.5.4 Assessment of Roads and Utilities

Given the length of the roads, the deflection expected was not anticipated to cause damage; however, monitoring is recommended as good practice.

6.5.5 Additional Comments

It should be noted that using stiff clay data in some movements in this assessment could be argued to have produced less conservative results. This however is countered by the following, which make the results more conservative.

- The size of the developments used to provide the case histories for C760 are significantly greater than the scale of works proposed. In practice the range of ground movements (relative to the excavation depth and the building dimensions) is therefore likely to be much smaller for this development.

Should the following precautions be included in the Construction Method Statement, as well as best practice and good construction techniques are utilised by a reputable contractor, then ground movements due to underpinning will be limited. In the permanent case the wall will/should always be propped at high level. **It is recommended that monitoring is undertaken as good practice.**

It will be important that the building contractor is closely supervised and is experienced in this type of construction. It will be critical to prevent exposed faces from collapse or significant ground loss into

the new excavation and temporary face support should be maintained where practicable. The adequacy of temporary support will be critical in limiting ground movements. A number of factors will assist in limiting ground movements:

- Most ground movement will occur during excavation and construction so the adequacy of temporary support will be critical in limiting ground movements;
- The speed of propping and support is key to limiting ground movements;
- Good workmanship will contribute to minimising ground movements;
- The assessment assumes the wall is in competent clay;
- Larger movements will be expected where soft soils are encountered at, above and below formation;
- The adequacy of temporary support will be critical in limiting ground movements;

CIRIA C760 advises that ground movements are influenced by the quality of workmanship. The party wall act will apply to this development and will re-enforce good workmanship. The act provides an effective mechanism for ensuring that structural integrity of the neighbouring property is maintained throughout the construction phase. Examples of this can be viewed below.

- Ensuring that adequate propping is in place at all times during construction;
- Minimise deterioration of the central soil mass by the use of blinding/covering with a waterproof membrane;
- Installation of the first (stiff) support quickly and early in the construction sequence for each excavation panel;
- Control dewatering to minimise fines removal and drawdown;
- Avoid overbreak.
- Avoid leaving ground unsupported.

6.6 Structural Monitoring

As stated within the previous section, it is recommended that structural monitoring is undertaken to ensure the movements remain within acceptable limits and to enable mitigation to be effectively implemented in the event of trigger values for movement being exceeded. Trigger values should be adopted based on this assessment and the comments by the structural engineers and implementation of monitoring will be required for the walls with Damage Category 2 in the initial assessment.

The final extent of the structural monitoring will be a matter for the agreement with the neighbours as part of the Party Wall Agreements.

Monitoring positions should be located at the front and rear elevations of the neighbouring properties. The targets should be set at both a low and high level and a minimum of four targets should be installed at each elevation (two targets near party wall and two targets at the far end of the elevation). Precise survey equipment should be used to record all vertical and horizontal components of movement (in three perpendicular dimensions) to a minimum accuracy of 1mm.

Before any excavation or construction works commence, monitoring over a period of at least a month should be undertaken in order to establish a baseline situation and record any seasonal movement trends that may also affect measurements during the development.

During all underpinning works and basement excavation works, monitoring should be undertaken daily at the start and end of every work shift. At other times, monitoring should be undertaken weekly to cover a period prior to commencement of any works and ceasing after completion of the works, by agreement of all interested parties.

6.7 Sub-Surface Concrete Design

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1, 2005, '*Concrete in Aggressive Ground*' considering the pH of the soils. For the classification given below, the "mobile" and "brownfield" case was adopted given the geology encountered and the residential use of the site. The results can be viewed in Appendix H.

Made Ground

The water soluble sulphate concentration ranged between 26.2-1,010mg/l, with a pH range of 7.93-11.00. The total potential sulphate was 0.2958%. According to BRE Special Digest 1, 2005, '*Concrete in Aggressive Ground*' a Sulphate Design Class of DS-2 could be used for sub-surface concrete in contact with the Made Ground. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-2.

London Clay Formation

The water soluble sulphate concentration ranged between 613-2,630mg/l, with a pH range of 7.93-8.33. The total potential sulphate ranged between 0.387-1.218%. According to BRE Special Digest 1, 2005, '*Concrete in Aggressive Ground*' a Sulphate Design Class of DS-4 could be used for sub-surface concrete in contact with the London Clay Formation. Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-4.

It is prudent to note that pyrite nodules may be present within the London Clay Formation. Pyrite can oxidise to gypsum and this normally only occurs in the upper weathered layer, but excavation allows faster oxidation and water-soluble sulphate values can rapidly increase during construction. Therefore, rising sulphate values should be considered should ferruginous staining/pyrite nodules be encountered within the London Clay Formation.

6.8 Hydrogeological Effects, Flooding and Surface Water Disposal

Basements have potential to greatly impact hydrological and hydrogeological regimes. Numerous comments and considerations reflecting on the relationship between the basement and groundwater/surface water have been discussed below.

6.8.1 Basement Construction

If the construction works take place during the winter months, when the groundwater level is expected to be at its higher elevation, water could accumulate thus dewatering could be required to facilitate the construction and prevent the base of the excavation blowing before the slab was cast.

The lower ground floors must be suitably tanked to prevent ingress of groundwater and also surface water run-off. A dewatering or permitting grout contingency plan should be included within the Construction Method Statement and considered in the final design. As there will be potential for groundwater to collect behind the retaining walls, the basement should be waterproofed and designed to withstand hydrostatic pressures in accordance with BS8102:2009: Code of Practice for

the Protection of Below Ground Structures against Water from the Ground.

Should groundwater/perched water be encountered across the site, dewatering from sumps introduced into the floor of the excavation may be required. Consideration could be given to creating a coffer dam using contiguous piled or sheet piled walls to aid construction below the perched water table if groundwater becomes a significant issue. **The advice of a reputable dewatering company should be sought.**

6.8.2 Site Drainage

The majority of new developments are encouraged to use Sustainable Urban Drainage Systems (SUDS) to manage surface water drainage. This ensures that any volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same effect.

The principles of SUDS and the requirements of the London Plan Policy 5.13 Sustainable Drainage should be applied to reduce the risk of flooding from surface water ponding and collection associated with the construction of the basement.

In accordance with the London Plan Policy 5.13 Sustainable Drainage the surface water run-off should be managed as close to its source as possible in line with the following drainage hierarchy.

- Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- Rainwater infiltration to ground at or close to source
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- Rainwater discharge direct to a watercourse (unless not appropriate)
- Controlled rainwater discharge to a surface water sewer or drain
- Controlled rainwater discharge to a combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

Any soakaways should be located sufficiently away from buildings and infrastructure, in order to prevent undermining of foundations. Additional drainage may be considered should significant amounts of water be encountered.

Soakage testing in accordance with BRE365 was beyond the scope of this investigation.

6.8.3 Additional Comments

The site itself has a low potential to flood from groundwater, due to the site being underlain by Unproductive Strata. Perched water may be encountered within the Made Ground and any granular pockets of the London Clay Formation, especially after periods of prolonged or intense rainfall. **This should be considered in final design.**

Given the geological setting of the site, limited groundwater was anticipated; however, perched water may be present, which would flow through the relatively permeable Made Ground, rather than the underlying London Clay Formation. Given the basement will be constructed into the London Clay

Formation, groundwater would be unable to flow beneath the basement. However, given the limited amount of groundwater/aquifer present at the site, the risk to obstructing groundwater flow is limited.

Given their subterranean position, lower ground floors can be susceptible to flooding from sewers. In order to minimise the risk of sewer flooding to the development, all subterranean development must be connected to the sewerage network, installed with a positively pumped non-return valve device.

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources, abstractions and surface water features/watercourses.

6.9 Discovery Strategy

A full contamination assessment was beyond the scope of this investigation, where targeted sampling was not undertaken. There may be areas of contamination that have not been identified during the course of the intrusive investigation (e.g. underground storage tanks). Such occurrences may be discovered during the construction phases for the redevelopment of the site.

Groundworkers should be instructed to report to the Site Manager any evidence for such contamination; this may comprise visual indicators, such as fibrous materials within the soil, discolouration, or odours and emission. Upon discovery advice must be taken from a suitably qualified person and then the Local Authority will need to be informed.

6.10 Waste Disposal

Waste disposal will be discussed in the Contamination Assessment Report (CAR) which will be completed at a later date once all monitoring and testing on site has been completed.

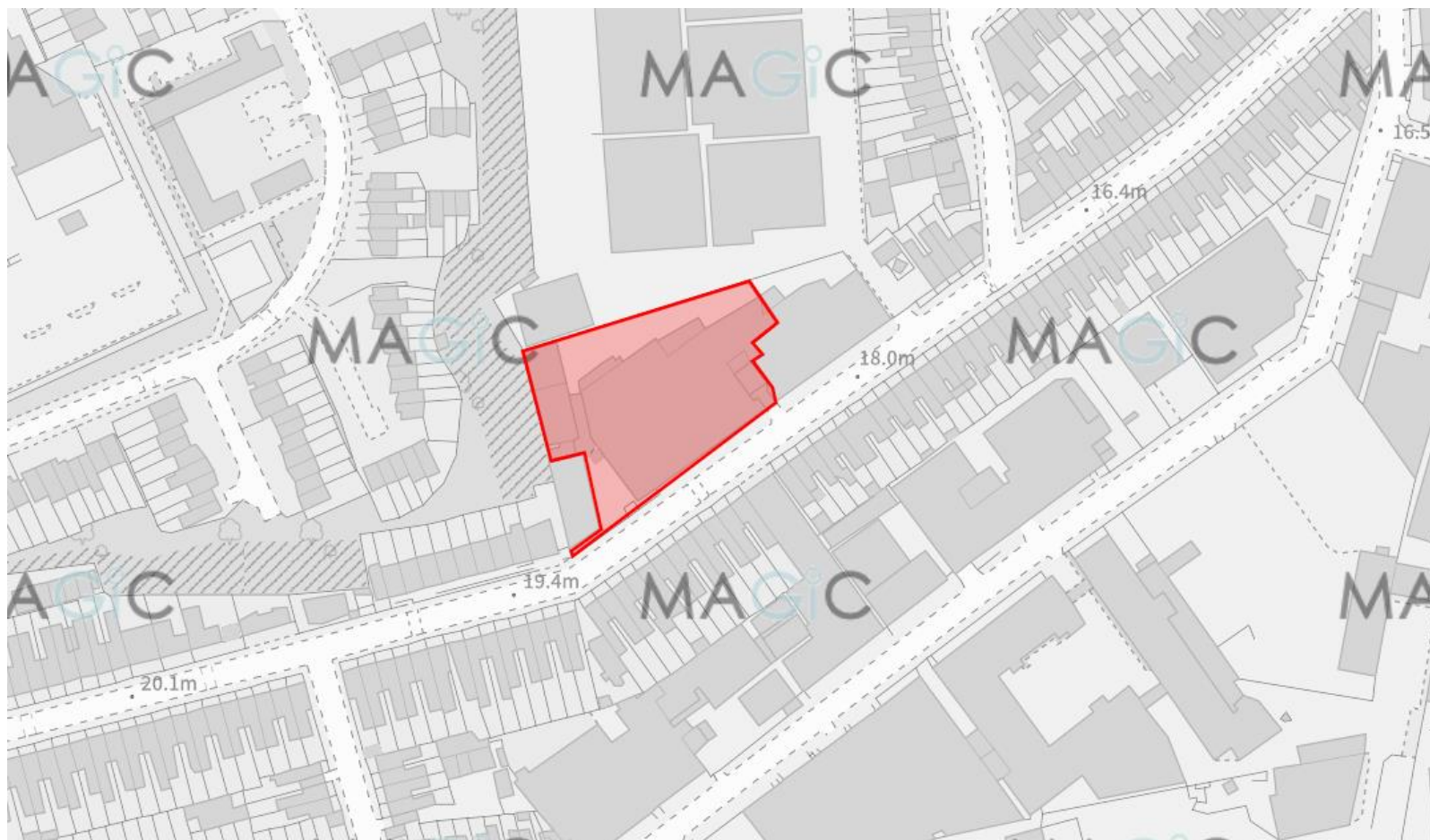
6.11 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust would be generated as a result of construction activities.

The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

FIGURES



 APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project:

167 Hermitage Road, Harringay, London N4 1LZ

Client:

Topfling

Date:

June 2022

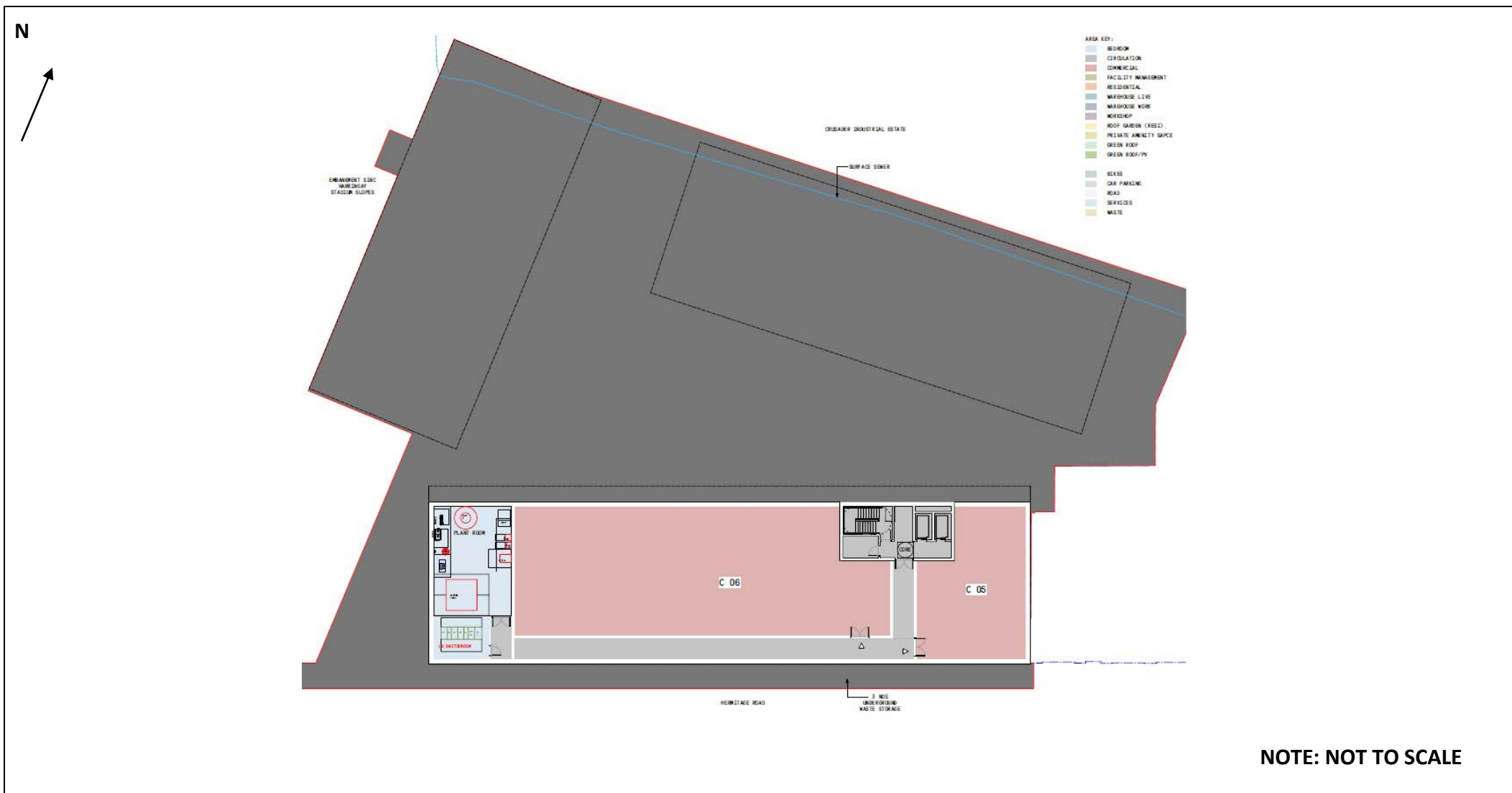
Site Location Plan

Ref:

GWPR4712

Figure 1

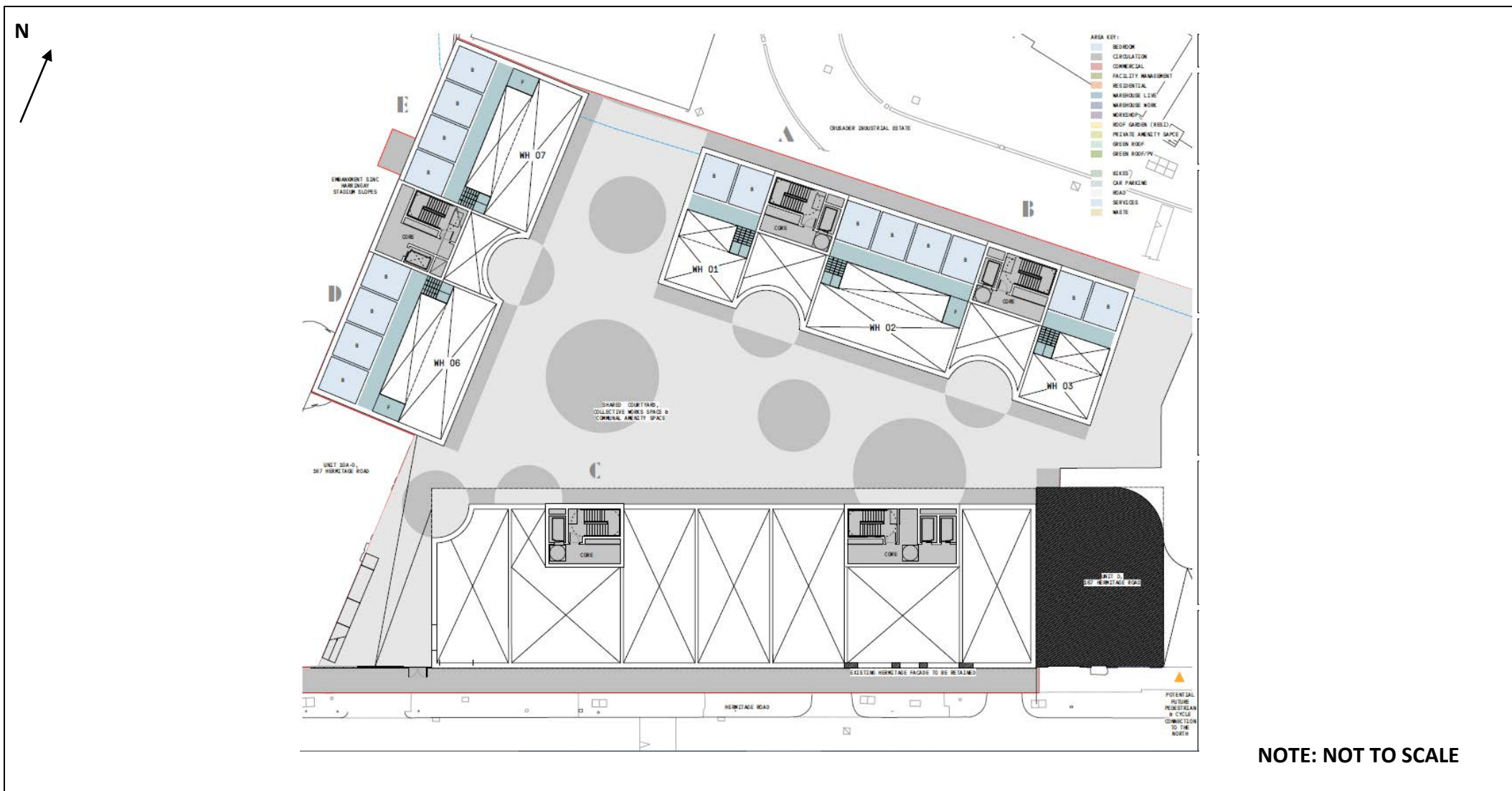




Project:		167 Hermitage Road, Harringay, London N4 1LZ	
Client:		Date:	June 2022
Topfling			
Proposed Development – Basement Plan		Ref:	GWPR4712

Figure 2

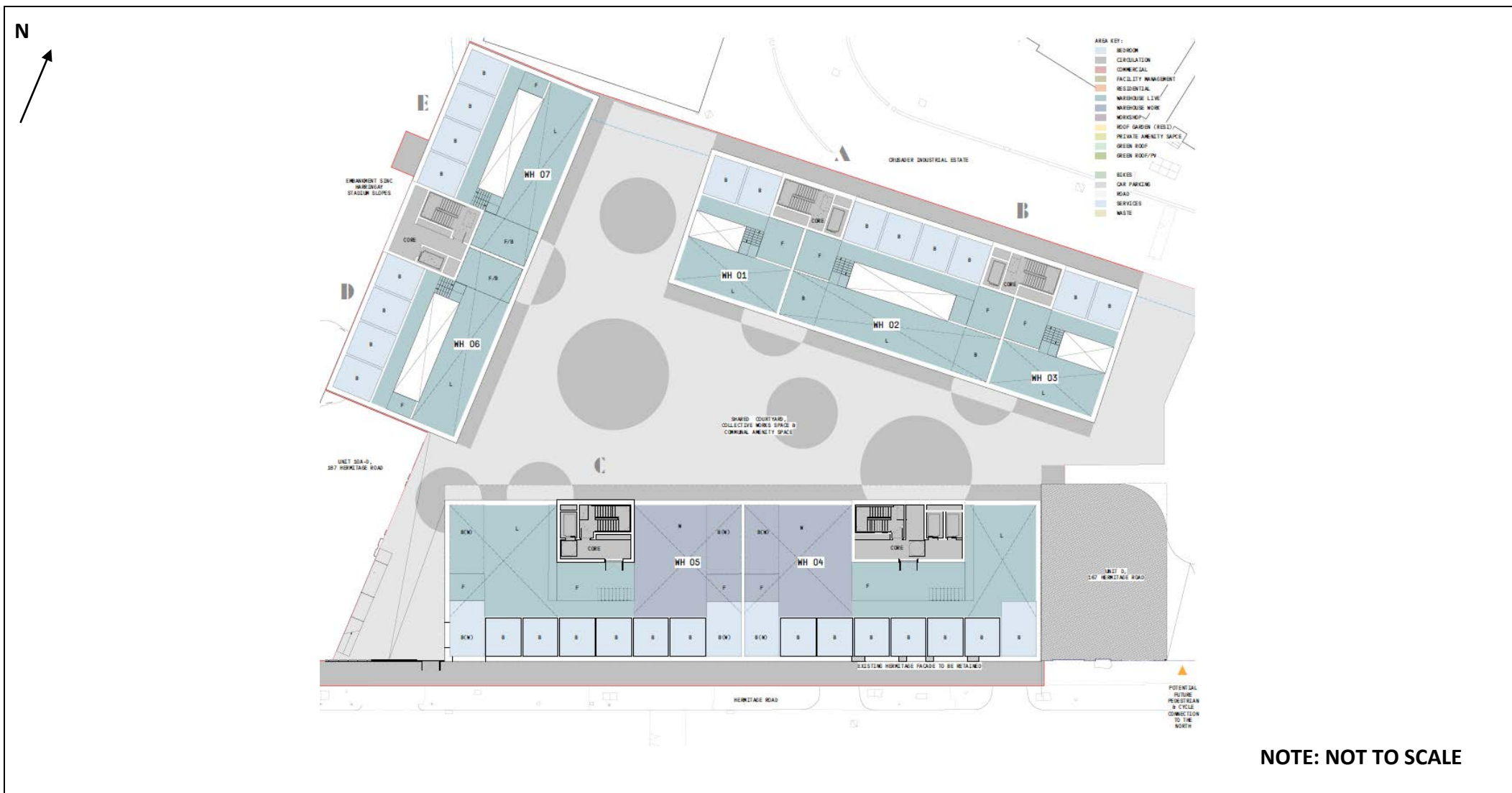




Project:		167 Hermitage Road, Harringay, London N4 1LZ	
Client:		Date:	June 2022
Topfling			
Proposed Development – Spilt Level Plan		Ref:	GWPR4712

Figure 4





Project:		167 Hermitage Road, Harringay, London N4 1LZ	
Client:		Date:	June 2022
Topfling		Ref:	GWPR4712
Proposed Development – First Floor Plan			

Figure 5

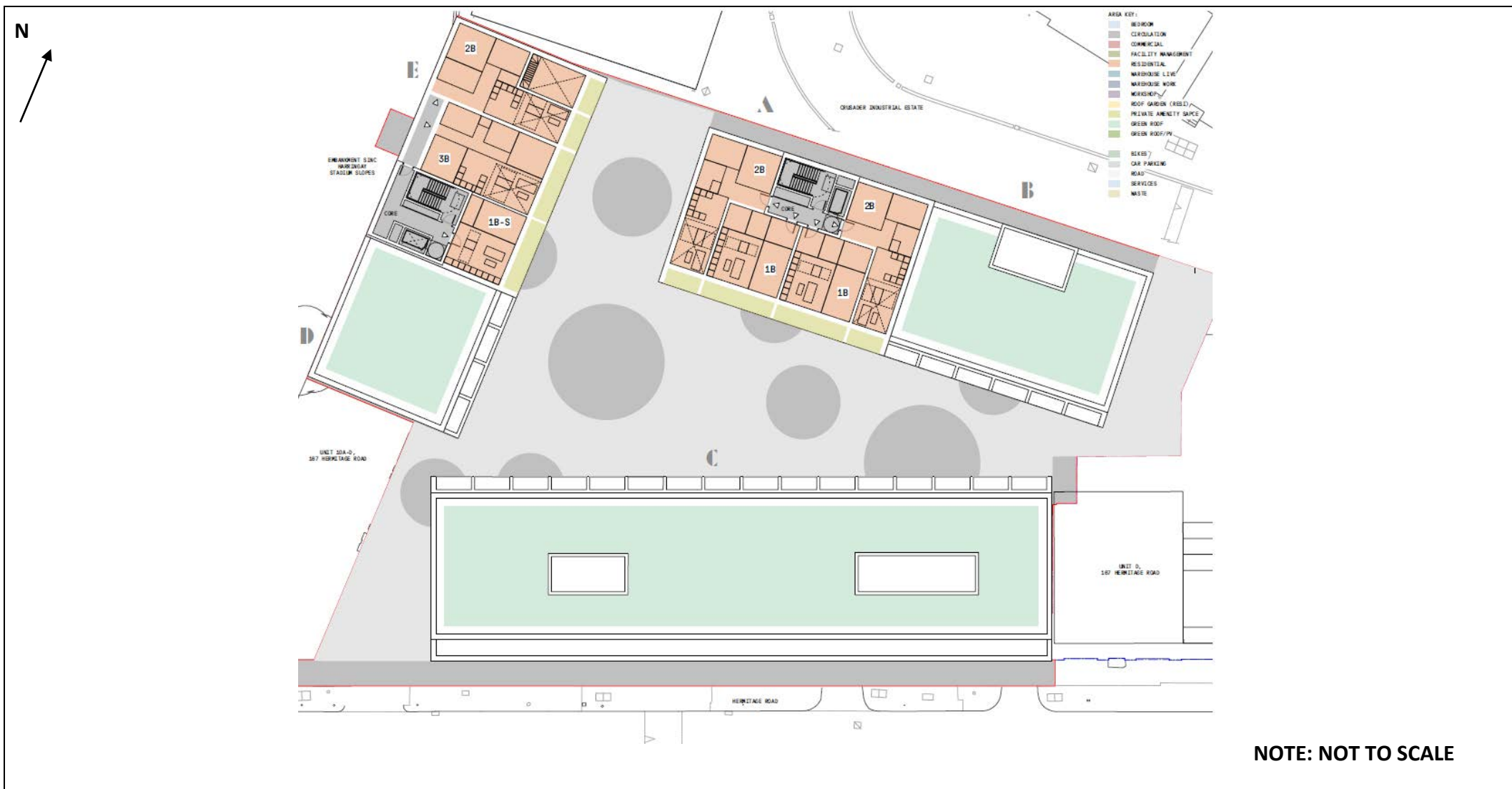




Project:		167 Hermitage Road, Harringay, London N4 1LZ		Figure 6 
Client:		Topfling	Date:	
Proposed Development – Second Floor Plan			Ref:	
			GWPR4712	



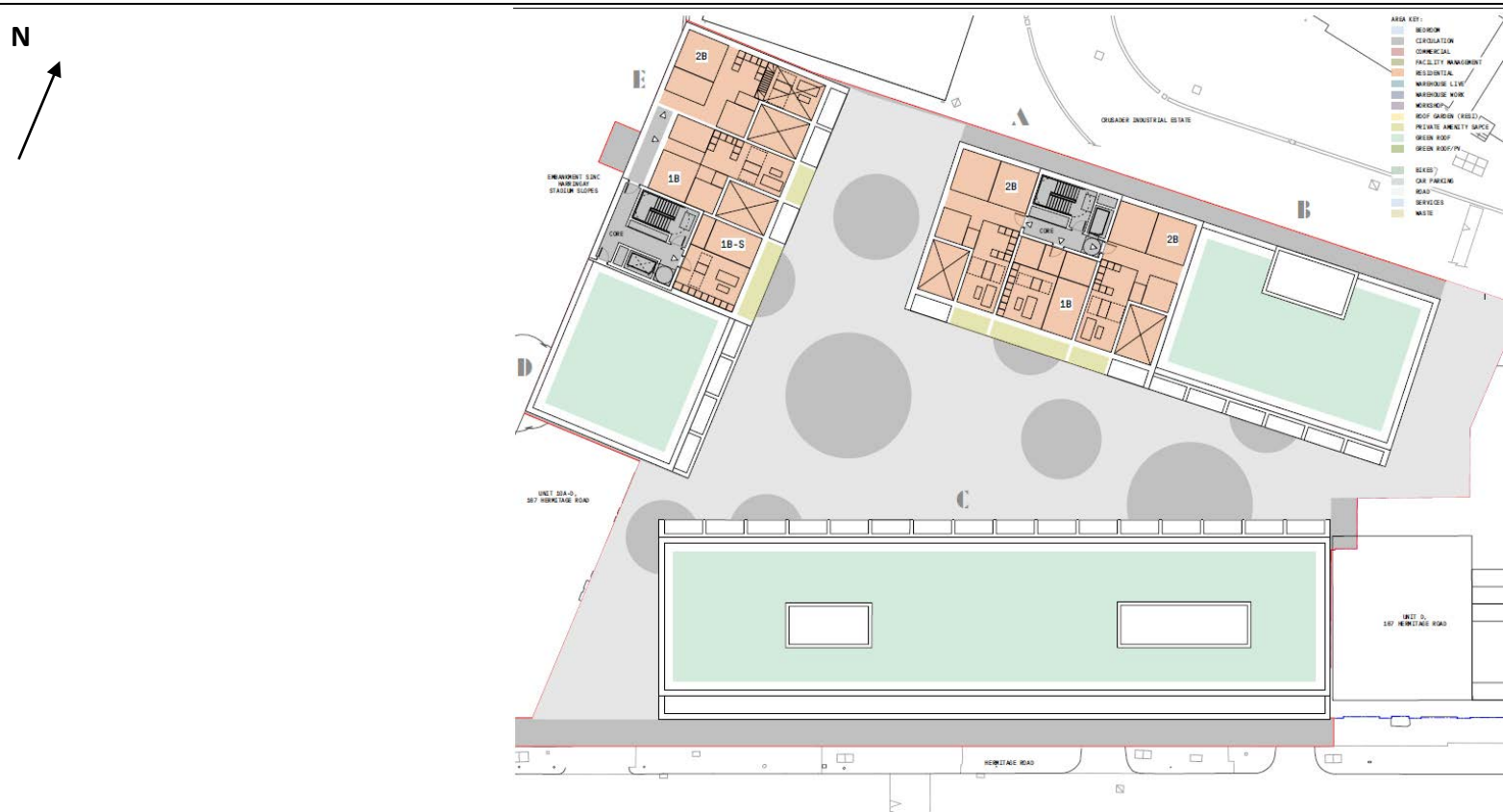
Project:		167 Hermitage Road, Harringay, London N4 1LZ		Figure 7 
Client:		Topfling	Date:	
Proposed Development – Third Floor Plan			Ref:	
			GWPR4712	



Project:		167 Hermitage Road, Harringay, London N4 1LZ	
Client:		Topfling	Date: June 2022
Proposed Development – Sixth Floor Plan		Ref:	GWPR4712

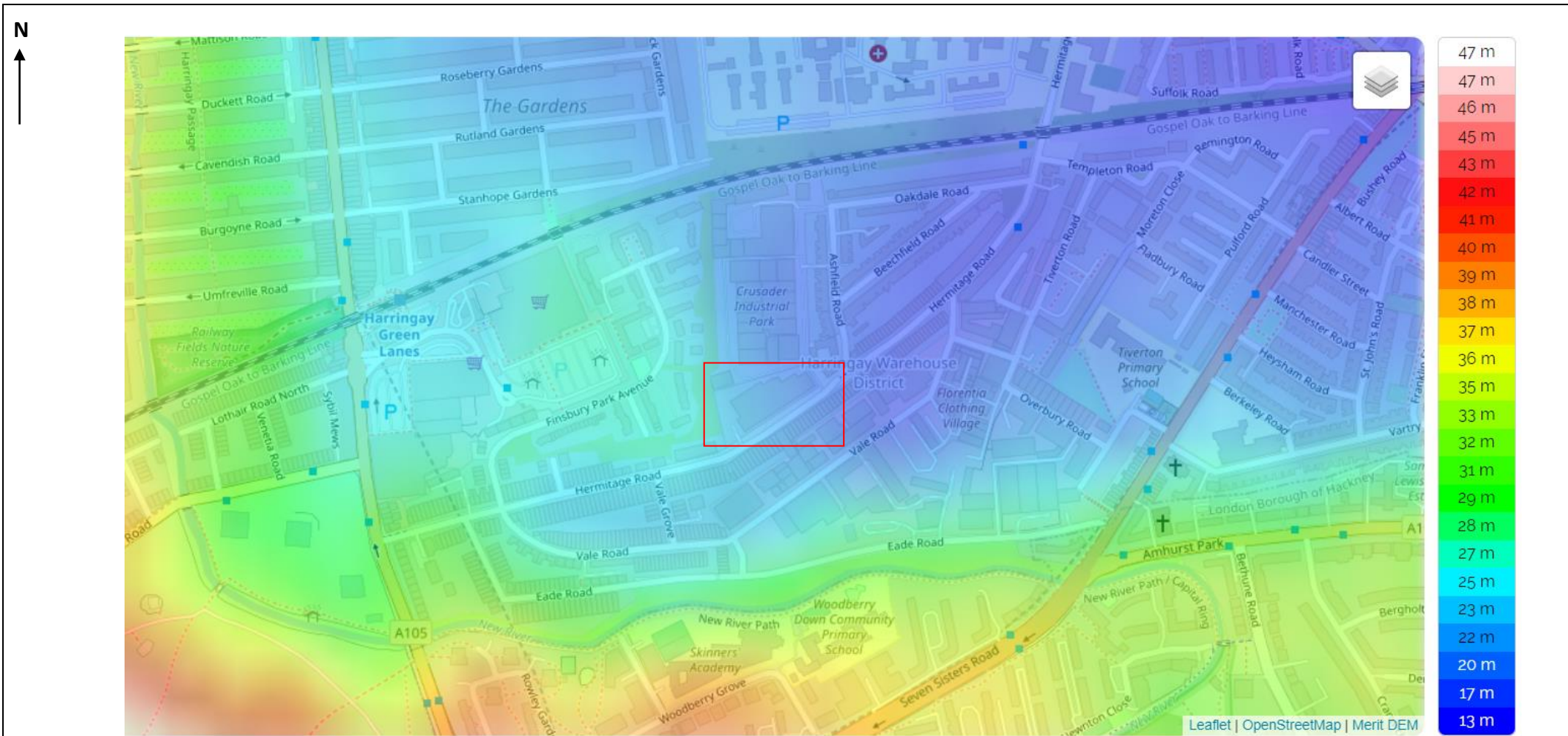
Figure 8





NOTE: NOT TO SCALE

Project:		167 Hermitage Road, Harringay, London N4 1LZ	
Client:		Date:	June 2022
Proposed Development – Seventh Floor Plan		Ref:	GWPR4712

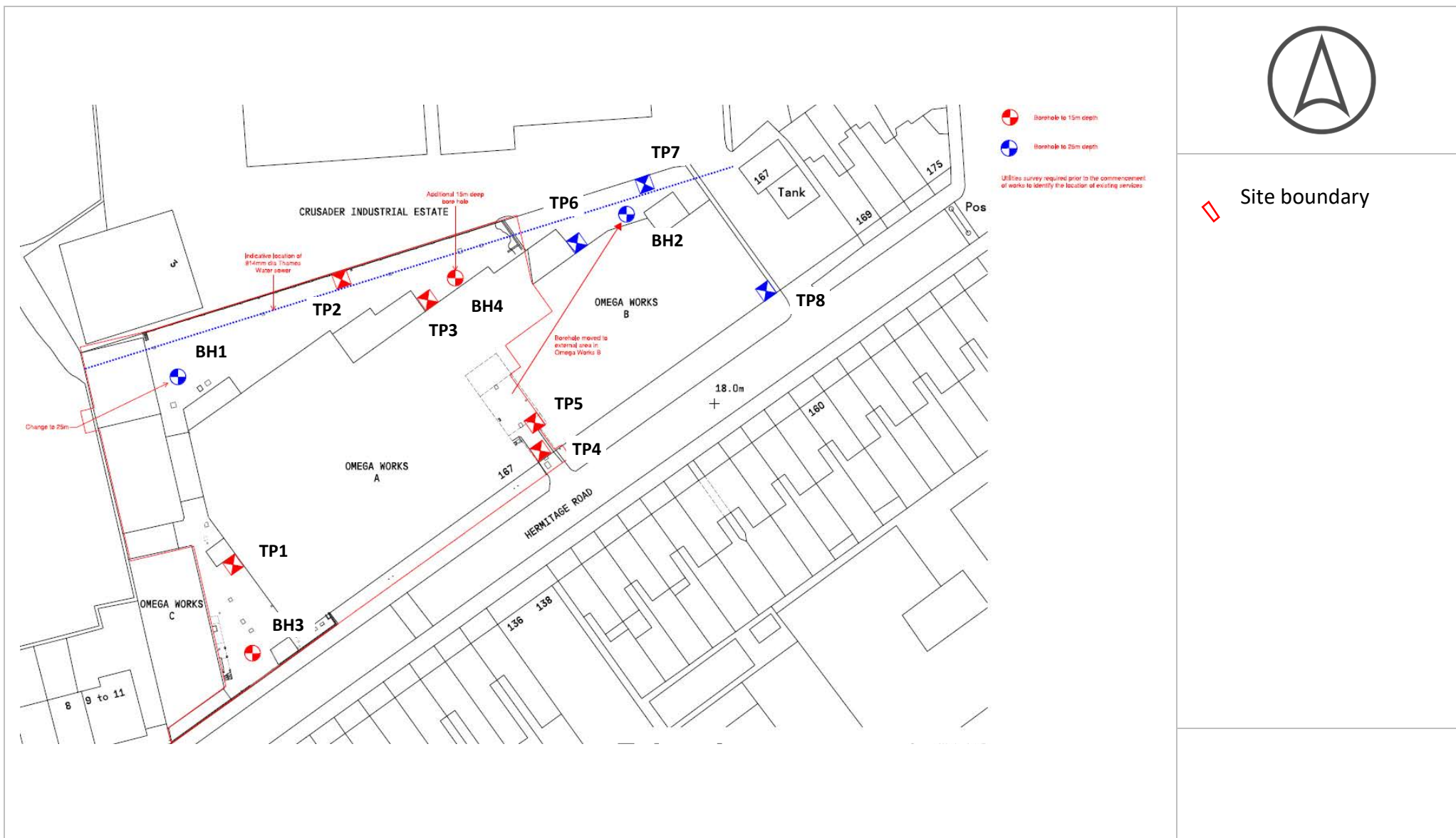


NOTE: NOT TO SCALE

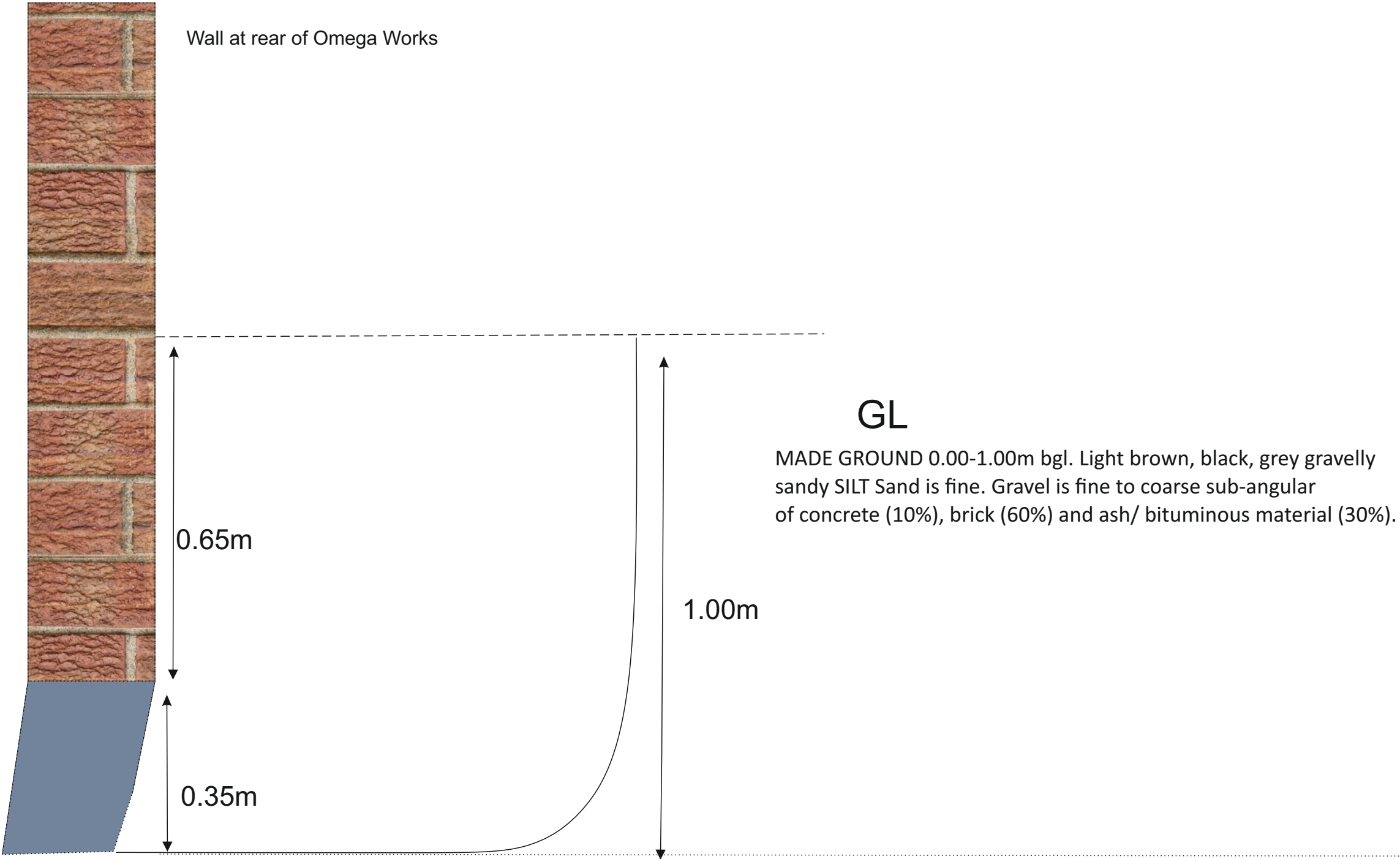
Project:	167 Hermitage Road, Harringay, London N4 1LZ	
Client:	Topfling	Date: June 2022
	Topographic Map	Ref: GWPR4712

Figure 10





TP 2



- Concrete
- Brick Wall
- 0.10m Distance in Metres

PROJECT 167 Hermitage Road, Harringay	
CLIENT Topfling	
DRAWING TITLE Foundation Exposure TP 2	
DRAWING NUMBER GWPR4712 - Figure 12	DATE June 2022
DRAWN BY AS	CHECKED BY MM

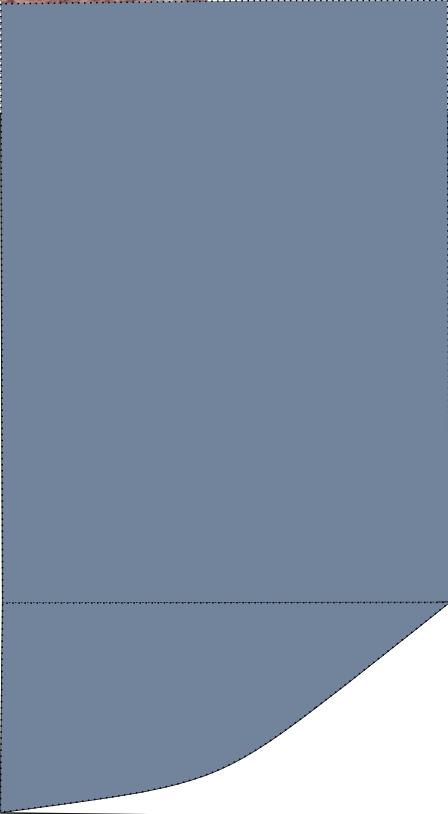


2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB

TP 3



Omega A Works



GL

MADE GROUND 0.00-1.00m bgl. Brown, black, grey
gravelly sandy SILT. Sand is fine to medium. Gravel is
fine to coarse sub-angular of concrete (15%), brick
(35%) and ash/ bituminous material (50%).



Concrete



Brick Wall



0.10m

Distance in Metres

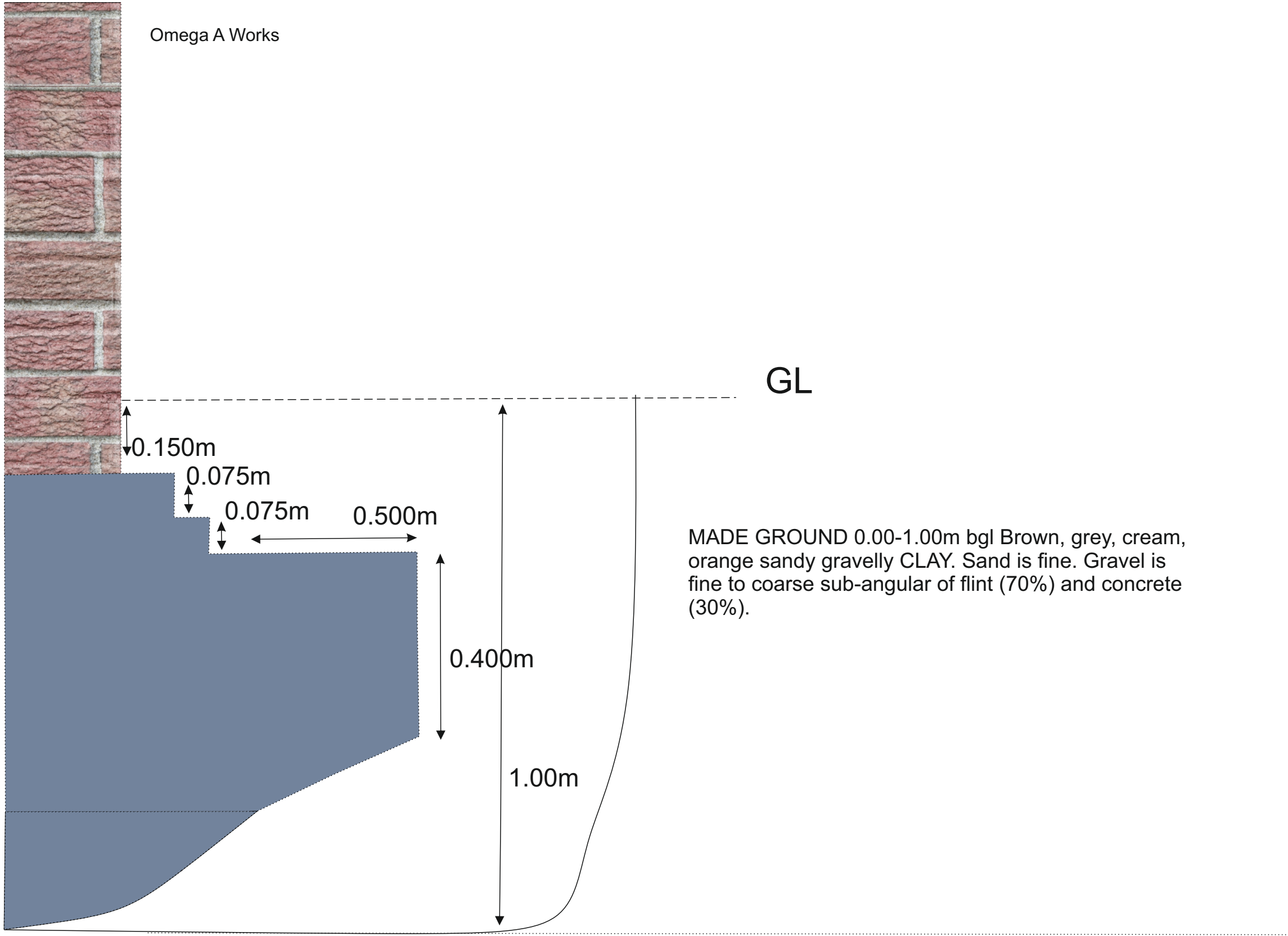
PROJECT 167 Hermitage Road, Harringay	
CLIENT Topfling	
DRAWING TITLE Foundation Exposure TP 3	
DRAWING NUMBER GWPR4712 - Figure 13	DATE January 2022
DRAWN BY AS	CHECKED BY MM



2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB

TP 5

Omega A Works



- Concrete
- Brick Wall
- 0.10m Distance in Metres

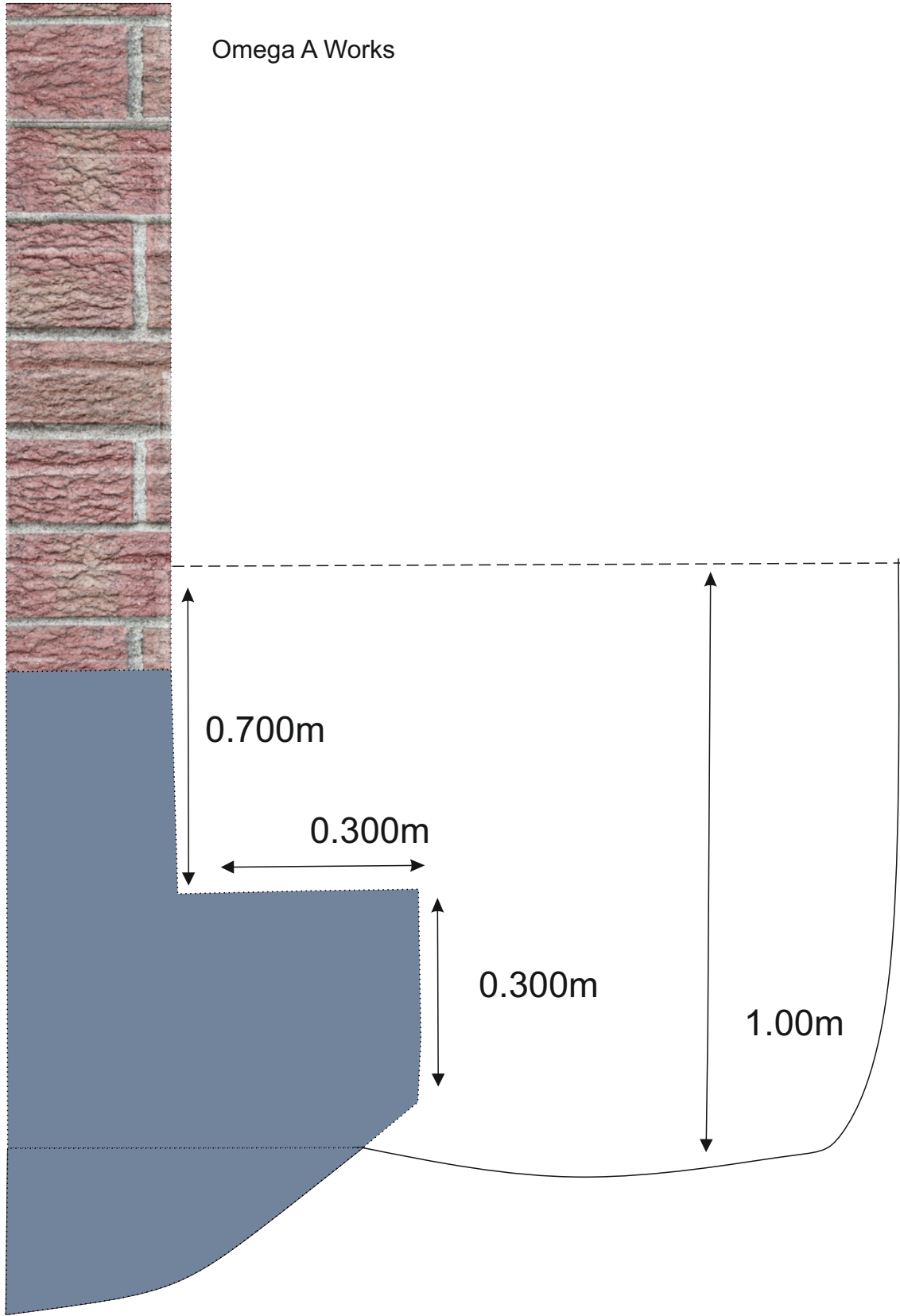
PROJECT 167 Hermitage Road, Harringay	
CLIENT Topfling	
DRAWING TITLE Foundation Exposure TP 5	
DRAWING NUMBER GWPR4712 - Figure 14	DATE June 2022
DRAWN BY AS	CHECKED BY MM



2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB

TP 6

Omega A Works



- Concrete
- Brick Wall
- 0.10m Distance in Metres

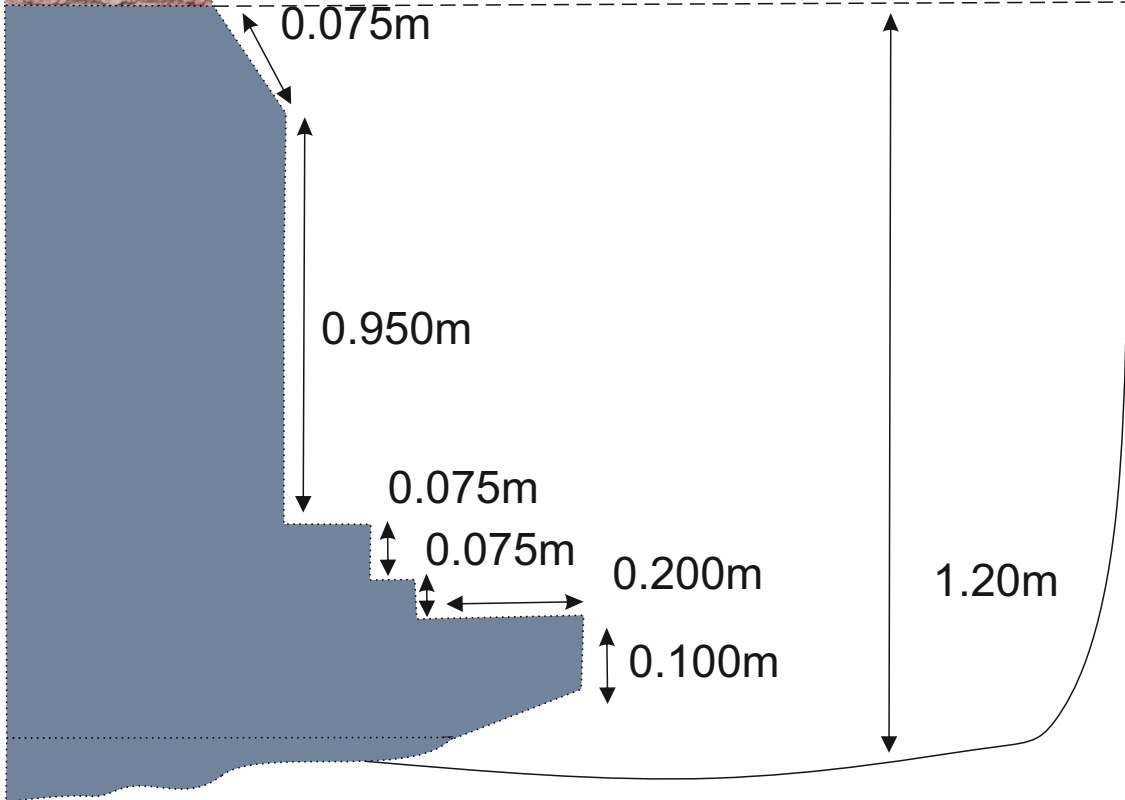
PROJECT 167 Hermitage Road, Harringay	
CLIENT Topfling	
DRAWING TITLE Foundation Exposure TP 6	
DRAWING NUMBER GWPR4712 - Figure 15	DATE June 2022
DRAWN BY AS	CHECKED BY MM



2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB

TP 7

Omega A Works



GL

MADE GROUND 0.00-0.80m bgl: Black, grey gravelly sandy SILT. Sand is fine. Gravel is fine to coarse sub-angular of brick (20%) flint (40%) and ash (40%).

0.80-1.00m bgl- Orangish grey brown slightly gravelly sandy CLAY. Sand is fine. Gravel is fine sub-angular of flint. (LONDON CLAY FORMATION).

- Concrete
- Brick Wall
- 0.10m Distance in Metres

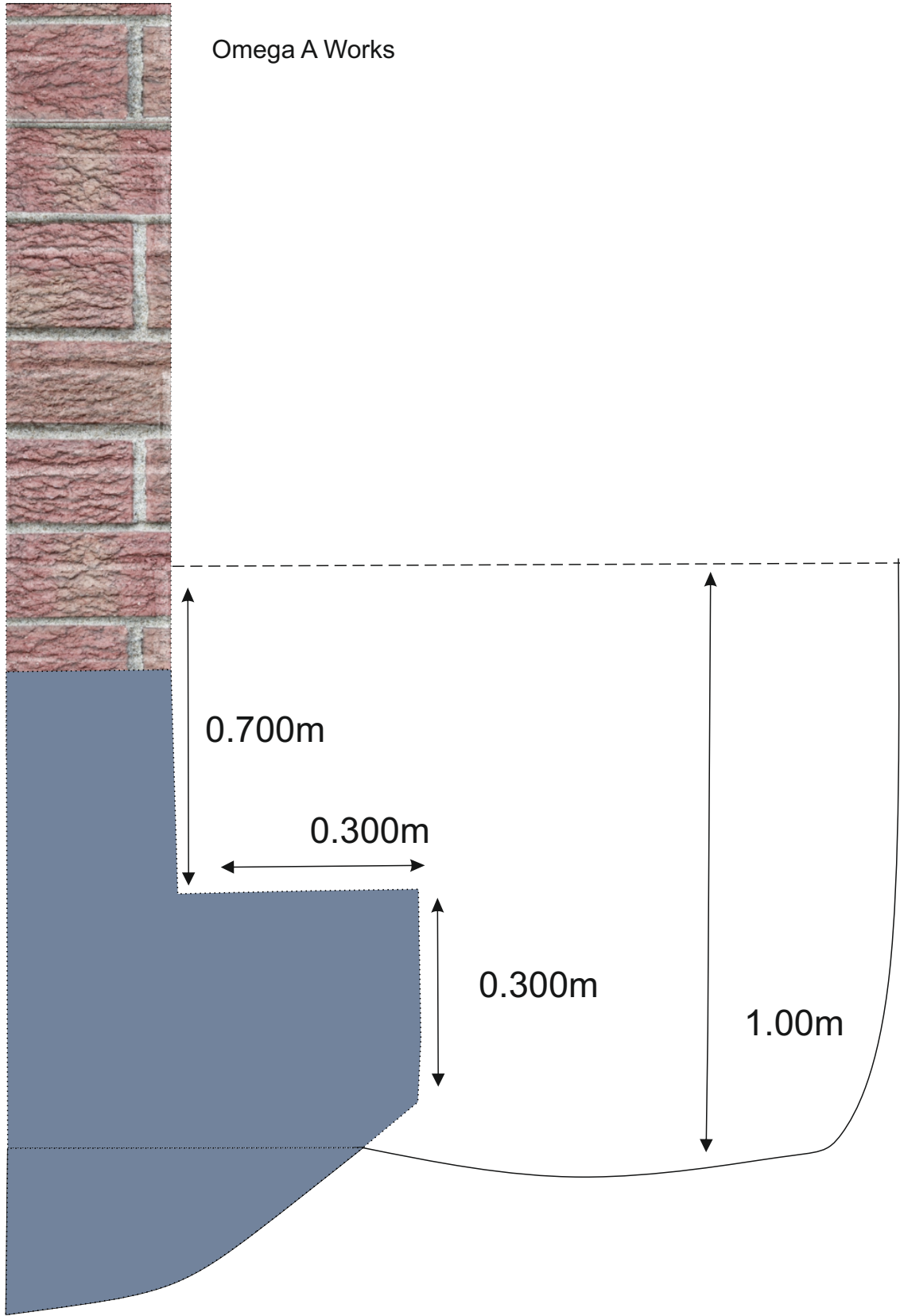
PROJECT 167 Hermitage Road, Harringay	
CLIENT Topfling	
DRAWING TITLE Foundation Exposure TP 7	
DRAWING NUMBER GWPR4712 - Figure 16	DATE June 2022
DRAWN BY AS	CHECKED BY MM



2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB

TP 8

Omega A Works



GL

MADE GROUND 0.00-0.50m bgl. Black, brown grey gravelly sandy SILT. Sand is fine. Gravel is fine to medium sub-angular of flint (50%), concrete (10%), brick (10%) and ash (30%).

MADE GROUND 0.50-1.00m bgl: Black, grey gravelly sandy CLAY. Sand is fine. Gravel is fine to coarse sub-angular of glass (10%) brick (20%), ash (10%) and flint (60%).

Concrete

Brick Wall

0.10m

Distance in Metres

PROJECT 167 Hermitage Road, Harringay	
CLIENT Topfling	
DRAWING TITLE Foundation Exposure TP 8	
DRAWING NUMBER GWPR4712 - Figure 17	DATE June 2022
DRAWN BY AS	CHECKED BY MM



2 The Long Barn, Norton Farm, Selborne Road,
Selborne, Alton, Hampshire, GU34 3NB

APPENDIX A: Conditions and Limitations

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The report has been prepared on the basis of information, data and materials which were available at the time of writing. Accordingly, any conclusions, opinions or judgements made in the report should not be regarded as definitive or relied upon to the exclusion of other information, opinions and judgements.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Any decisions made by you, or by any organisation, agency or person who has read, received or been provided with information contained in the report ("you" or "the Recipient") are decisions of the Recipient and we will not make, or be deemed to make, any decisions on behalf of any Recipient. We will not be liable for the consequences of any such decisions.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Any Recipient must take into account any other factors apart from the Report of which they and their experts and advisers are or should be aware. The information, data, conclusions, opinions and judgements set out in the report may relate to certain contexts and may not be suitable in other contexts. It is your responsibility to ensure that you do not use the information we provide in the wrong context.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the

context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been sampled or monitored in recorded locations and tests for some of the more common chemicals generally expected. Other concentrations of types of chemicals may exist. It was not part of the scope of this report to comment on environment/contaminated land considerations.

The conclusions and recommendations relate to 167 Hermitage Road, Harringay, London N4 1LZ.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sampler borehole implies the specific technique used to produce a trial hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets, remain with Ground and Water Limited. Licence is for the sole use of the client and may not be assigned, transferred or given to a third party.

Only our client may rely on this report and should this report or any information contained in it be provided to any third party we accept no responsibility to the third party for the contents of this report save to the extent expressly outlined by us in writing in a reliance letter addressed from us to the third party.

Recipients are not permitted to publish this report outside of their organisation without our express written consent.

APPENDIX B: Technical Glossary

TECHNICAL GLOSSARY

The list of possible definitions within the report may be seen below. Please note that some definitions may not be relevant to this report.

HYDROGEOLOGY:

A **Principal Aquifer** is a layer of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary (A) Aquifers consist of deposits with permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

Secondary (B) Aquifers consist of deposits with predominantly lower permeability layers with may stoke and yield limited amounts of groundwater due to localised features such as fissures, think permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary Aquifers (Undifferentiated) are assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both a minor aquifer and non-aquifer in different locations due to the variable characteristics of the rock type.

Unproductive Strata are rock layers with low permeability that have negligible significance for water supply or river base flow. These were formerly classified as non-aquifers.

FLOOD ZONES:

Environment Agency Flood Zone 2, defined as; land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

Environment Agency Flood Zone 3 shows the extent of a river flood with a 1 in 100 (1% or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

Environment Agency Flood Zone 3 area that benefits from flood defences, defined as; land and property in this flood zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

GROUNDWATER SOURCE PROTECTION ZONES (SPZS):

Inner Zone (SPZ1): This zone is 50 day travel time of pollutant to source with a 50 metres default minimum radius.

Outer Zone (SPZ2): This zone is 400 day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken.

Total Catchment (SPZ3): This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

Zone of Special Interest (SPZ4): This zone is where local conditions require additional protection.

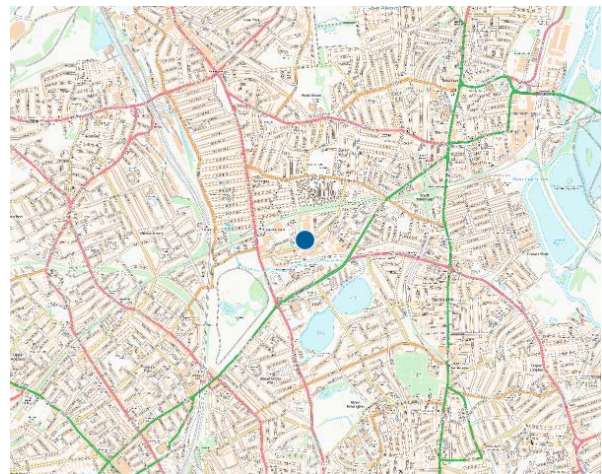
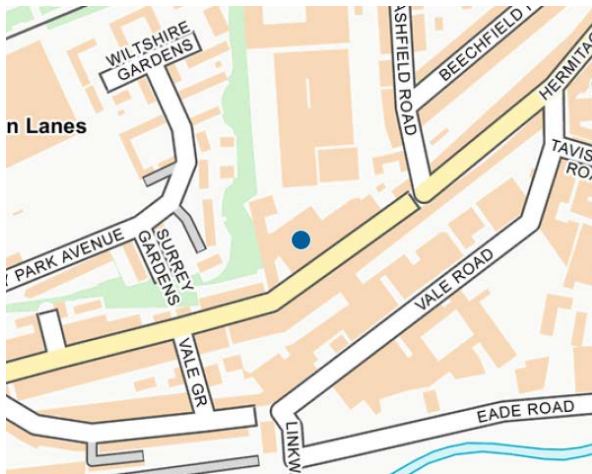
IN-SITU STRENGTH GEOTECHNICAL TESTING:

Windowless Sample and/or Cable Percussion and/or Rotary Boreholes provide samples of the ground for assessment but they do not give any engineering data. The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The test uses a thick-walled sample tube, with an outside diameter of 50mm and an inside diameter of 35mm, and a length of around 650mm. This is driven into the ground at the bottom of a borehole by blows from a slide hammer with a weight of 63.5kg falling through a distance of 760mm. The sample tube is driven 150mm into the ground and then the number of blows needed for the tube to penetrate each 75mm up to a depth of 450mm is recorded. The sum of the number of blows is termed the "standard penetration resistance" or the "N-value".

Dynamic Probing involves the driving of a metal cone into the ground via a series of steel rods. These rods are driven from the surface by a hammer system that lifts and drops a 63.5kg (SHDP) hammer onto the top of the rods through a set height, thus ensuring a consistent energy input. The number of hammer blows that are required to drive the cone down by each 100mm increment are recorded. These blow counts then provide a comparative assessment from which correlations have been published, based on dynamic energy, which permits engineering parameters to be generated. (The Dynamic Probe 'Super Heavy' (SHDP) Tests were conducted in accordance with BS 1377; 1990; Part 9, Clause 3.2).

APPENDIX C: Preliminary UXO Report

Preliminary Unexploded Ordnance Risk Assessment



Project: UNIT A, OMEGA WORKS, HERMITAGE ROAD, TOTTENHAM,
LONDON, N4 1LZ
Groundsure Ref: GS-8685355

Report prepared by SafeLane Global and F!ND Mapping Limited

Report reference: 504972

**SAFE, RELIABLE,
PROFESSIONAL**

The established market leader in
UXO risk mitigation

www.bombrisk.com

Preliminary Unexploded Ordnance Threat Assessment

For:

UNIT A, OMEGA WORKS, HERMITAGE ROAD, TOTTENHAM, LONDON, N4 1LZ

Contents	Page
1 Executive Summary	02
2 Introduction	03
3 Methodology	05
4 Search Results	06
5 Risk of UXO Based on WWII German Bombing Density	09
6 Risk of UXO Based on WWII German Bomb Strikes	10
7 Conclusions	11

Terms of Use

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1 Has a potential unexploded ordnance (UXO) risk been identified at the site in question?

YES

Indicative British / Allied UXO Risk

LOW-MEDIUM

Indicative German UXO Risk

HIGH

2 Does the site in question require further research to clarify the unexploded ordnance (UXO) risk to future ground works?

YES

3 SafeLane Global's recommendation:

A Stage 2 Detailed Unexploded Ordnance Desktop Threat Assessment of the site is carried out.

To request a quotation please call SafeLane Global on 01634 471 340

If you order the recommended Stage 2 Detailed Desktop Threat Assessment, you will be refunded the fee for this BombRisk Preliminary Threat Assessment.

About SafeLane Global Limited

Operational for over 30 years for 10,000+ clients, SafeLane Global supports the UK construction industry with its BombRisk service. This assesses the risk of encountering items of unexploded ordnance (UXO) during intrusive works.

SafeLane Global's specialist advice provides essential information for risk assessments, improving safety and enhancing reputations, helping contractors avoid costly delays.

SafeLane Global holds the following accreditations:

- **Occupational Health & Safety Management Systems (OHAS 18001:2007)**
- **Environmental Management Systems (ISO 14001:2004)**
- **Quality Management Systems (ISO 9001:2008).**

The risk of encountering UXO on most sites in the UK is low. However, where a site is at increased risk it is necessary to take measures to mitigate that risk. The factors affecting UXO risk assessment are based upon the history and previous usage of a site and its surroundings.

In 2009, the Construction Industry Research and Information Association (CIRIA) established a set of guidelines to assist industry professionals; SafeLane Global was a significant contributor to the guide, under former company name Dynasafe BACTEC.

CIRIA recommends a four-stage risk management process:

- **Preliminary risk assessment**
- **Detailed risk assessment**
- **Risk mitigation**
- **Implementation**

The preliminary risk assessment enables a non-UXO specialist to place a site in context and to identify whether a more detailed assessment is necessary. The assessment is based upon data obtained from desktop reviews of the site's history and its proximity to potential indicators of UXO contamination.

There are two principal groups of onshore UXO in the UK:

- **British / Allied army, air force and navy activities - domestic military activity**
- **Enemy bombing during WWI and WWII - aerial bombing and naval bombardment**

These two groups comprise many potential UXO risk contributing sources within the UK, the most significant of which are listed below. Georeferenced databases containing this information are used

by BombRisk.com to identify areas of potentially elevated UXO risk.

- **Historic army, navy and air-force facilities**
- **Explosives / ammunition factories**
- **Munitions storage depots**
- **Historic military training areas and firing ranges**
- **British army explosive ordnance clearance tasks / recces**
- **WWII heavy anti-aircraft batteries**
- **WWII anti-invasion defensive fortifications**
- **Miscellaneous WWII pipe mined locations**
- **WWII prisoner of war camps**
- **WWII German bombing density statistics**
- **WWII bombing decoy sites**
- **Press articles regarding UXO finds**
- **Locations of SafeLane Global UXO finds**
- **Locations of SafeLane Global desktop threat assessments**
- **Locations of SafeLane Global on-site support services**

About FIND Mapping Limited

Established in 2006, FIND Mapping Limited is a pioneering web mapping and spatial data technology company offering online mapping and consultancy services. FIND technology powers the generation of this report.

www.findmaps.co.uk provides detailed mapping and a wealth of data sets to hundreds of the UK's top property, environmental and design/build companies.

FIND's consultancy services provide bespoke internet mapping solutions to a range of businesses enabling them to manage their spatial data more effectively.

While working closely with a wide range of reputable data providers including Ordnance Survey and the Environment Agency, FIND works independently of these organisations. A similar arm's-length relationship is maintained in terms of software and hardware providers. This enables the team at FIND to offer truly independent advice.

SafeLane Global Limited and FIND have compiled a geo-referenced database of potential sources of UXO risk within the UK. From this information a range of risk zones have been defined.

The weighting of these zones is based upon the influence of all relevant factors. A WWII-era RAF airfield, for example, has a far greater zone of influence than a single WWII-era anti-aircraft battery, as it would have covered a larger area, housed a much greater quantity / variety of munitions, seen more domestic troop training activities and would have been a more likely target for enemy bombers.

An online Preliminary Automated UXO Threat Assessment will determine an indicative level of UXO risk relating to a site. Note that these risk levels could be subject to change following the completion of any Detailed Desktop Threat Assessment for the same site.

The assessment will list all factors contributing to this weighting and will also give appropriate recommendations for further action, if considered necessary.

London during WWII

As a Capital city, London was an obvious target for the Luftwaffe. The city was home to the British government, the largest docks system in the UK and numerous historic and cultural monuments.

The night time carpet bombing Blitz on London began on 7th September 1940 with concentrated attacks coming to an end in May 1941 as the Luftwaffe was diverted east to prepare for "Operation Barbarossa"; the invasion of the Soviet Union. By the end of the war London had become the most heavily bombed city in Britain. Between 1940 and 1945 there were a total of 71 "major" air raids on the city, resulting in an estimated 190,000 bombs dropped; approximately 18,000 tons. This left some 29,000 people dead.

During 1942 and 1943 there were a number of minor intruder raids carried out by small formations of fighter bombers and then between January and May 1944 the Luftwaffe returned to London in mass, for Operation Steinbock, a series of large Blitz style raids.

From mid-1944 the V-weapon (for Vengeance) campaign, using unmanned cruise missiles and rockets carrying 1,000kg warheads, represented Hitler's final attempt to reverse Germany's imminent defeat. The V1 (Flying Bomb or Doodlebug) and the V2 (Long Range Rocket) were launched from bases in Germany and occupied Europe. Totals of 2,419 V1s and 517 V2s were recorded in the London Civil Defence region.

The map included at the end of this report shows the high explosive bombs recorded falling in the region of the site on the available bomb census mapping for the area. Please note that this information comes from a single source and should not be considered definitive in its accuracy or coverage.

SafeLane Global Limited's UXO Source Database

Within 10km of the site the following potential sources of explosive ordnance have been recorded:

Source	Number within 10km
Abandoned Bombs	16
Press Articles Regarding UXO Finds	11
WWII Defence Related Positions & Pillboxes	108
Historic Army Camps	5
Prisoner of War Camps	3
Heavy Anti-Aircraft Batteries	19
Army Explosive Ordnance Clearance Tasks/Recces	38
Sites Related to the Manufacture of Explosives and Explosive Ordnance	7
SafeLane Global Desk-top Threat Assessments	357
Military Airfield Facilities	None recorded
Bombing Decoy Sites	None recorded
Military Training Areas and Firing Ranges	None recorded
Pipe Mined WWII Airfields	None recorded
Miscellaneous WWII Pipe Mined Locations	None recorded
SafeLane Global Unexploded Ordnance Finds	None recorded
SafeLane Global On-Site Support Services	None recorded

Of these sources, the following are deemed the most significant:

Abandoned Bombs

Description	Approximate distance (km) from site
Unknown size, No. 9 Filter bed, Metropolitan Waterworks, Green Lane. Exact location unknown	1

An Abandoned Bomb (AB) is a suspected unexploded WWII bomb or anti-aircraft projectile recorded during 1940-1945, but not definitively located/removed at the time.

A typical post-air raid survey of buildings, facilities and installations included a search for evidence of bomb entry holes. Where entry holes were identified, a bomb disposal team would usually be called upon to locate, render safe and dispose of any unexploded bomb (UXB). However, when the position of a UXB was considered relatively benign, where access was problematic or resources short, the UXB

may not have been exposed and rendered safe. Such incidents were noted AB.

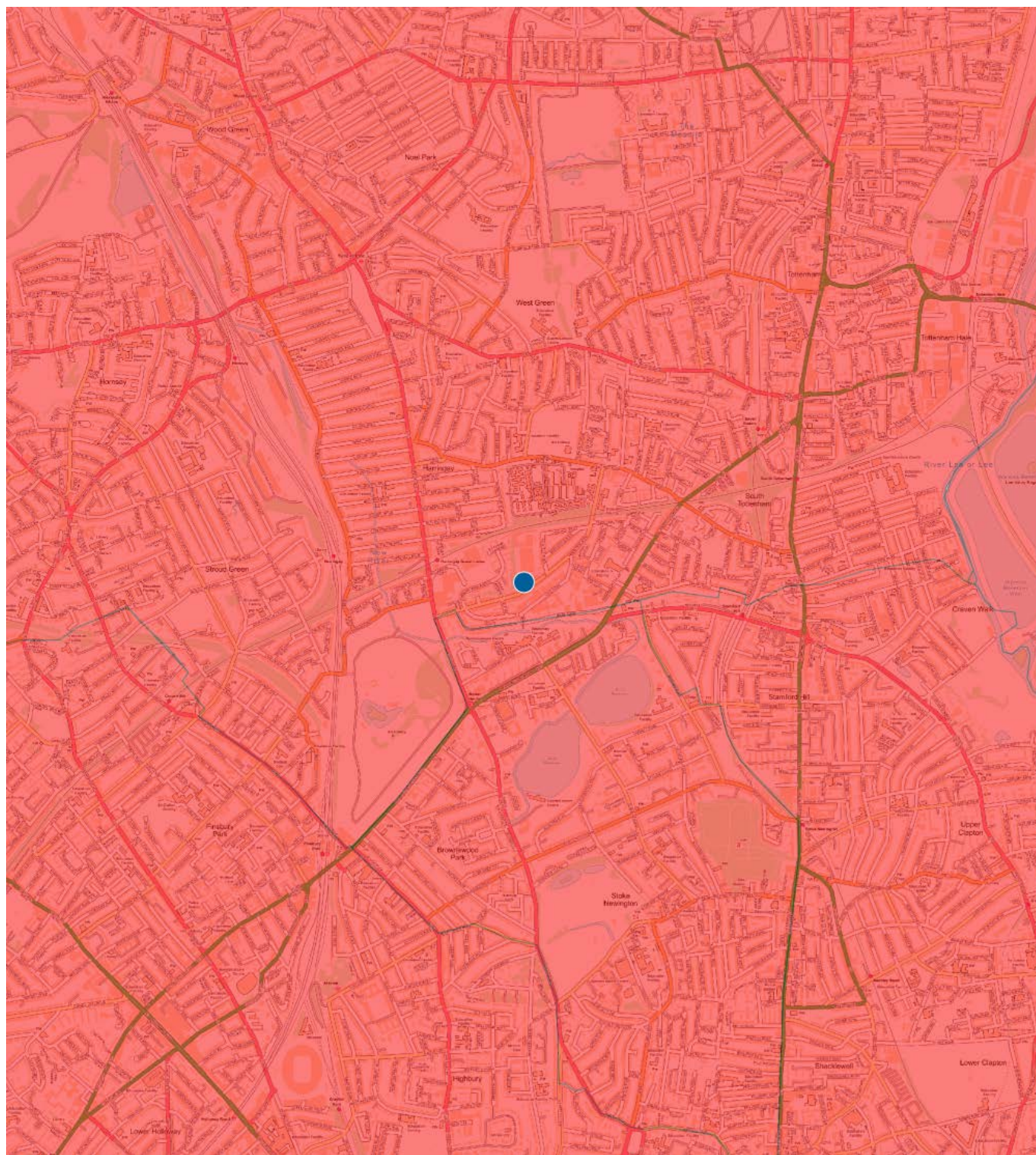
Given the inaccuracy of WWII records the location of ABs cannot be considered definitive. The geographic location of ABs must therefore be regarded as approximate.

SafeLane Global Desk-top Threat Assessments

Number of SafeLane Global Threat Assessments in the local area	Determined risk level at site
1 assessment	Medium - High

It should be noted that not all of the above Threat Assessments have contributed to the final risk score for this report.

SafeLane Global has researched and produced full explosive ordnance threat assessments for over 1,300 sites in the UK. Our database shows that the above assessments have been carried out on sites nearby. These sites were rated as either Low-Medium risk or Medium-High risk.

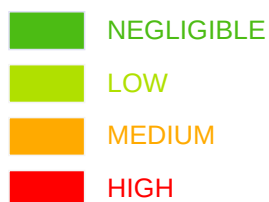


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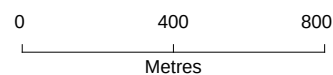
BOMB/RISK

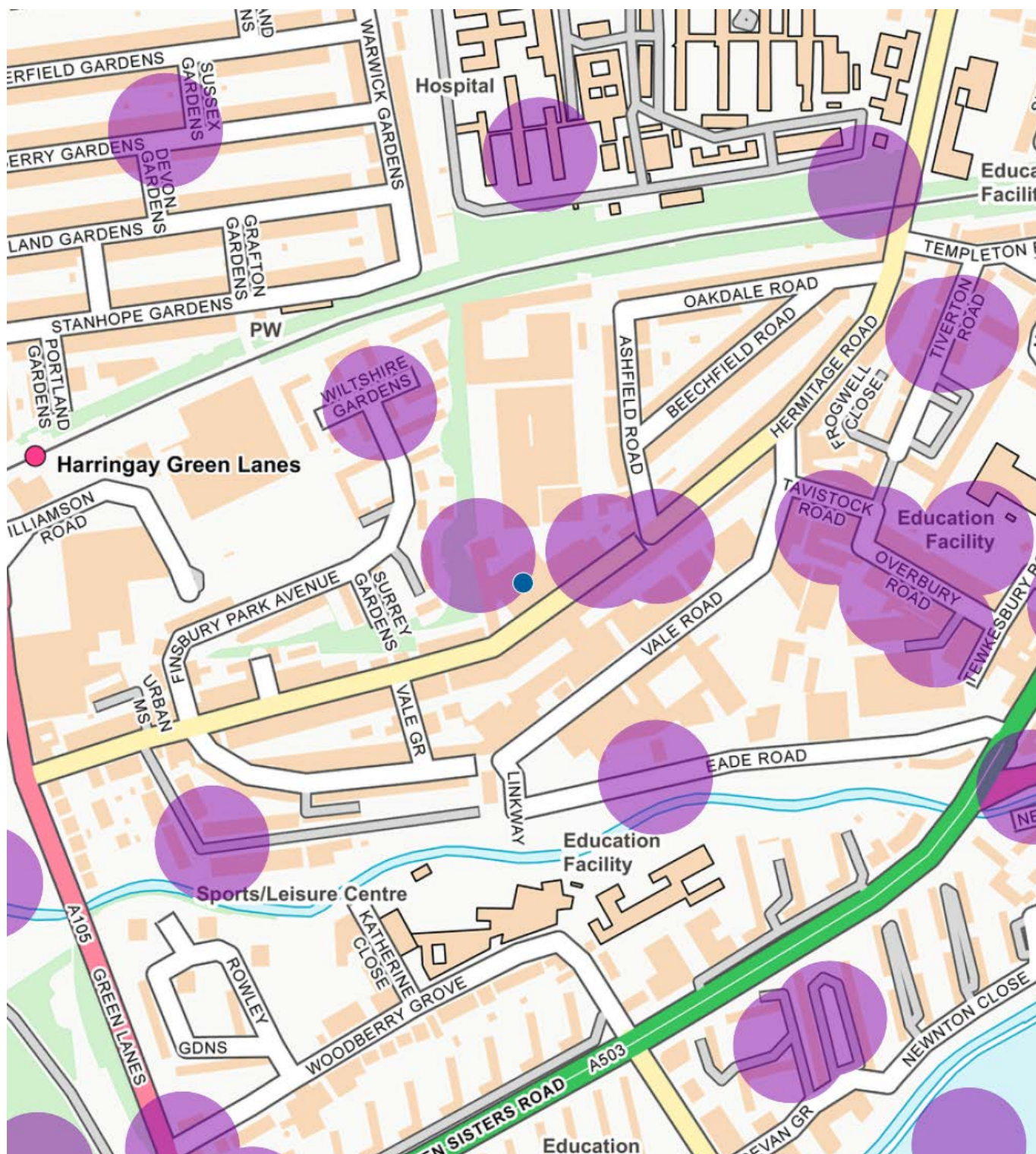
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**BOMB STRIKES
WITH BUFFER**

1:5000



0 100 200
Metres

Risk Levels and Recommendation

Indicative British / Allied UXO Risk

LOW-MEDIUM

There are potential sources of British / Allied UXO recorded in SafeLane Global's historical database in the general area surrounding the site. It is recommended that further research is undertaken to determine more about these potential sources and how they may have affected the site. If there is any empirical evidence of actual or potential contamination, SafeLane Global should be contacted for advice. Otherwise, the risk on site from UXO is considered to be Low-Medium.

Indicative German UXO Risk

HIGH

Historical records indicate that the borough within which the site was situated during WWII sustained an overall high density of bombing. Furthermore, a bomb strike(s) was recorded within 50m of the site on the London ARP Bomb Census Maps.

Given these factors, this preliminary assessment has identified a High risk from German unexploded bombs at this site.

Conclusion

This preliminary assessment has resulted in an overall High risk from UXO. SafeLane Global would recommend that a Detailed UXO Threat Assessment Desk Top Study is undertaken for this site. Detailed assessments are conducted offline by SafeLane Global's researchers and use information such as historical mapping, WWII-era aerial photography, written air-raid precaution records and where necessary local archive research to fully qualify the risk on site. Land use, changes to building layout during WWII and post war redevelopment will also have an impact on any remaining level of risk from UXO. It is often possible to zone sites into different risk categories. The lead time for a detailed assessment will vary between 3-10 working days dependent upon the complexity of the site and the additional site specific information required.

For a quotation, or more information, please contact SafeLane Global's research team on 01634 471 340, or at research@safelaneglobal.com

BOMB/RISK

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GLOBAL

Unit 3 The Courtyard, Campus Way,
Gillingham Business Park, Gillingham,
Kent, ME8 0NZ, UK

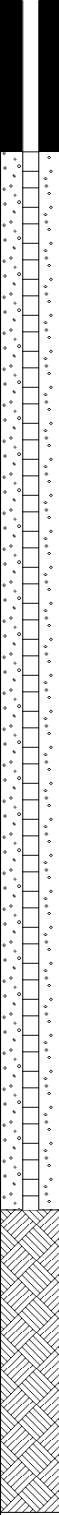
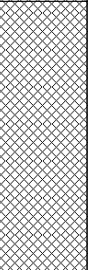
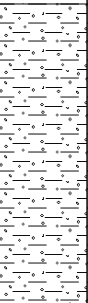
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APPENDIX D: Trial Hole Logs

Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH1	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 1 of 3

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		0.30			MADE GROUND: Concrete	
		0.50	D					MADE GROUND: black, brown, gravelly sandy CLAY. Gravel is fine to coarse sub-angular of brick (20%), concrete (50%) and flint (30%).	
		0.80	D		0.90			MADE GROUND: Black, brown, gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium sub-angular of brick (20%), clinker (40%) and flint (40%).	1
		1.00	D						
		1.20	D						
		1.20	SPT	N=34 (1,1/2,10,14,8)					
		1.70	D					Orange, grey CLAY with fine selenite crystals. (LONDON CLAY FORMATION).	2
		2.20	D						
		2.20	SPT	N=9 (1,0/1,2,4,2)					
		2.70	D		2.70				
		3.20	SPT	N=7 (1,1/1,2,2,2)				Orange, grey CLAY with fine selenite crystals and gravels of fine to coarse sub-angular claystone at 6.60m bgl. (LONDON CLAY FORMATION).	3
		3.70	D						
		4.20	SPT	N=9 (1,2/2,2,2,3)					4
		4.70	D		4.70				
		5.20	SPT	N=10 (2,2/2,2,3,3)				Orange, grey CLAY with selenite crystals and gravels of fine to coarse sub-angular claystone at 6.60m bgl. (LONDON CLAY FORMATION).	5
		5.70	D						6
		6.50	SPT	50 (10,14/50 for 150mm)					7
		7.20	D						
		8.00	SPT	N=15 (3,4/3,4,4,4)				Grey, brown, orange, yellow slightly sandy CLAY with fine selenite crystals. Sand is fine. (LONDON CLAY FORMATION).	8
					8.70				
		9.50	SPT	N=17 (3,3/4,4,4,5)					9
		9.70	D						10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks Groundwater recorded at 2.40m and 6.60m bgl Roots recorded at 2.70m bgl.										
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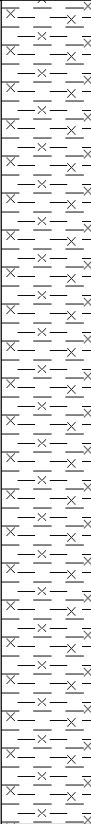


Project Name: 167 Hermitage Road				Client: Topfling				Date:			
Location: Haringey London N4 1LZ				Contractor: LAS and KDS							
Project No. : GWPR4712				Crew Name:				Drilling Equipment:			
Borehole Number BH1		Hole Type CP		Level		Logged By		Scale 1:50		Page Number Sheet 2 of 3	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		11.00 11.20	SPT D	N=18 (3,4/4,4,5,5)	11.70			Grey, brown, orange, yellow slightly sandy CLAY with fine selenite crystals. Sand is fine. (LONDON CLAY FORMATION).		11	
		12.50 12.70	SPT D	N=23 (4,4/5,6,6,6)				Grey, brown slightly silty CLAY with selenite crystals. (LONDON CLAY FORMATION).		12	
		14.00 14.20	SPT D	N=28 (6,6/6,7,7,8)						13	
		15.50 15.70	SPT D	50 (11,16/50 for 150mm)				Grey, brown slightly gravelly slightly silty CLAY with fine selenite crystals. Gravel is fine to medium sub-angular of claystone. (LONDON CLAY FORMATION).		14	
		17.00 17.20	SPT D	N=33 (7,8/8,8,8,9)	17.70					15	
		18.50 18.70	SPT D	N=35 (6,7/7,9,9,10)				Dark grey, brown slightly silty CLAY with fine selenite crystals and shells. (LONDON CLAY FORMATION).		16	
		20.00	SPT	N=37 (4,8/8,9,10,10)						17	
										18	
										19	
										20	
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
Remarks											
Groundwater recorded at 2.40m and 6.60m bgl											
Roots recorded at 2.70m bgl.											



Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH1	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 3 of 3

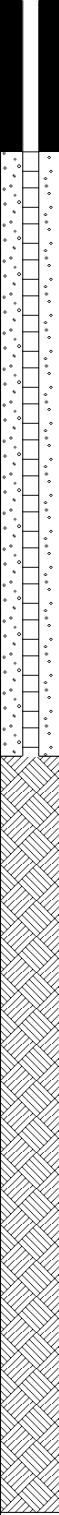
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.20	D		25.45			Dark grey, brown slightly silty CLAY with fine selenite crystals and shells. (LONDON CLAY FORMATION).	21
		21.50	SPT	N=40 (7,7/9,9,11,11)					22
		21.70	D						
		23.00	SPT	N=50 (8,10/11,13,16,10)					23
		23.20	D						24
		24.50	SPT	N=50 (5,8/50 for 225mm)					25
		24.70	D						
									26
									27
									28
								End of Borehole at 25.450m	29
									30

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks Groundwater recorded at 2.40m and 6.60m bgl Roots recorded at 2.70m bgl.										
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Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH2	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 1 of 3

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D					MADE GROUND: Dark brown, grey gravelly sandy SILT. Sand is fine. Gravel is fine to medium sub-angular of flint (30%), concrete (60%) and bituminous material (10%).	
		0.50	D		0.40			MADE GROUND: Dark brown, grey gravelly sandy SILT. Sand is fine. Gravel is fine to medium sub-angular of flint (40%), concrete (40%) and brick (20%).	
		0.80	D		0.90			MADE GROUND: Dark grey, black, brown, gravelly sandy CLAY. Gravel is fine to medium sub-angular of flint (70%) and brick (30%). Strong hydrocarbon odour.	1
		1.00	D					MADE GROUND: Blue, grey, brown, slightly gravelly CLAY. Gravel is fine sub-angular of brick (20%) and flint (80%). Strong organic odour.	
		1.20	D						
		1.20	SPT	N=3 (1,0/1,0,1,1)					
		1.70	D		1.60				2
		2.20	D						
		2.20	SPT	N=7 (1,1/2,1,2,2)					
					2.70				
		3.20	SPT	N=8 (1,1/2,2,2,2)				Brown, grey, CLAY with fine selenite crystals. (LONDON CLAY FORMATION).	3
		3.70	D						
		4.20	SPT	N=10 (2,2/2,2,3,3)					4
		4.70	D						
		5.20	SPT	N=12 (2,3/2,3,3,4)					5
		5.70	D		5.90				
		6.70	SPT	N=15 (3,3/3,4,4,4)				Brown, grey, CLAY with pockets of selenite crystals. (LONDON CLAY FORMATION).	6
		7.20	D						7
		8.20	SPT	N=17 (2,3/4,4,4,5)					8
									9
		9.70	D		9.70				
		9.70	SPT	N=22 (4,4/4,6,6,6)				Dark grey, brown slightly silty CLAY. (LONDON CLAY FORMATION).	10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

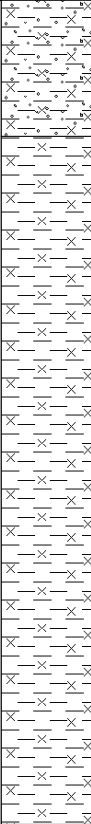
Remarks Groundwater recorded at 15.8m bgl. No roots recorded.										
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Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH2	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 3 of 3

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.20 20.20	D SPT	N=46 (8,9/9,11,11,15)	20.90			Light to dark grey gravelly silty CLAY with fine selenite crystals. Gravel; is fine to coarse sub-angular of claystone. (LONDON CLAY FORMATION).	21
		21.70 21.70	D SPT	N=51 (7,8/10,12,13,16)				Dark grey, brown silty CLAY with fine selenite crystals. (LONDON CLAY FORMATION).	
		23.20 23.20	D SPT	N=52 (9,9/11,11,15,15)					
		24.70 24.70	D SPT	N=50 (8,10/11,12,16,11)					
					25.45			End of Borehole at 25.450m	25
									26
									27
									28
									29
									30

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

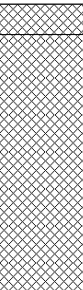
Groundwater recorded at 15.8m bgl.
No roots recorded.





Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH3	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 1 of 1

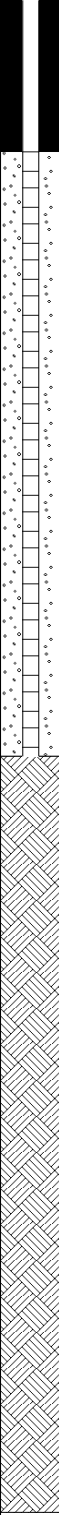
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D	N=5 (2,1/1,2,1,1)	0.20			MADE GROUND: Concrete.	1
		0.50	D						
		1.00	D						
		1.20	SPT						
		1.70	D						
					1.90			End of Borehole at 1.900m	2
									3
									4
									5
									6
									7
									8
									9
									10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks No roots recorded. Borehole terminated early due to concrete obstruction. No further drilling possible.	
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Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH4	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		0.20			MADE GROUND: Concrete Slab	
		0.50	D		0.40			MADE GROUND: Black, grey gravelly silty SAND. Sand is fine to coarse. Gravel is fine to coarse sub-angular of brick (20%) and concrete (80%).	
		0.80	D					MADE GROUND: Black, grey, brown, gravelly sandy CLAY. Gravel is fine to coarse sub-angular of brick (20%) and concrete (80%).	1
		1.00	D		1.00			MADE GROUND: Grey, brown, black, gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is fine to medium sub-angular of flint (20%), brick (20%), ash (20%) and bituminous material (40%). Metal fragments at 1.70m bgl.	
		1.20	D						
		1.20	SPT	N=40 (1,1/4,10,12,14)					2
		1.70	D						
		2.20	D						
		2.20	SPT	N=12 (3,4/1,0,5,6)					
		2.70	D						
		3.20	SPT	N=6 (1,1/1,1,2,2)	3.00			Brown, grey CLAY with pockets of selenite crystals at 3.70m and 4.70m bgl. (LONDON CLAY FORMATION).	3
		3.70	D						
		4.20	SPT	N=7 (1,2/2,1,2,2)					4
		4.70	D						
		5.20	SPT	N=11 (2,2/2,3,3,3)					5
		5.70	D						6
		6.70	SPT	N=12 (2,3/3,3,3,3)					
		7.20	D		7.70				7
		8.20	SPT	N=16 (3,4/4,4,4,4)				Grey, brown, orange, slightly gravelly silty CLAY with fine selenite crystals. Gravel is fine to medium sub-angular of claystone and flint. (LONDON CLAY FORMATION).	8
		8.70	D						
		9.70	SPT	N=18 (3,4/4,5,4,5)	9.00			Dark grey, brown slightly silty CLAY with fine selenite crystals. (LONDON CLAY FORMATION)	9
									10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks Groundwater recorded at 11.00m bgl No roots recorded.										
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Percussion Drilling Log

Project Name: 167 Hermitage Road		Client: Topfling		Date:	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Drilling Equipment:	
Borehole Number BH4	Hole Type CP	Level	Logged By	Scale 1:50	Page Number Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.20	D					Dark grey, brown slightly silty CLAY with fine selenite crystals. (LONDON CLAY FORMATION)	
		11.20	SPT	N=19 (3,4/4,5,5,5)					11
		11.70	D						12
		12.70	SPT	N=22 (4,5/5,5,6,6)					13
		13.20	D						14
		14.20	SPT	N=28 (6,6/7,7,7,7)					15
		14.70	D						16
		15.00	D						17
		15.00	SPT	N=29 (6,7/7,7,7,8)					18
					15.45				19
								End of Borehole at 15.450m	20

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

Groundwater recorded at 11.00m bgl

No roots recorded.



Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP1	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

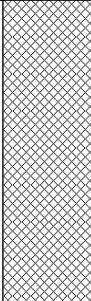
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			MADE GROUND: Concrete	
								End of Borehole at 0.400m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks No groundwater record. No roots recorded. Trial Pit terminated early due to concrete obstruction. No further excavation possible.							
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Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS		Co-ords: E532380.37 N188083.80	
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP2	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

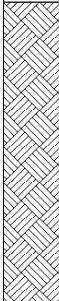
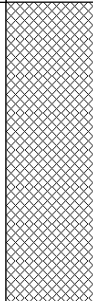
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		1.00			MADE GROUND. Light brown, black, grey gravelly sandy SILT Sand is fine. Gravel is fine to coarse sub-angular of concrete (10%), brick (60%) and ash/bituminous material (30%).	1
		0.50	D						
		0.80	D						
		1.00	D						
								End of Borehole at 1.000m	5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks No groundwater record. No roots recorded.							
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Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS		Co-ords: E532380.37 N188083.80	
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP3	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		1.00			MADE GROUND. Brown, black, grey gravelly sandy SILT. Sand is fine to medium. Gravel is fine to coarse sub-angular of concrete (15%), brick (35%) and ash/bituminous material (50%).	
		0.50	D						
		0.80	D						
		1.00	D						
								End of Borehole at 1.000m	1
									2
									3
									4
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks No groundwater record. Roots recorded. 0.80m bgl.							
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Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS			
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP4	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			MADE GROUND: Concrete	
								End of Borehole at 0.400m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks No groundwater record. No roots recorded. Trial Pit terminated early due to concrete obstructions. No further excavation possible							
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Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS		Co-ords: E532351.61 N188062.73	
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP5	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D					MADE GROUND. Brown, grey, cream, orange sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse sub-angular of flint (70%) and concrete (30%).	
		0.50	D						
					0.70			End of Borehole at 0.700m	
									1
									2
									3
									4
									5

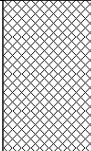
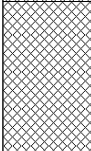
Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks No groundwater record. No roots recorded.						
--	--	--	--	--	--	---



Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS		Co-ords: E532380.37 N188083.80	
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP6	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		0.50			MADE GROUND. Black, brown grey, gravelly sandy SILT. Sand is fine. Gravel is fine to coarse sub-angular of brick (20%), concrete (30%) and flint (50%).	1
		0.50	D						
		0.80	D					MADE GROUND. Black, brown, grey gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium sub-angular of flint (50%) brick (25%) and concrete (25%).	
		1.00	D		1.00			End of Borehole at 1.000m	
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

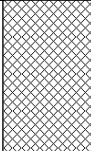
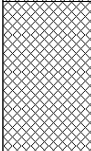
Remarks No groundwater record. No roots recorded.							
---	--	--	--	--	--	--	---





Trial Pit Log

Project Name: 167 Hermitage Road		Client: Topfling		Date: 03/05/2022	
Location: Haringey London N4 1LZ		Contractor: LAS and KDS		Co-ords: E532380.37 N188083.80	
Project No. : GWPR4712		Crew Name:		Equipment:	
Location Number TP8	Location Type TP	Level	Logged By	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		0.50			MADE GROUND. Black, brown grey gravelly sandy SILT. Sand is fine. Gravel is fine to medium sub-angular of flint (50%), concrete (10%), brick (10%) and ash (30%).	1
		0.50	D					MADE GROUND: Black, grey gravelly sandy CLAY. Sand is fine. Gravel is fine to coarse sub-angular of glass (10%) brick (20%), ash (10%) and flint (60%).	
		0.80	D						
		1.00	D		1.00			End of Borehole at 1.000m	
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks No groundwater record. No roots recorded.						
---	--	--	--	--	--	---

APPENDIX E: Geotechnical Laboratory Testing



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 59643

Client Ref: **GWPR4712**

Report Date: **31-05-2022**

Client PO: **GWPR4712**

Client **Ground and Water Limited**
Unit 2, The Long Barn,
Norton Farm,
Selbourne Road,
Alton,
Hampshire
GU34 3NB

Contract Title: **167 Hermitage Road, Haringey, London, N4 1LZ**
For the attention of: **Alex Stratford**

Date Received: **20-05-2022**

Date Completed: **31-05-2022**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	10
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	10
Water Soluble Sulphate 2:1 extract Sub-contracted Test - @ Non Accredited Test	2
pH value of soil Sub-contracted Test - @ Non Accredited Test	2
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.3 & 5.3)**

Contract Number	59643	
Site Name	167 Hermitage Road, Haringey, London, N4 1LZ	
Date Tested	27/05/2022	
	DESCRIPTIONS	

[illegible]

Operators	Checked	31/05/2022	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	31/05/2022	Paul Evans (Quality/Technical Manager)

APPENDIX F: Settlement and Heave Analysis Modelling

Analysis Options

Property	Value
☐ General	
Poisson's ratio	0.45000
Max E Ratio	1.50000
H boundary level	-42.50000
GSA piled raft data	☐
Displacements at load centroids	☒
☐ Elastic	
Elastic	☒
Analysis Method	Mindlin
Legacy	☐
Calculate H Displacement	☒
Stiffness	Weighted average
Heave	☒
☐ Effect of soil above load	
Vertical loads	☐
Horizontal loads	☒
☐ Consolidation	
Consolidation	☐

Short term Soil Profile

GWPR4712 PDISP Model 1.pdd : Soil Profiles							
Layer ref.	Name	Level at top	No of intermediate displacement levels	Young's modulus		Poisson's ratio	Colour
				Top	Bottom		
		[m]		[kN/m ²]	[kN/m ²]		
Defaults	Layer #	0.000	5	50000	50000	0.200	
1	Made Ground	0.000	5	10000	10000	0.450	
2	London Clay Format	-2.700	5	10000	30000	0.450	
3	London Clay Format	-3.650	5	30000	37500	0.450	
4	London Clay Format	-4.650	5	37500	45000	0.450	
5	London Clay Format	-5.650	5	45000	56250	0.450	
6	London Clay Format	-7.150	5	56250	63750	0.450	
7	London Clay Format	-8.650	5	63750	82500	0.450	
8	London Clay Format	-10.150	5	82500	101250	0.450	
9	London Clay Format	-11.650	5	101250	112500	0.450	
10	London Clay Format	-13.150	5	112500	146250	0.450	
11	London Clay Format	-14.650	5	146250	187500	0.450	
12	London Clay Format	-16.150	5	187500	157000	0.450	
13	London Clay Format	-17.600	5	157000	176250	0.450	
14	London Clay Format	-19.150	5	176250	172500	0.450	
15	London Clay Format	-20.650	5	172500	191250	0.450	
16	London Clay Format	-22.150	5	191250	195000	0.450	
17	London Clay Format	-23.650	5	195000	187500	0.450	
18	London Clay Format	-25.150	5	187500	276300	0.450	
19							

Long Term Soil Profile

GWPR4712 PDISP Model 1.pdd : Soil Profiles

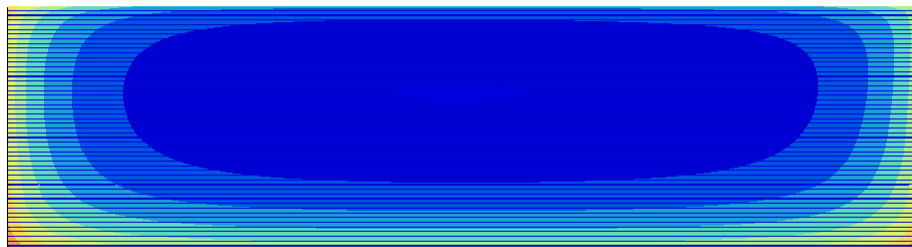
Layer ref.	Name	Level at top [m]	No of intermediate displacement levels	Young's modulus		Poisson's ratio	Colour
				Top [kN/m ²]	Bottom [kN/m ²]		
Defaults	Layer #	0.000	5	50000	50000	0.200	
1	Made Ground	0.000	5	10000	10000	0.450	
2	London Clay Format	-2.700	5	10000	22500	0.450	
3	London Clay Format	-3.650	5	22500	28125	0.450	
4	London Clay Format	-4.650	5	28125	33750	0.450	
5	London Clay Format	-5.650	5	33750	42188	0.450	
6	London Clay Format	-7.150	5	42188	47813	0.450	
7	London Clay Format	-8.650	5	47813	61875	0.450	
8	London Clay Format	-10.150	5	61875	70875	0.450	
9	London Clay Format	-11.650	5	70875	84375	0.450	
10	London Clay Format	-13.150	5	84375	109688	0.450	
11	London Clay Format	-14.650	5	109688	140625	0.450	
12	London Clay Format	-16.150	5	140625	118125	0.450	
13	London Clay Format	-17.600	5	118125	132188	0.450	
14	London Clay Format	-19.150	5	132188	129375	0.450	
15	London Clay Format	-20.650	5	129375	143438	0.450	
16	London Clay Format	-22.150	5	143438	146250	0.450	
17	London Clay Format	-23.650	5	146250	140625	0.450	
18	London Clay Format	-25.150	5	140625	207225	0.450	
19							
20							

Pressures Applied

GWPR4712 PDISP Model 3.pdd : Polygonal Load Data

Load ref.	Name	Load position				Number of rectangles	Load value
		Z (level)	Polygon				Normal
			Wizard	Coordinates	Rectangle tolerance		(local z)
		[m]		[m]	[%]		[kN/m ²]
Defaults	Poly Load #	0.000			10.0	5	0.00
1	Demolition Load	0.000	More...	(0,0) (0,39) (27.7,39) (27.7,3	10.0	3	-90.00
2	Mass Ex	-4.850	More...	(0,0) (0,17.3) (58.3,17.3) (58	10.0	1	-92.15
3	Slab	-4.850	More...	(0,0) (0,17.3) (58.3,17.3) (58	10.0	1	17.50
4			More...				

Model 1



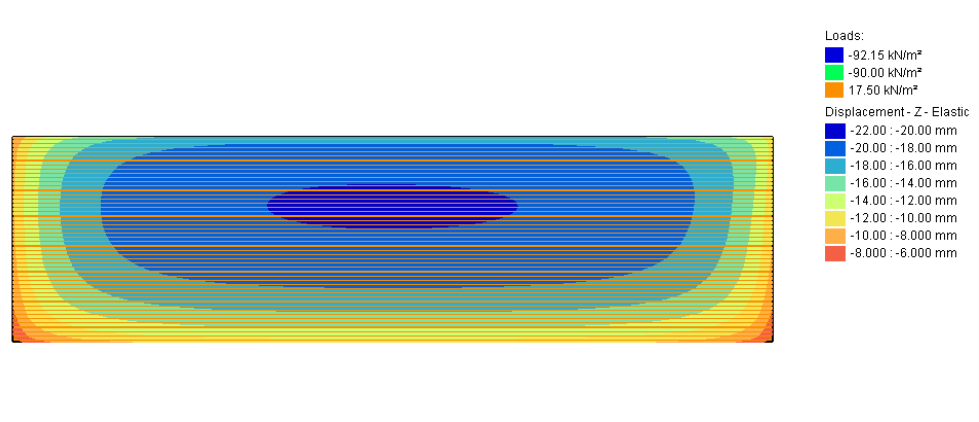
Loads:

-92.15 kN/m²
-90.00 kN/m²

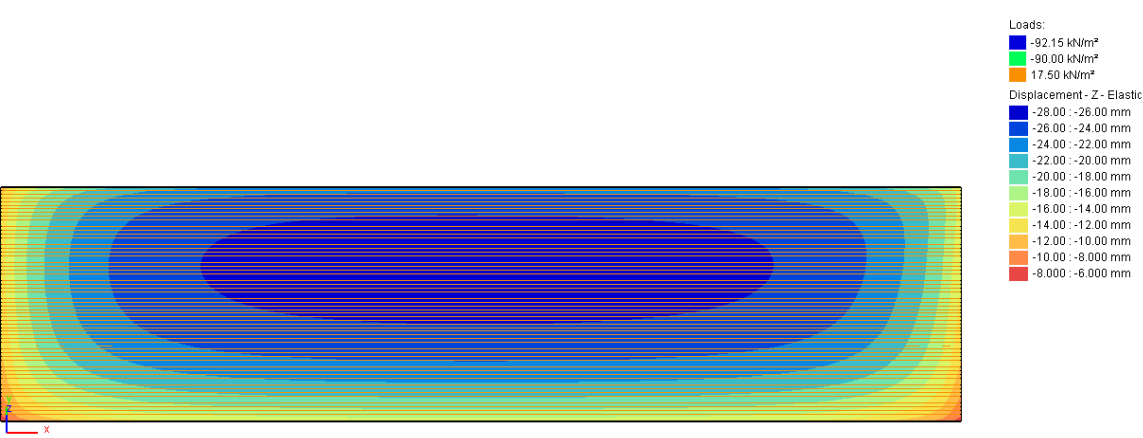
Displacement - Z - Elastic

-22.00 : -20.00 mm
-20.00 : -18.00 mm
-18.00 : -16.00 mm
-16.00 : -14.00 mm
-14.00 : -12.00 mm
-12.00 : -10.00 mm
-10.00 : -8.000 mm
-8.000 : -6.000 mm
-6.000 : -4.000 mm

Model 2



Model 3



APPENDIX G: Ground Movement Analysis and Damage Categorization Modelling

APPENDIX H: Chemical Laboratory testing Results



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Ground and Water Ltd
Head Office
2 The Long Barn
Norton Farm, Selborne Road
Alton
Hampshire
GU34 3NB

Attention: Alex Stratford

CERTIFICATE OF ANALYSIS

Date of report Generation:	18 May 2022
Customer:	Ground and Water Ltd
Sample Delivery Group (SDG):	220506-97
Your Reference:	GWPR4712 167 Hermitage Road
Location:	Haringey, London N4 1LZ
Report No:	646726
Order Number:	GWPR4712

We received 2 samples on Friday May 06, 2022 and 2 of these samples were scheduled for analysis which was completed on Wednesday May 18, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 220506-97 **Report Number:** 646726 **Superseded Report:**
Client Ref.: GWPR4712 167 Hermitage Road **Location:** Haringey, London N4 1LZ

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26237044	TP2		0.20 - 0.20	03/05/2022
26237050	TP8		0.20 - 0.20	03/05/2022

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220506-97
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 646726
Location: Haringey, London N4 1LZ

Superseded Report:

Results Legend



Test



No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

26237044

26237050

Customer
Sample Reference

TP2

TP8

AGS Reference

Depth (m)

0.20 - 0.20

0.20 - 0.20

Container

250g Amber Jar
(ALE210)

1kg TUB with
(ALE210)

250g Amber Jar
(ALE260)

60g VOC (ALE215)

1kg TUB with
(ALE260)

250g Amber Jar
(ALE210)

Sample Type

S

S

S

S

S

Anions by Kone (soil)

All

NDPs: 0
Tests: 2

X

X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 2

X

X

Boron Water Soluble

All

NDPs: 0
Tests: 2

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 2

X

X

EPH CWG GC (S)

All

NDPs: 0
Tests: 1

X

GRO by GC-FID (S)

All

NDPs: 0
Tests: 1

X

Hexavalent Chromium (s)

All

NDPs: 0
Tests: 2

X

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 2

X

X

PAH by GCMS

All

NDPs: 0
Tests: 2

X

X

pH

All

NDPs: 0
Tests: 2

X

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X

X

Sample description

All

NDPs: 0
Tests: 1

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 1

X

VOC MS (S)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 220506-97
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 646726
Location: Haringey, London N4 1LZ

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
26237044	TP2	0.20 - 0.20	Dark Brown	Loamy Sand	Vegetation	Brick
26237050	TP8	0.20 - 0.20	Dark Brown	Loamy Sand	Stones	Concrete/Aggregate

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220506-97
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 646726
Location: Haringey, London N4 1LZ

Superseded Report:

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Asbestos Actinolite	Asbestos Anthophyllite	Asbestos Tremolite	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP2 0.20 - 0.20 SOLID 03/05/2022 00:00:00 06/05/2022 05:00:00 220506-97 26237044 TM048	12/05/2022	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP8 0.20 - 0.20 SOLID 03/05/2022 00:00:00 06/05/2022 05:00:00 220506-97 26237050 TM048	12/05/2022	Paul Poynton	N/A	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

SDG: 220506-97
Client Ref.: GWPR4712 167 Hermitage Road**Report Number:** 646726
Location: Haringey, London N4 1LZ**Superseded Report:**

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:Soil) by ICP OES.
TM243		Mixed Anions In Soils By Kone
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.



CERTIFICATE OF ANALYSIS

SDG: 220506-97
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 646726
Location: Haringey, London N4 1LZ

Superseded Report:

Test Completion Dates

Lab Sample No(s)	26237044	26237050
Customer Sample Ref.	TP2	TP8
AGS Ref.		
Depth	0.20 - 0.20	0.20 - 0.20
Type	Soil/Solid (S)	Soil/Solid (S)

Anions by Kone (soil)	12-May-2022	11-May-2022
Asbestos ID in Solid Samples	12-May-2022	12-May-2022
Boron Water Soluble	12-May-2022	11-May-2022
Cyanide Comp/Free/Total/Thiocyanate	13-May-2022	11-May-2022
EPH CWG GC (S)	12-May-2022	
GRO by GC-FID (S)	17-May-2022	
Hexavalent Chromium (s)	12-May-2022	10-May-2022
Metals in solid samples by OES	13-May-2022	12-May-2022
PAH by GCMS	11-May-2022	10-May-2022
pH	12-May-2022	12-May-2022
Phenols by HPLC (S)	12-May-2022	11-May-2022
Sample description	10-May-2022	09-May-2022
Total Organic Carbon	18-May-2022	11-May-2022
TPH CWG GC (S)	17-May-2022	
VOC MS (S)	16-May-2022	



CERTIFICATE OF ANALYSIS

SDG: 220506-97 **Report Number:** 646726 **Superseded Report:**
Client Ref: GWPR4712 167 Hermitage Rc **Location:** Haringey, London N4 1LZ

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



Unit 7-8 Hawarden Business Park

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Hawarden

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Website: www.alsenvironmental.co.uk

Ground and Water Ltd
Head Office
2 The Long Barn
Norton Farm, Selborne Road
Alton
Hampshire
GU34 3NB

Attention: Alex Stratford

CERTIFICATE OF ANALYSIS

Date of report Generation:	24 May 2022
Customer:	Ground and Water Ltd
Sample Delivery Group (SDG):	220519-131
Your Reference:	GWPR4712 167 Hermitage Road
Location:	Haringey, London N4 1LZ
Report No:	647849
Order Number:	GWPR4717

We received 1 sample on Wednesday May 18, 2022 and 1 of these samples were scheduled for analysis which was completed on Tuesday May 24, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 220519-131 **Report Number:** 647849 **Superseded Report:**
Client Ref.: GWPR4712 167 Hermitage Road **Location:** Haringey, London N4 1LZ

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26309940	BH1		1.20 - 1.20	05/05/2022

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220519-131

Report Number: 647849

Superseded Report:

Client Ref.: GWPR4712 167 Hermitage Road

Location: Haringey, London N4 1LZ

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

26309940

Customer
Sample Reference

BH1

AGS Reference

Depth (m)

1.20 - 1.20

Container

1kg Cardboard
Container

Sample Type

S

Ammoniacal N as NH4 in 2:1 extract

All

NDPs: 0
Tests: 1

X

Anions by Kone (soil)

All

NDPs: 0
Tests: 1

X

Magnesium (BRE)

All

NDPs: 0
Tests: 1

X

NO3, NO2 and TON by KONE (s)

All

NDPs: 0
Tests: 1

X

pH

All

NDPs: 0
Tests: 1

X

Sample description

All

NDPs: 0
Tests: 1

X

Total Sulphate

All

NDPs: 0
Tests: 1

X

Total Sulphur

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

SDG: 220519-131
Client Ref.: GWPR4712 167 Hermitage Road**Report Number:** 647849
Location: Haringey, London N4 1LZ**Superseded Report:**

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
26309940	BH1	1.20 - 1.20	Dark Brown	Sandy Clay Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

SDG: 220519-131
Client Ref.: GWPR4712 167 Hermitage Road**Report Number:** 647849
Location: Haringey, London N4 1LZ**Superseded Report:**

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid Extractable Sulphate in Soils by ICP OES
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM282		Extraction of Magnesium by BRE Method

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220519-131

Report Number: 647849

Superseded Report:

Client Ref.: GWPR4712 167 Hermitage Road

Location: Haringey, London N4 1LZ

Test Completion Dates

Lab Sample No(s)	26309940
Customer Sample Ref.	BH1
AGS Ref.	
Depth	1.20 - 1.20
Type	Soil/Solid (S)

Ammoniacal N as NH4 in 2:1 extract	20-May-2022
Anions by Kone (soil)	24-May-2022
Magnesium (BRE)	23-May-2022
NO3, NO2 and TON by KONE (s)	24-May-2022
pH	23-May-2022
Sample description	19-May-2022
Total Sulphate	23-May-2022
Total Sulphur	24-May-2022



CERTIFICATE OF ANALYSIS

SDG: 220519-131 **Report Number:** 647849 **Superseded Report:**
Client Ref: GWPR4712 167 Hermitage Rc **Location:** Haringey, London N4 1LZ

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Ground and Water Ltd
Head Office
2 The Long Barn
Norton Farm, Selborne Road
Alton
Hampshire
GU34 3NB

Attention: Alex Stratford

CERTIFICATE OF ANALYSIS

Date of report Generation:	30 May 2022
Customer:	Ground and Water Ltd
Sample Delivery Group (SDG):	220520-132
Your Reference:	GWPR4712 167 Hermitage Road
Location:	Haringey, London N4 1LZ
Report No:	648657
Order Number:	GWPR4712

We received 6 samples on Friday May 20, 2022 and 6 of these samples were scheduled for analysis which was completed on Monday May 30, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26318827	BH2		0.20 - 0.20	11/05/2022
26318832	BH2		1.00 - 1.00	11/05/2022
26318836	BH2		12.00 - 12.00	11/05/2022
26318839	BH3		1.00 - 1.00	09/05/2022
26318843	BH4		0.20 - 0.20	10/05/2022
26318847	BH4		5.90 - 5.90	10/05/2022

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend X Test N No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	26318847		BH4				5.90 - 5.90		1kg TUB with Handle (ALE260)		S	
	26318843		BH4				0.20 - 0.20		250g Amber Jar (ALE210)		S	
	26318839		BH3				1.00 - 1.00		1kg TUB with Handle (ALE260)		S	
	26318836		BH2				12.00 - 12.00		1kg TUB with Handle (ALE260)		S	
	26318832		BH2				1.00 - 1.00		60g VOC (ALE215)		S	
	26318827		BH2				0.20 - 0.20		250g Amber Jar (ALE210)	1kg TUB with Handle (ALE260)	S	S
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 2						X				X
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 1							X			
Anions by Kone (soil)	All	NDPs: 0 Tests: 6							X			
Anions by Kone (w)	All	NDPs: 0 Tests: 1								X		
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 4							X			
Boron Water Soluble	All	NDPs: 0 Tests: 4								X		
CEN Readings	All	NDPs: 0 Tests: 1									X	
Coronene	All	NDPs: 0 Tests: 1								X		
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4									X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1										
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1									X	
EPH by GCxGC-FID	All	NDPs: 0 Tests: 1									X	
EPH CWG GC (S)	All	NDPs: 0 Tests: 2									X	
Fluoride	All	NDPs: 0 Tests: 1										
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2									X	

CERTIFICATE OF ANALYSIS



CERTIFICATE OF ANALYSIS

Validated

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
26318827	BH2	0.20 - 0.20	Dark Brown	Sandy Loam	Stones	None
26318832	BH2	1.00 - 1.00	Dark Brown	Sandy Loam	Stones	N/A
26318836	BH2	12.00 - 12.00	Dark Brown	Clay	None	None
26318839	BH3	1.00 - 1.00	Dark Brown	Sandy Clay Loam	Stones	Brick
26318843	BH4	0.20 - 0.20	Dark Brown	Sandy Clay Loam	Stones	None
26318847	BH4	5.90 - 5.90	Dark Brown	Clay	None	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage RoadReport Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Results Legend		Customer Sample Ref.	BH2	BH2	BH2	BH3	BH4	BH4	
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4* @ Sample deviation (see appendix)	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.20 - 0.20 Soil/Solid (S) 11/05/2022 12:00 20/05/2022 220520-132 26318827	1.00 - 1.00 Soil/Solid (S) 11/05/2022 12:00 20/05/2022 220520-132 26318832	12.00 - 12.00 Soil/Solid (S) 11/05/2022 12:00 20/05/2022 220520-132 26318836	1.00 - 1.00 Soil/Solid (S) 09/05/2022 12:00 20/05/2022 220520-132 26318839	0.20 - 0.20 Soil/Solid (S) 10/05/2022 12:00 20/05/2022 220520-132 26318843	5.90 - 5.90 Soil/Solid (S) 10/05/2022 12:00 20/05/2022 220520-132 26318847	
Component	LOD/Units		Method						
Moisture Content Ratio (% of as received sample)	%		PM024	19	30	18	16	25	21
Loss on ignition	<0.7 %		TM018	5.21					
Phenol	<0.01 mg/kg		TM062 (S)	<0.01	<0.01		<0.01	<0.01	
Cresols	<0.01 mg/kg		TM062 (S)	<0.01	<0.01		<0.01	<0.01	
Xylenols	<0.015 mg/kg		TM062 (S)	<0.015	<0.015		<0.015	<0.015	
Phenols, Total Detected monohydric	<0.035 mg/kg		TM062 (S)	<0.035	<0.035		<0.035	<0.035	
Organic Carbon, Total	<0.2 %		TM132	1.72	3.34		2.12	2.42	
Sulphur, Total	<0.02 %	TM132			0.29			0.118	
Soil Organic Matter (SOM)	<0.35 %	TM132	2.97	5.76		3.65	4.17		
pH	1 pH Units	TM133	9.2	9.23	8.33	9.93	8.25	7.93	
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6		<0.6	<0.6		
Cyanide, Total	<1 mg/kg	TM153	<1	<1		<1	<1		
PCB congener 28	<0.003 mg/kg	TM168	<0.015						
PCB congener 52	<0.003 mg/kg	TM168	<0.015						
PCB congener 101	<0.003 mg/kg	TM168	<0.015						
PCB congener 118	<0.003 mg/kg	TM168	<0.015						
PCB congener 138	<0.003 mg/kg	TM168	<0.015						
PCB congener 153	<0.003 mg/kg	TM168	<0.015						
PCB congener 180	<0.003 mg/kg	TM168	<0.015						
Sum of detected PCB 7 Congeners	<0.021 mg/kg	TM168	<0.105						
Arsenic	<0.6 mg/kg	TM181	17.7	18.8		18.9	21.2		
Cadmium	<0.02 mg/kg	TM181	0.54	0.0347		0.317	0.822		
Chromium	<0.9 mg/kg	TM181	12.2	14		11.9	16.3		
Copper	<1.4 mg/kg	TM181	85.1	85.5		83.1	96.6		
Lead	<0.7 mg/kg	TM181	332	390		334	353		
Mercury	<0.1 mg/kg	TM181	1.55	1.75		<0.1	0.771		
Nickel	<0.2 mg/kg	TM181	16.5	19.4		27.9	24.9		
Selenium	<1 mg/kg	TM181	<1	1.18		1.17	1		
Vanadium	<0.2 mg/kg	TM181	45.3	57.8		48.9	71		
Zinc	<1.9 mg/kg	TM181	165	187		291	327		
ANC @ pH 4	<0.03 mol/kg	TM182	0.0853						
ANC @ pH 6	<0.03 mol/kg	TM182	0.0514						
Sulphate, acid soluble (total)	<0.0048 %	TM221			0.129			0.406	



CERTIFICATE OF ANALYSIS

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Asbestos Actinolite	Asbestos Anthophyllite	Asbestos Tremolite	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH2 0.20 - 0.20 SOLID 11/05/2022 00:00:00 20/05/2022 05:00:00 220520-132 26318827 TM048	27/05/2022	Emily Anderton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH2 1.00 - 1.00 SOLID 11/05/2022 00:00:00 20/05/2022 05:00:00 220520-132 26318832 TM048	27/05/2022	Joanne Furnivall	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH3 1.00 - 1.00 SOLID 09/05/2022 00:00:00 20/05/2022 05:00:00 220520-132 26318839 TM048	27/05/2022	Emily Anderton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH4 0.20 - 0.20 SOLID 10/05/2022 00:00:00 20/05/2022 05:00:00 220520-132 26318843 TM048	27/05/2022	Emily Anderton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg)	0.115
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location

Site Location	Haringey, London N4 1LZ
Natural Moisture Content (%)	28.9
Dry Matter Content (%)	77.6

Case

SDG	220520-132
Lab Sample Number(s)	26318827
Sampled Date	11-May-2022
Customer Sample Ref.	BH2
Depth (m)	0.20 - 0.20

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis

Result

Total Organic Carbon (%)	1.72
Loss on Ignition (%)	5.21
Sum of BTEX (mg/kg)	<0.8
Sum of 7 PCBs (mg/kg)	<0.105
Mineral Oil (mg/kg) (EH_2D_AL)	93.6
PAH Sum of 17 (mg/kg)	38.8
pH (pH Units)	9.2
ANC to pH 6 (mol/kg)	0.0514
ANC to pH 4 (mol/kg)	0.0853

Eluate Analysis

C₂

Concⁿ in 10:1 eluate (mg/l)

A₂

10:1 concⁿ leached (mg/kg)

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.0138	<0.0005	0.138	<0.005	0.5	2	25
Barium	0.0106	<0.0002	0.106	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.0175	<0.001	0.175	<0.01	0.5	10	70
Copper	0.192	<0.0003	1.92	<0.003	2	50	100
Mercury Dissolved (CVAF)	0.0000313	<0.00001	0.000313	<0.0001	0.01	0.2	2
Molybdenum	0.0188	<0.003	0.188	<0.03	0.5	10	30
Nickel	0.00987	<0.0004	0.0987	<0.004	0.4	10	40
Lead	0.0012	<0.0002	0.012	<0.002	0.5	10	50
Antimony	0.0399	<0.001	0.399	<0.01	0.06	0.7	5
Selenium	0.00451	<0.001	0.0451	<0.01	0.1	0.5	7
Zinc	0.00189	<0.001	0.0189	<0.01	4	50	200
Chloride	7.5	<2	75	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	48.2	<2	482	<20	1000	20000	50000
Total Dissolved Solids	197	<5	1970	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	22.3	<3	223	<30	500	800	1000

Leach Test Information

Date Prepared	23-May-2022
pH (pH Units)	10.48
Conductivity (µS/cm)	294.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.875

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

30/05/2022 17:01:40

17:01:20 30/05/2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM182	CEN/TC 292 - WI 292046-characterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid Extractable Sulphate in Soils by ICP OES
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:Soil) by ICP OES.
TM243		Mixed Anions In Soils By Kone
TM248	In-House Method	Determination of Ammonium BRE (2:1 Extract) on solids
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM282		Extraction of Magnesium by BRE Method
TM410	Shaker extraction-In house coronene method	Determination of Coronene in soils by GCMS
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
TM415	Analysis of Petroleum Hydrocarbons in Environmental Media.	Determination of Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220520-132
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 648657
Location: Haringey, London N4 1LZ

Superseded Report:

Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

	26318827	26318832	26318836	26318839	26318843	26318847
	BH2	BH2	BH2	BH3	BH4	BH4
	0.20 - 0.20	1.00 - 1.00	12.00 - 12.00	1.00 - 1.00	0.20 - 0.20	5.90 - 5.90
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract			25-May-2022			25-May-2022
ANC at pH4 and ANC at pH 6	25-May-2022					
Anions by Kone (soil)	25-May-2022	27-May-2022	24-May-2022	26-May-2022	25-May-2022	26-May-2022
Anions by Kone (w)	26-May-2022					
Asbestos ID in Solid Samples	27-May-2022	27-May-2022		27-May-2022	27-May-2022	
Boron Water Soluble	25-May-2022	27-May-2022		27-May-2022	25-May-2022	
CEN 10:1 Leachate (1 Stage)	24-May-2022					
CEN Readings	26-May-2022					
Coronene	30-May-2022					
Cyanide Comp/Free/Total/Thiocyanate	25-May-2022	30-May-2022		30-May-2022	25-May-2022	
Dissolved Metals by ICP-MS	26-May-2022					
Dissolved Organic/Inorganic Carbon	26-May-2022					
EPH by GCxGC-FID	25-May-2022					
EPH CWG GC (S)	25-May-2022	26-May-2022				
Fluoride	26-May-2022					
GRO by GC-FID (S)	27-May-2022	27-May-2022				
Hexavalent Chromium (s)	26-May-2022	30-May-2022		30-May-2022	26-May-2022	
Loss on Ignition in soils	27-May-2022					
Magnesium (BRE)			24-May-2022			24-May-2022
Mercury Dissolved	30-May-2022					
Metals in solid samples by OES	25-May-2022	27-May-2022		27-May-2022	25-May-2022	
Moisture at 105C	23-May-2022					
NO3, NO2 and TON by KONE (s)			24-May-2022			26-May-2022
PAH 16 & 17 Calc	30-May-2022					
PAH by GCMS	25-May-2022	26-May-2022		25-May-2022	24-May-2022	
PCBs by GCMS	26-May-2022					
pH	25-May-2022	25-May-2022	23-May-2022	25-May-2022	25-May-2022	23-May-2022
Phenols by HPLC (S)	25-May-2022	27-May-2022		26-May-2022	25-May-2022	
Phenols by HPLC (W)	26-May-2022					
Sample description	21-May-2022	24-May-2022	21-May-2022	24-May-2022	21-May-2022	21-May-2022
Total Dissolved Solids	27-May-2022					
Total Organic Carbon	27-May-2022	27-May-2022		27-May-2022	27-May-2022	
Total Sulphate			27-May-2022			25-May-2022
Total Sulphur			27-May-2022			27-May-2022
TPH CWG GC (S)	27-May-2022	27-May-2022				
VOC MS (S)	30-May-2022	30-May-2022				



CERTIFICATE OF ANALYSIS

SDG: 220520-132 **Report Number:** 648657 **Superseded Report:**
Client Ref: GWPR4712 167 Hermitage Rc **Location:** Haringey, London N4 1LZ

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.