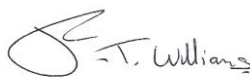


Contamination Assessment Report

Omega B Works 167 Hermitage Road, Harringay, London N4 1LZ

On behalf of Topfling

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EXECUTIVE SUMMARY	
PROPOSED DEVELOPMENT	At the time of reporting no formal development plans were made available to Ground and Water for the Omega B works, therefore it was assumed that any development works would be similar to the Omega A works. It is unsure if any areas of soft landscaping will be present on site.
GEOLOGY AND HYDROGEOLOGY	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 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.
CONTAMINATION	The comparison between the laboratory analysis and the assessment criteria indicates that there is an unacceptable risk to future receptors caused by exceedances of the following determinands: Lead; Mercury; Benzo(a)pyrene; Benzo(b)fluoranthene and Dibenzo(ah)anthracene. The remaining determinands were identified at below the adopted screening value and are not considered to represent an unacceptable risk to future receptors. Where an unacceptable risk to future receptors remains, mitigation is required. The results indicate that the TPH EC5-EC10 (Aliphatics and Aromatics) were above the threshold for the use of a PE pipe at the site. Comparison between the soil laboratory analysis and the derived Level 1 (soils) target concentrations indicate that some contaminants theoretically have the potential to pose a risk to Controlled Waters. It also should be noted that a number of determinands at laboratory limit of detection exceed the target concentration for a Level 1 (soils) risk assessment, most notably some PAHs. Where a determinand is identified at the laboratory limit of detection, no further assessment is considered necessary. The site is located on an Unproductive strata where the ground conditions were mostly cohesive. Leachate generation is not considered significant. Considering

	the ground conditions, the nearest receptor of concern / compliance is the New River 200m south of the site). Given the Level 1 risk assessment does not consider dilution, dispersion or attenuation, it is not expected that the soils on-site represent an unacceptable risk to controlled water receptors. No further action is considered necessary.
GROUND GAS	Two methods of ground gas risk assessment have been applied to the site following site investigation, comprising a review of organic content of soils and ground gas monitoring. A soil derived approach identified soils of the Made Ground was considered to pose an unacceptable ground gas risk at the site and warrant classification of Characteristic Situation CS2 - CS3. Ground gas monitoring was undertaken. The ground gas monitoring and the derived GSVs have indicated that there is a very low risk from ground gases, equating to Characteristic Situation CS1 across the site. Therefore, based on the evidence available to date from gas monitoring, the risk assessment for the site indicates that the site should be classified as Characteristic Situation CS1.
REMEDIATION	At the time of reporting no formal development plans were made available to Ground and Water for the Omega B works, therefore it was assumed that any development works would be similar to the Omega A works. It is unsure if any areas of soft landscaping will be present on site. Any areas of hardstanding would not require remediation due to the break of the contaminant pathway. The following recommendations would be required for any areas of proposed soft landscaping in the Omega B works site area. An Asbestos Management Strategy should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination. An asbestos survey of the buildings is required prior to any demolition works. The highest exceedance of contaminants has been identified as Benzo(b)fluoranthene at ~3.36 times the assessment criteria. Since the exceedances are not considered to be significant (~5-6 times the assessment criteria), the BRE "Cover Systems for Land Generation" can be considered for the design of the cover system and is considered applicable within all soft landscaped areas. Based on the available information within this report and the calculated thickness of clean cover required, it was proposed that the following remedial methodology should be undertaken within all soft landscaping areas: • A 290mm clean capping of soils; • Validation of the clean capping system by a suitably trained Ground and Water Limited engineer. Based on risk assessment undertaken, the site warrants classification as Characteristic Situation CS1. The risk from vapours was considered to be low due

	to the very low concentrations of BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE, which are used as marker compounds for Volatile Organic Compounds (VOCs) and the low anticipated risk level. The risk from Vapours was also considered to be low to moderate. Values higher than 10ppm from PID testing, should be further investigated, potentially through VOC testing of groundwater. Groundwater was recorded during the site investigation works at depths of 15.80m bgl in BH2. No groundwater was noted in the remaining boreholes. The monitoring visits recorded groundwater levels between 1.50m bgl and 4.40m bgl. The presence of groundwater within the upper 0.75m below the ground floor slab would provide a pathway for Vapours to disperse into the basement structure. The risk of vapours decreases when groundwater levels are below 0.75m or at greater depths. As groundwater levels were not recorded within 0.75m of the proposed Blocks A and B then the risk is thought to be low. In the area of the proposed basement the risk from Vapours was considered to be low due to the basement founding depth being with the London Clay Formation. The potential source of vapours (Made Ground) is to be excavated and removed as part of the basement constructed. Based off this line of evidence the risk from vapours can be reduced to Low.
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1. INTRODUCTION

1.1. General

Ground and Water Limited were instructed by Topfling on the 29th March 2022 to conduct a Contamination Assessment 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.

Included within the fee proposal was an allowance to undertake chemical laboratory testing on soil samples recovered from the site to enable recommendations for the safe development of the site and the protection of site workers, end-users and the public from any potential contamination identified, as detailed in the Conceptual Site Model (CSM) within the desk study referenced GWPR4712/DS/May 2022.

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.

This Site Investigation Report must be read in conjunction with the Desk Study Report referenced GWPR4712/DS/May 2022 and the BIA and GMA referenced GWPR4712/June 2022.

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.

1.3. Conditions and Limitations

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

1.4. Technical Glossary

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

2. 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.

The comments relating to site works, ground conditions, contamination testing results and remediation strategies (sections 3-6) of this report will only relate to Omega B works of the site development.

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, October 2022, the proposed development was understood to comprise redevelopment of the Omega Works A and B 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 majority of the site is to be covered by permeable paving with soft landscaping areas associated with the proposed playground area and courtyard area of Block B. The proposed development plans can be seen within Figure 2 – 9 and elevation view in Figure 10.

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 11, 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 a 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 fluvial 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.

2.11. Preliminary Risk Assessment

The tabulated Conceptual Site Model developed as part of the Ground and Water Ltd Desk Study (GWPR4712/DS/May 2022) is outlined overleaf. For ease of reference and understanding, the risks have been classified within this risk assessment against four possible levels / categories, summarised in the table below. Any risk deemed to be negligible within the Preliminary Risk Assessment have been excluded from this report.

Risk Categories used in the Tabulated CSM	
Low Risk	Regarding this potential SPR linkage, the site is considered suitable for the proposed end-use and there is not considered to be an unacceptable risk to receptors. However, it is considered that further investigation to confirm this is recommended.
Moderate Risk	Regarding this potential SPR linkage, the site may not be suitable for the proposed end-use in its current condition and there may be an unacceptable risk to receptors. Further investigation is required to confirm this.
High Risk	Regarding this potential SPR linkage, the site is probably or certainly not suitable for proposed end-use and there is likely to be an unacceptable risk to receptors. Contaminants probably or certainly present and urgent action required in the short term.

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(On-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from construction/ demolition activities and historical and present day land use of the site which is a works/ industrial land: - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals.	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Moderate
	- Direct uptake of groundwater - Direct uptake of determinands in the soil	Flora and Fauna Vegetation within soft landscaped areas	Low
	- Anthropogenic (man-made) pathways - Vertical and lateral migration in permeable strata - Surface water runoff	Controlled Waters - Unproductive Strata (London Clay Formation) - New River	Low
Asbestos within the building's fabric/roof Asbestos	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands	Human Health - End Users (Residents/Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	High
Aggressive ground conditions with Made Ground and natural ground, including groundwater: - Sulphates, - PAH/TPH.	Direct contact with aggressive ground conditions	Building Materials and Services - Buried Concrete - Underground services (water pipes)	Moderate
Ground gases generated by Made Ground associated with historical and present day works/industrial land use: - Methane, - Carbon Dioxide, - Hydrogen Sulphide, and - Carbon Monoxide.	- Migration through anthropogenic & natural pathways - Inhalation of Asphyxiating gases - Explosion (methane only)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development (especially in confined spaces) - Site operatives during maintenance works in confined spaces	Moderate
	- Migration through anthropogenic & natural pathways - Explosion (methane only)	Building Materials and Services - Buildings - Confined spaces - Underground services	Moderate

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from nearby works and industrial buildings, historical and present day tanks and a historical garage site: - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals.	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Moderate
	Direct uptake of groundwater	Flora and Fauna Vegetation within soft landscaped areas	Low
Aggressive ground conditions associated with impacted groundwater; - Sulphates, - PAH/TPH.	Direct contact with aggressive ground conditions	Building Materials and Services - Buried Concrete - Underground services (water pipes)	Moderate
Ground gases generated by Made Ground, Historical and present day tanks: - Methane, - Carbon Dioxide, - Hydrogen Sulphide, and - Carbon Monoxide.	- Migration through anthropogenic & natural pathways - Inhalation of Asphyxiating gases - Explosion (methane only)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development (especially in confined spaces) - Site operatives during maintenance works in confined spaces	Moderate
	- Migration through anthropogenic & natural pathways - Explosion (methane only)	Building Materials and Services - Buildings - Confined spaces - Underground services	Moderate

3. 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 1No. Cable Percussion Borehole (BH2) to a depth of 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 borehole.

A combined groundwater and ground-gas monitoring standpipe was installed within BH2. 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)
BH2	Standpipe	5.00	4.00	1.00	1.00 – 5.00	50

Additionally, 3No. Trial Pit Foundation Exposures (TP6-TP8) were hand excavated on the 3rd May 2022, to depths of 1.00m bgl.

The approximate location of the trial hole locations can be seen within Figure 4.

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. 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 (BH2)			
Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
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.	GL	2.70	2.70
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.	2.70	>25.45	>22.75

Summary of Strata Encountered (TP6-TP8)			
Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
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	0.80->1.00	0.80->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 4.

4.2. Foundation Exposures

The hand excavation of 3No. Foundation Exposures (TP/FE6 – 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 5 – 7.

Summary of Foundations Encountered			
Trial Hole	Depth of Foundation (m bgl)	Width at the Base of Foundation (mm)	Bearing Stratum
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 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)
BH2	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 15.80m bgl in BH2. 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)
BH2	15.80
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 three occasions to date. The results can be seen tabulated below.

Groundwater Observations			
Date	Trial Hole	Water Level	Final Well Depth
08/06/2022	BH2	1.60	5.20
21/06/2022	BH2	1.50	5.20
28/06/2022	BH2	4.40	4.90
05/07/2022	BH2	1.20	5.20

4.5. Obstructions

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

5. CONTAMINATION RISK ASSESSMENT

5.1. Results of the Preliminary Risk Assessment

The tabulated Conceptual Site Model (CSM) developed by the Ground and Water Desk Study (ref. GWPR4712/DS/May 2022) is reproduced in section 2.8. For the complete information please see the Desk Study report.

No additional source of contamination, pathway or receptor was identified between the desk study and the ground investigation and as such, it was not necessary to modify the CSM.

In the UK, the assessment of risk from contamination follows the source-pathway-receptor (SPR) approach. For a risk to be present there must be a source of contamination, a receptor or receptors, and a pathway for contaminants to migrate or be absorbed. If there is a linkage between any given source and receptor, then a quantitative risk assessment is used to assess the significance or impact of the pollutant linkage.

5.2. Sampling Locations

The synopsis for the trial hole locations and their final depth can be seen tabulated below. A trial hole location plan is provided within Figure 4. The table also indicates whether any locations targeted a source of contamination as well as the proposed end-use. The proposed development can be seen in Figure 4-7.

Trial Hole Location Synopsis		
Trial Hole/Final Depth	Sampling Strategy	Proposed End-Use
BH2/25.45m	Random	Hard Landscaping
TP6/1.00m	Random	Hard Landscaping
TP7/1.00m	Random	Hard Landscaping
TP8/1.00m	Random	Hard Landscaping

The investigation area totals approximately 1230m² and with four sampling locations, given an unknown hotspot shape, the sampling density means that a hotspot with an area of approximately 461.25m² and a radius of approximately 6.84m would be encountered (CLR 4).

5.3. Soil Risk Assessment

Sampling depths were chosen to reflect the receptor of concern (e.g. human health, controlled waters and vegetation). The remaining samples were scheduled under a random strategy. The receptors relevant to the sampling depths are tabulated below.

Summary of Receptors per Sample Depth	
Depth	Receptors
Shallow Samples (< 0.75m bgl)	- End Users (Residents/Future site visitors) - Construction workers during development - Site operatives during maintenance works - Vegetation within soft landscaped areas (shallow rooted) - Buried Concrete - Receiving landfill
Moderate Samples (0.75 – 1.50m bgl)	- Construction workers during development - Site operatives during maintenance works - Vegetation within soft landscaped areas (deep rooted)

	• Buried Concrete • Receiving landfill • Underground services (water pipes)
Deep Samples (> 1.50m bgl)	• Construction workers during development • Buried Concrete • Receiving landfill

Chemical laboratory testing, scheduled by Ground and Water Limited, and carried out by ALS Environmental, was undertaken on six samples of Made Ground. The samples were subjected to a combination of analysis that comprised:

- Asbestos screen;
- Semi-metals and heavy metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc;
- Polycyclic Aromatic Hydrocarbons (PAH's) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene;
- Speciated TPH including full aliphatic/aromatic split;
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs);

A breakdown of the number of tests undertaken for each determinand is discussed in further sections. The chemical laboratory results are presented in Appendix E.

5.3.1. Soil Assessment Criteria and Results

At the time of reporting, October 2022, the proposed development was understood to comprise redevelopment of the Omega Works A and B 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 majority of the site is to be covered by permeable paving with soft landscaping areas associated with the proposed playground area and courtyard area of Block B. The proposed development plans can be seen within Figure 2.

Based on the proposed development, the results of the chemical laboratory testing were compared to the Generic Assessment Criteria (GAC) for a ***'Residential without homegrown produce'*** land-use scenario, as this was considered the most appropriate land-use scenario.

Where a contaminant of concern's GAC varies according to the Soil's Organic Matter (SOM), the SOM recorded for each uncontaminated soil type was used to derive the appropriate GAC for each soil type. An SOM value of 1%, the most conservative value, was utilised.

A summary of the analytical results and the comparison to the determinands adopted screening value are presented in the table below and overleaf.

Soil Contamination Test Results and Screening Values					
Determinand	Number of Samples	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Was the adopted screening value exceeded for relevant land-use scenario?
INORGANICS					
Asbestos	3	ND	ND	ND	No
Cyanide (total)	3	< 1	< 1	24	No
Phenols	3	<0.035	<0.035	750	No
METALS					
Arsenic	3	17.7	18.8	40	No
Boron	3	<1	2.6	11000	No
Cadmium	3	0.0347	0.781	85	No
Chromium (III)	3	12.2	15.7	910	No
Chromium (Hexavalent)	3	<1.2	<1.2	6	No
Copper	3	85.1	169	7100	No
Lead	3	303	390	310	BH2/0.20m, BH2/1.00m,
Mercury	3	0.381	1.75	1.2	BH2/0.20m, BH2/1.00m
Nickel	3	16.5	30.4	180	No
Selenium	3	<1	1.18	430	No
Vanadium	3	37.2	57.8	1200	No
Zinc	3	165	272	40000	No
TOTAL PETROLEUM HYDROCARBONS (TPHs)					
Aliphatic >C5 - C6	2	0.0335	0.0475	42	No
Aliphatic >C6 - C8	2	0.0558	0.109	100	No
Aliphatic >C8 - C10	2	0.0694	0.962	27	No
Aliphatic >C10 - C12	2	<1	43.4	130	No
Aliphatic >C12 - C16	2	5.92	270	1,100	No
Aliphatic >C16 - C21	2	35.9	254	65,000	No
Aliphatic >C21 - C34	2	38.1	66.6		
Aromatic >C5 - C7	2	<0.01	<0.01	370	No
Aromatic >C7 - C8	2	<0.01	<0.01	860	No
Aromatic >C8 - C10	2	0.0471	0.641	47	No
Aromatic >C10 - C12	2	<1	3.28	250	No
Aromatic >C12 - C16	2	2.13	45.5	1800	No
Aromatic >C16 - C21	2	19	29.4	1900	No
Aromatic >C21 - C35	2	40.9	79.8	1900	No
Benzene	2	<0.18	<0.18	0.38	No
Toluene	2	<0.14	<0.14	880	No
Ethylbenzene	2	<0.08	<0.08	83	No
m,p-Xylene	2	<0.2	<0.2	79	No
o-Xylene	2	<0.2	<0.2	88	No
POLYCYCLIC-AROMATIC HYDROCARBONS					
Acenaphthene	3	0.0908	0.239	3000	No

Acenaphthylene	3	<0.06	0.161	2900	No
Anthracene	3	0.15	0.597	31000	No
Benzo(a)anthracene	3	0.994	3.48	11	No
Benzo(a)pyrene	3	1.04	3.73	3.2	BH2/0.20m, TP8/0.20m
Benzo(b)fluoranthene	3	1.5	5.05	3.9	BH2/0.20m, TP8/0.20m
Benzo(ghi)perylene	3	0.862	2.49	360	No
Benzo(k)fluoranthene	3	0.497	1.71	110	No
Chrysene	3	0.961	3.44	30	No
Dibenzo(a,h)anthracene	3	0.154	0.492	0.31	BH2/0.20m, TP8/0.20m
Fluoranthene	3	1.9	6.42	1500	No
Fluorene	3	0.0821	0.221	2800	No
Indeno(1,2,3-cd)pyrene	3	1.13	2.79	45	No
Naphthalene	3	0.0536	0.104	2.6	No
Phenanthrene	3	0.987	3.29	1300	No
Pyrene	3	1.62	5.49	3700	No
MARKER FOR VOLATILE ORGANIC COMPOUND					
Methyl tert-butyl ether (MTBE)	3	< 0.1	< 0.1	73	No
The derivation of the Soil Assessment Criteria used within this report can be seen within Appendix F. The soil concentrations were typically compared to the LQM/CIEH Suitable for Use Levels (S4UL) (2014), based upon the assumption of 1% soil organic matter. A screening value for Lead is based on the Category 4 Screening Levels (C4SLs). Where no S4UL or C4SL is available for Cyanide, a SoBRA acute GAC is assigned. Where no S4UL or C4SL is available for MTBE, a CL:AIRE 2010 GAC is assigned. Where exceedances are noted, the trial hole and depth of sample is recorded.					

The proposed development includes areas of soft-landscaping, where shallow rooted vegetation may be exposed to aggressive ground conditions. The previous table compares the results of the laboratory analysis to GAC that is protective of Human Health and therefore different GAC is required for vegetation.

Soil Contamination Test Results and Screening Value					
Determinand	Number of Samples	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Was the adopted screening value exceeded for relevant land-use scenario?
Copper	3	85.1	169	100	Yes
Nickel	3	16.5	30.4	60	No
Zinc	3	165	272	200	Yes
The derivation of the Soil Assessment Criteria used within this report can be seen within Appendix F. The soil concentrations were compared to BS3882:2015 <i>Specification for Topsoil</i> and based on differing pH. For the purpose of conservatism, the pH of the soils have been assumed to be below 6 within this table. Where exceedances are noted, the trial hole and depth of sample is recorded.					

5.3.2. Soil Assessment

The comparison between the laboratory analysis and the assessment criteria indicates that there is an unacceptable risk to future receptors caused by exceedances of the following determinands: Lead;

Mercury; Benzo(a)pyrene; Benzo(b)fluoranthene and Dibenzo(ah)anthracene. The remaining determinands were identified at below the adopted screening value and are not considered to represent an unacceptable risk to future receptors. Where an unacceptable risk to future receptors remains, mitigation is required.

Mercury was noted to be elevated when compared to the elemental mercury S4UL of 1.2 mg/kg. The S4UL provides an alternative assessment criterion for inorganic mercury (mercury compounds most likely with sulphur or oxygen) of 56 mg/kg. The mercury present on-site is likely to be in inorganic form due to no evidence at present for an elemental mercury source. Therefore, the higher assessment criteria of 56 mg/kg for inorganic mercury should be applied to the risk assessment. The value identified within the laboratory analysis therefore falls within the assessment criteria.

Lead was noted to be elevated in two samples, the two values of 332mg/kg in BH2/0.20m and 390mg/kg in BH2/1.00mm were elevated when compared to C4SL of 310mg/kg.

Benzo(a)pyrene was noted to be elevated in two samples, the two values of, 3.47mg/kg in BH2/0.20m and 3.73mg/kg in TP8/0.20m were elevated when compared to C4SL of 3.2mg/kg.

Benzo(b)fluoranthene was noted to be elevated in two samples, the two values of 4.59mg/kg in BH2/0.20m and 5.05mg/kg in TP8/0.20m were elevated when compared to C4SL of 3.9mg/kg.

Dibenzo(ah)anthracene was noted to be elevated in three samples, the two values of 0.492mg/kg in BH2/0.20m and 0.463mg/kg in TP8/0.20m were elevated when compared to C4SL of 3.9mg/kg.

Due to the nature of the contamination encountered at the site, it is considered that there is an unacceptable risk to future receptors. Remediation, as outlined later within this report is required as part of any site development.

Asbestos

No asbestos has been identified during the testing, however, an **Asbestos Management Strategy** should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination.

5.3.3. Water Supply Pipe Risk Assessment

As part of the proposed development, it is expected that new water supply pipes will be installed at the site. Water supply pipes have the potential to be exposed to contaminants in the ground that can lead to unacceptable concentrations within the drinking water. If a risk is identified, specialist pipes that are protective of the drinking water are required.

A pipe selection risk assessment should be submitted to the water supply company as part of the development based on the supplier's assessment criteria. An indication of whether there is likely to be a risk can be seen tabulated below, where the PE pipe thresholds are based on *UKWIR Contaminated Land Assessment Guidance, 2014*.

Pipe Selection Risk Assessment			
Determinand	PE Pipe Threshold (mg/kg)	Laboratory Analysis Range (mg/kg)	Was the Threshold Exceeded?
Total BTEX and MTBE	0.1	LOD	No

Total VOCs	0.5	N/A	N/A
Total SVOCs	2	N/A	N/A
Phenols	2	< 0.035	No
TPH EC5 – EC10 (aliphatics and aromatics)	2	1.7795	No
TPH EC10 – EC16 (aliphatics and aromatics)	10	362.18	Yes
TPH EC16 – EC40 (aliphatics and aromatics)	500	429.8	No
Naphthalene	5	0.0536-0.104	No

The results indicate that the TPH EC10-EC16 (Aliphatics and Aromatics) were above the threshold for the use of a PE pipe at the site.

5.4. Groundwater Risk Assessment

In the UK, the water environment is protected under a number of regulatory regimes, mainly governed by the Environment Agency. The Environment Agency is consulted when there may be a risk to Controlled Waters, or where a pollution incident has occurred historically. The Water Framework Directive is implemented in various guises covering groundwater, surface water and drinking water supply.

The soil samples analysed as part of the risk assessments in section 5.3 have been used to undertake a Level 1 (soils) Controlled Waters risk assessment. At Level 1 (soils), the conceptual site model and the determinand concentrations of the soils are used to indicate whether the concentrations are sufficient to impact the receptor. At this stage, dilution, dispersion and attenuation along the pathway are not considered.

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.

During the site investigation, Made Ground was encountered to depths of between >0.40-3.00m, overlying silty clay of the London Clay Formation to the base of the boreholes (15.45-25.45m bgl).

Comparison between the soil laboratory analysis and the derived Level 1 (soils) target concentrations indicate that some contaminants theoretically have the potential to pose a risk to Controlled Waters. It also should be noted that a number of determinands at laboratory limit of detection exceed the target concentration for a Level 1 (soils) risk assessment, most notably some PAHs. Where a determinand is identified at the laboratory limit of detection, no further assessment is considered necessary.

The site is located on an Unproductive strata where the ground conditions were mostly cohesive. Leachate generation is not considered significant. Considering the ground conditions, the nearest receptor of concern / compliance is the New River 200m south of the site. In addition, given the Level 1 risk assessment does not consider dilution, dispersion or attenuation, it is not expected that the soils on-site represent an unacceptable risk to controlled water receptors. No further action is considered necessary.

The findings of this risk assessment should be agreed with the Environment Agency.

5.5. Ground Gas Risk Assessment

A review of the Phase I desk study, has identified a source of ground gas on-site or within influencing distance of the site that warrants investigation through ground gas monitoring.

The investigation undertaken to date have identified the main sources of ground gases to be associated with the degradation of putrescible material within deep Made Ground both on-site and off-site. Ground gases have the potential to migrate vertically through preferential pathways and build up within the proposed development, especially enclosed spaces on the ground floor. Based on the preceding information, ground gas monitoring was undertaken at the site.

5.5.1. Available Data

Soils

An alternative approach to ground gas risk assessment is presented within the CL:AIRE research bulletin RB17 and included within Annex D of BS8485:2015+A1:2019. The method considers the gas generation potential of the soils from data that is not subject to external influences, for example atmospheric pressure can change the recorded flow and concentrations of ground gas during spot monitoring, or a rising groundwater level can displace ground gases in pore spaces. Determination of the characteristic situation is based on the total organic carbon (TOC) of the soils, coupled with any organic-rich material identified within the borehole logs, such as wood gravels. TOC is easily analysed by the laboratory and can also be calculated by the equation outlined below.

$$\text{Total Organic Carbon (TOC)} = 0.58 \times \text{Soil Organic Matter (SOM)} = 1.33 \times \text{Degradable Organic Carbon (DOC)}$$

As part of the ground investigation works, five samples were submitted to the laboratory for analysis, which identified TOC to vary between 1.72 and 5.65% in the Made Ground. The trial hole logs identified the gravels within the Made Ground to comprise; flint, brick, glass, bituminous material, ash and concrete. Made Ground was identified to a maximum depth between >0.40m and 3.00m bgl.

Gas Monitoring

In order to assess the ground-gas risk, three combined ground-gas/groundwater monitoring standpipes were installed to a maximum depth of 5.00m bgl. The construction of the wells has been tabulated below.

Monitoring Well Construction				
Trial Hole	Piping internal diameter (mm)	Depth of Installation (m bgl)	Response Zone (m bgl)	Response Zone Strata
BH2	50	5.00	1.00 – 5.00	Made Ground and London Clay Formation

Ground-gas monitoring has been undertaken on four occasions by a representative of Ground and Water Limited using a GasData GFM436 landfill gas analyser, where monitoring was undertaken during a combination of atmospheric pressures and pressure trends. During monitoring the borehole flow, as well as concentrations of methane, carbon dioxide, carbon monoxide and hydrogen sulphide were recorded. In addition to the borehole readings, a reading was taken from the ambient air of the site to ensure that the gas analyser was functioning correctly.

The results of the ground-gas monitoring have been tabulated below and the full Ground and Water Limited monitoring results are provided within Appendix H. Where the reliability of the monitoring results will require consideration in line with CIRIA C665 and BS8485:2015+A1:2019, the table has been highlighted orange.

Ground-Gas Monitoring Results							
Trial Hole	Highest CH ₄ (% v/v)	Highest CO ₂ (% v/v)	Lowest O ₂ (% v/v)	Highest H ₂ S (ppm)	Highest CO (ppm)	Highest Flow Rate (l/hr)	Shallowest Groundwater (m BGL)
Ambient Air	0.00	0.00	19.70 ⁴	0	0	n/a	n/a
BH2	0.00	1.20 ²	16.80 ²	0	0	0.00	1.20 ⁴
Notes: Number ^{1,2} etc. indicates monitoring round when recorded.							

No Methane was recorded in any of the trial holes. Carbon dioxide was encountered in all boreholes at a maximum concentration of 1.20%v/v. No flow was recorded in any of the trial holes during any of the monitoring visits. No wells were noted to be flooded.

5.5.2. Data Quality

A review was made of the quality of the available data for the site, which can be viewed in the table below. CIRIA Report C665 (2007), BS 8485:2015+A1:2019 and BS 8576:2013 stress the need for risk assessments to be based on good quality data and give guidance as to best practice in this respect.

Review of Data Quality			
Data Type	Current Understanding	UK Practice	Recommendation
Geological and hydro-geological conditions	The CSM identified the site to be located on Made Ground (>1.50m), overlying the London Clay Formation. The ground Investigation recorded Made Ground which varied in thickness from >0.40-3.00m thick with the average thickness within the deep boreholes of 2.45m bgl, overlying the London Clay Formation comprising cohesive soils. Groundwater was recorded to depths of 15.80m bgl in BH2 during the site investigation works. No groundwater was noted in the remaining boreholes. The monitoring visits recorded groundwater levels between 1.20m bgl and 4.40m bgl.	CIRIA C665 & C659, Wilson and Card (1999) and BS 8485 recommend that geology and hydrogeology be fully understood.	The geological and hydrogeological model is understood to a standard that will not comprise the findings of the risk assessment. No further action required.

Review of Data Quality			
Soil Laboratory Analysis	A dataset of soil analysis from 3No. samples have identified a range of TOC concentrations between 1.72% and 5.65%.	CL:AIRE RB17 outlines an approach to ground gas risk assessment away from the influences that directly affect ground gas monitoring. It should typically be used on sites with limited sources identified in the CSM and Made Ground with average thickness <3m and maximum thickness <5m. TOC should be < 6%.	The TOC concentrations are above the limit of 4% in order to use the soil derived approach for the risk assessment. Gas Monitoring required.
Monitoring period	The monitoring has been undertaken on a total of four occasions. Monitoring has been undertaken during a variety of atmospheric conditions including periods of steady and falling pressure.	CIRIA C665 and BS 8576 recommends monitoring over a range of weather conditions. Concentrations of ground gas are likely to be highest during falling pressures, with sharp falls providing the worst-case results. In line with BS8576 a minimum of 6No. monitoring visits are required.	Monitoring should be undertaken over a 2 month period with between weekly and fortnightly readings. Monitoring has been undertaken during atmospheric pressures of between 1013.3 and 1023.6 mbar.
Gas data sets	No Methane was recorded in any of the trial holes during the monitoring program. Carbon dioxide concentrations were recorded up to 1.20%. No hydrogen sulphide or carbon monoxide has been detected during monitoring. Monitoring revealed a maximum positive flow of 0.00l/hr.	Borehole flow velocity and borehole gas volume (methane and carbon dioxide) are required for ground gas flux categorisation. Modified Wilson and Card classification, CIRIA C665 (2007), BS8485:2015+A1:2019.	4No. suitable gas datasets are available for the risk assessment, where a minimum of 4No. is deemed necessary.

5.5.3. Risk Assessment

Soil Derived Method

The intrusive investigation has revealed the Made Ground varied in thickness from >0.40-3.00m thick with the average thickness within the deep boreholes of 2.45m bgl, overlying the London Clay Formation comprising cohesive soils. Site has undergone a previous phase of construction and limited degradable material has been identified. The introduction of oxygen to the Made Ground through redevelopment may lead to an initial increase of ground gas generation as degradable material within the soils present on-site may act as source of ground gas. The soils at the site are considered to be of variable permeability (low to high) in nature and pathways for ground gas migration will be present.

An alternative approach for ground gas risk assessment (CL:AIRE RB17) can be considered utilising measured concentrations from soil parameters that are independent of influencing factors such as atmospheric pressure and groundwater level. Total Organic Carbon (TOC) was tested on 3No. samples with the analytical results ranging between 1.72 and 5.65%. Furthermore, it is considered that a thickness of >0.80m could generate sufficient ground gas to pose an unacceptable risk.

Using the soil derived method, it is considered that a TOC value of <1% within soil is unlikely to pose an unacceptable risk from ground gases and the site can be characterised as Characteristic Situation CS1. Any value between 3 and 6% warrants classification as a Characteristic Situation CS3. Any value over 6% requires investigation through ground gas monitoring. Any site with Made Ground <1.00m bgl will have a limited gas generation potential from the organic carbon present and consideration should be given to this thickness within the risk assessment.

Based on the soil derived method outlined, the thickness of made ground and the maximum TOC concentration encountered, the soils from site would warrant classification as **Characteristic Situation CS2 – CS3**. It should be noted that this only represents the assessment from an on-site source.

Gas Monitoring Data

The ground gas monitoring undertaken to date has been reviewed and following any omissions caused by contradiction of the UK guidance (e.g. flooded wells), is deemed suitable for use in the risk assessment. The monitoring undertaken recorded methane concentrations of 0.00%v/v, carbon dioxide concentrations of up to 1.00%v/v and the maximum steady-state flow rate recorded was 0.0l/hr.

Based on the documentation presented in BS 8485:2015+A1:2019 “Code of practice for the characterisation and remediation from ground gas in affected developments”, the *hazardous gas flow rate* (Q_{hg}) should be calculated for each borehole using the equation below.

$$Q_{hg} = (C_{hg}/100) * q$$

Where: Q_{hg} is the measured hazardous gas concentration (in percentage volume-by-volume);

q is the flow rate (in litres per hour) of combined gases found by direct measurement.

The hazardous gas flow rate has been calculated for each borehole, referred to as the Gas Screening Value (GSV) using the worst-case steady-state concentration and flow, from all monitoring to date. The results are presented within the table below. Following the generation of the GSV, a ground gas characteristic situation can be assigned to the borehole. This has also been included within the table below.

Hazardous Gas Flow Rate Assessment							
Trial Hole	CH ₄ (%v/v)	CO ₂ (%v/v)	Flow Rate (l/hr)	CH ₄ GSV (l/hr)	Characteristic Situation	CO ₂ GSV (l/hr)	Characteristic Situation
BH2	0.0 ¹	1.20	0.0 ³	0.0002	CS1	0.0012	CS1

¹Where a value of 0.0 %v/v is detected the detection error is to be used of 0.2%v/v for methane.

²Where a value of 0.0 %v/v is detected the detection error is to be used of 0.1%v/v for carbon dioxide.

³Where a value of 0.0 l/hr is detected the detection error is to be used of 0.1 l/hr for flow.

⁴CS1 typically when <1% methane and <5% carbon dioxide otherwise *consider* an increase to CS2.

Based upon the available ground gas monitoring to date, the risk from ground gas is considered to be **very low (CS1)**, in accordance with BS8485:2015+A1:2019. Carbon monoxide and hydrogen sulphide were not detected at a concentration to warrant further assessment.

Consideration is required to any GSV that falls into the CS1 category, however the methane concentration is greater than 1% and/or the carbon dioxide concentration is greater than 5%. These locations are typical of sites where the hazardous gas concentration is significant, however marginal flow has been recorded during monitoring. It should be noted that consideration does not indicate that an increase is required. The monitoring results indicate that consideration is not required for an increase.

Assessing the sufficiency of the data is a requirement of BS 8576:2013, to determine whether further monitoring is required and the impact that this may have on the risk assessment. The current worst-case scenario is within BH2, which has identified a carbon dioxide GSV of 0.0012 l/hr. A GSV of 0.07 l/hr or above would result in an increase to Characteristic Situation CS2. Should the flow rate remain (0.1l/hr), a carbon dioxide concentration of 70% would be required to increase the classification to CS2. The understanding of the CSM indicates that this is unlikely to occur, however a slight increase may be plausible. Should the concentration of carbon dioxide remain constant (1.20%), a borehole flow rate of 5.83l/hr would be required to increase the classification to CS2. The understanding of the CSM indicates that this is unlikely to occur, however a slight increase may be plausible.

5.5.4. Ground Gas Risk Assessment Summary

Two methods of ground gas risk assessment have been applied to the site following site investigation, comprising a review of organic content of soils and ground gas monitoring.

A soil derived approach identified soils of the Made Ground was considered to pose an unacceptable ground gas risk at the site and warrant classification of Characteristic Situation CS2 - CS3. Ground gas monitoring was undertaken.

The ground gas monitoring and the derived GSVs have indicated that there is a very low risk from ground gases, equating to **Characteristic Situation CS1** across the site.

Therefore, based on the evidence available to date from gas monitoring, the risk assessment for the site indicates that the site should be classified as **Characteristic Situation CS1**.

Boreholes can act as preferential pathways for ground gas and therefore prior to construction, all boreholes should be suitably decommissioned in line with Environment Agency guidance. This usually comprises pumping liquid grout down a tremie pipe to the base of the borehole, raising as the borehole fills.

5.6. Vapour Risk Assessment

The CSM identified a source of contamination that may pose an unacceptable risk to receptors through vapours.

The risk from vapours was considered to be low due to the very low concentrations of BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE, which are used as marker compounds for Volatile Organic Compounds (VOCs) and the low anticipated risk level.

5.6.1. Borehole Monitoring

During the monitoring of the boreholes installed, an oil-water interface probe and Photoionization Detector (PID) was utilised. The interface probe did not identify any dense or light non-aqueous phase

liquids (DNAPL / LNAPL) during any of the monitoring visits. The highest PID reading was 14.10ppm. Values higher than 10ppm, should be further investigated, potentially through VOC testing of groundwater.

5.7. Updated Conceptual Site Model

Following completion of the Phase 2 Site Investigation, the CSM, inclusive of associated risk, within Section 2.8 of this report was re-evaluated.

For ease of reference and understanding, the risks have been re-assigned within this risk assessment against three possible levels / categories, summarised in the table below.

Risk Categories used in the Tabulated CSM	
Low Risk	Regarding this potential SPR linkage, the site is considered suitable for the proposed end-use and there is not considered to be an unacceptable risk to receptors.
Moderate Risk	Regarding this potential SPR linkage, the site is suitable for the proposed end-use however remediation and/or further investigation is required.
High Risk	Regarding this potential SPR linkage, the site is not suitable for proposed end-use and there is an unacceptable risk to receptors. Urgent action required in the short term.

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(On-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from construction/ demolition activities: - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals.	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Ingestion of home-grown produce, and soils attached - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Moderate Exceedances of lead, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(a,h)anthracene have been identified. Remediation is required.
	- Direct uptake of groundwater - Direct uptake of determinands in the soil	Flora and Fauna Vegetation within soft landscaped areas	Moderate Copper and Zinc have been identified above the phytotoxicity level.
	- Anthropogenic (man-made) pathways - Vertical and lateral migration in permeable strata - Surface water runoff	Controlled Waters - Unproductive strata (London Clay Formation) - New River 200m south of the site	Low
Aggressive ground conditions with Made Ground and natural ground, including groundwater: - Sulphates, - PAH/TPH.	Direct contact with aggressive ground conditions	Building Materials and Services - Buried Concrete - Underground services (water pipes)	High Concrete must be designed against AC-4
Ground gases generated by Made Ground: - Methane, - Carbon Dioxide, - Hydrogen Sulphide, and - Carbon Monoxide.	- Migration through anthropogenic & natural pathways - Inhalation of Asphyxiating gases - Explosion (methane only)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development (especially in confined spaces) - Site operatives during maintenance works in confined spaces - Neighbours and public	Low
	- Migration through anthropogenic & natural pathways - Explosion (methane only)	Building Materials and Services - Buildings - Confined spaces	Low

		Underground services	
--	--	--	--

Tabulated Conceptual Site Model – Pollutant Linkage Summary			(Off-Site Sources)
Potential Sources	Potential Absorption Pathways	Potential Receptors	Risk Classification
Made Ground from AST's and USTS, and garages: - Asbestos, - PAHs, - TPHs, - VOCs, - Sulphates, and - Metals.	- Direct ingestion of soil and soil derived dust - Dermal contact of soil and soil derived dust - Inhalation of dust (indoors and outdoors) with elevated concentration of determinands - Direct ingestion of groundwater - Inhalation of volatile vapour (indoors and outdoors)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development - Site operatives during maintenance works - Neighbours and public	Moderate
	Direct uptake of groundwater	Flora and Fauna Vegetation within soft landscaped areas	Low
Aggressive ground conditions associated with impacted groundwater; - Sulphates, - PAH/TPH.	Direct contact with aggressive ground conditions	Building Materials and Services - Buried Concrete - Underground services (water pipes)	Moderate
Ground gases generated by Made Ground, AST's, UST's and garage sites: - Methane, - Carbon Dioxide, - Hydrogen Sulphide, and - Carbon Monoxide.	- Migration through anthropogenic & natural pathways - Inhalation of Asphyxiating gases - Explosion (methane only)	Human Health - End Users (Residents/Future site visitors) - Construction workers during development (especially in confined spaces) - Site operatives during maintenance works in confined spaces - Neighbours and public	Low
	- Migration through anthropogenic & natural pathways - Explosion (methane only)	Building Materials and Services - Buildings - Confined spaces - Underground services	Low

6. CONTAMINATION RECOMMENDATIONS AND REMEDIATION STRATEGY

Based on the results of the intrusive works, chemical analyses and risk assessments undertaken, the following has been identified that requires further action:

- Lead; Benzo(a)pyrene; Benzo(b)fluoranthene and Dibenzo(a,h)anthracene have been found at an unacceptable concentration within the soils across the site.

An Asbestos Management Strategy should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination. An asbestos survey of the buildings is required prior to any demolition works.

At the time of reporting October 2022, the proposed development was understood to comprise redevelopment of the Omega Works A and B 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 majority of the site is to be covered by permeable paving with soft landscaping areas associated with the proposed playground area and courtyard area of Block B. At the time of reporting no formal development plans were made available to Ground and Water for the Omega B works, therefore it was assumed that any development works would be similar to the Omega A works. It is unsure if any areas of soft landscaping will be present on site. Any areas of hardstanding would not require remediation due to the break of the contaminant pathway. The following recommendations would be required for any areas of proposed soft landscaping in the Omega B works site area.

6.1. Soils

Where permeable paving/hardstanding is to be located on site, it is considered that this will act as a pathway break for any contaminants within the soils. The break in pathway means the risk to the receptor (end user, residents, ground workers) is considered to be low. In these areas no remediation is therefore required.

In the area of the proposed playground and soft landscaping area in the courtyard of block B remedial action will be required due to the pathway of contaminants through the soil potentially causing a risk to the receptor.

The highest exceedance of contaminants has been identified as Benzo(b)fluoranthene at ~3.36 times the assessment criteria. Since the exceedances are not considered to be significant (~5-6 times the assessment criteria), the BRE "Cover Systems for Land Generation" can be considered for the design of the cover system and is considered applicable within all soft landscaped areas.

Based on the available information within this report and the calculated thickness of clean cover required, it was proposed that the following remedial methodology should be undertaken within **all soft landscaped areas**:

- A 290mm clean capping of soils;

- Validation of the clean capping system by a suitably trained Ground and Water Limited engineer.

Full liaison must be made with the statutory authority, prior to the implementation of this remediation strategy and/or removal of soils from the site. All works must be undertaken to meet their approval. The BRE Capping calculations can be seen in Appendix I.

6.1.1. 290mm Clean Capping of Soil

The capping system should be at least 290mm in thickness within all soft landscaping areas. It is recommended that at least the top 150mm of the clean capping should comprise suitable topsoil for use as a growing medium. It is a requirement that this should be no less than 100mm thick.

All subsoil and topsoil must be fit for purpose to ensure that the receptors cannot come into contact with determinands that could be detrimental to their health. It has been assumed that for the principal contaminant of concern (Benzo(b)fluoranthene a maximum concentration of 3.90 mg/kg will be present within the capping of soil.

The thickness of the capping system has been calculated based on a mixing zone of 600mm, assuming that they will not be implemented on a slope with a gradient in excess of 1 in 12 and are away from the influence of burrowing animals, such as rabbits and badgers.

6.1.2. Change in Level

In locations where site levels are to be lowered, Made Ground should be removed from the location to allow the capping of 290mm to be placed. Materials should be removed and stockpiled on an impermeable liner with raised edges and covered at all times. This contamination stockpile destined for removal from site should be stored away from imported soils to avoid cross-contamination. The void should then be backfilled with 290mm of clean certified soil.

Materials to be removed off-site must be classified by carrying out Waste Acceptance Produce (WAP) testing. A registered contractor must undertake the removal of waste. Consignment notes for the removal of waste must be obtained and kept for inclusion within the final validation Report.

If levels are raised, the imported materials should be clean and validated, where the top 290mm within areas of soft landscaping will still need to be covered with a clean capping of soil.

6.1.3. Validation

The remediation works outlined above will need to be inspected and independently validated by a Ground and Water Limited Engineer. All excavations will need to be inspected, documented and photographed. Validation holes should prove the depth of the clean cover and enable the sampling of soils. Due to the design of the proposed development, validation should be undertaken at a rate of 1 validation trial hole per area of soft-landscaping and a sample taken equating to 1 sample per 50m³ imported.

6.1.4. Water Supply Pipes

The Water Supply pipe risk assessment indicated that the use of PE pipes is inappropriate at the site due to the concentrations of TPH within the soils. It is therefore recommended that the use of Metal

or Barrier pipes are implemented as part of the design in order to prevent an unacceptable risk to future receptors.

6.2. Groundwater

It was concluded that there was no risk associated with controlled waters.

6.3. Ground Gas and Vapours

Based on risk assessment undertaken and ground gas monitoring, the site warrants classification as **Characteristic Situation CS1**. The risk from vapours was considered to be low due to the very low concentrations of BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE, which are used as marker compounds for Volatile Organic Compounds (VOCs) and the low anticipated risk level.

The risk from Vapours was also considered to be low to moderate. Values higher than 10ppm from PID testing, should be further investigated, potentially through VOC testing of groundwater. Groundwater was recorded during the site investigation works at depths of 15.80m bgl in BH2. No groundwater was noted in the remaining boreholes. The monitoring visits recorded groundwater levels between 1.50m bgl and 4.40m bgl.

The presence of groundwater within the upper 0.75m below the ground floor slab would provide a pathway for Vapours to disperse into the basement structure. The risk of vapours decreases when groundwater levels are below 0.75m or at greater depths. As groundwater levels were not recorded within 0.75m of the proposed Blocks A and B then the risk is thought to be low. In the area of the proposed basement the risk from Vapours was considered to be low due to the basement founding depth being with the London Clay Formation. The potential source of vapours (Made Ground) is to be excavated and removed as part of the basement constructed. Based off this line of evidence the risk from vapours can be reduced to Low.

6.4. Discovery Strategy

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.

6.5. Imported Material

It is required that clean soils will be brought onto site as part of the validation works. Any soil which is to be imported onto the site must undergo chemical analysis to prove that it is suitable for the purpose for which it is intended.

The soil must be fit for purpose and must either be supplied with traceable chemical laboratory test certificates or be tested, prior to placing (ideally) and after placing, to ensure that the future receptors (human health and vegetation) cannot come into contact with compounds that could be detrimental

to their health. The compounds that are to be tested for are those given in the Generic Assessment Criteria, which can be viewed in Appendix F of this report.

6.6. Waste Disposal

The excavation of foundations and other soils is likely to produce waste which will require classification and then recycling or removal from site.

Under the Landfill (England and Wales) Regulations 2002 (as amended), prior to disposal, all waste must be classified as either: Inert; Non-hazardous; or Hazardous.

The Environment Agency's Hazardous Waste Technical Guidance (WM3) document outlines the methodology for classifying wastes. Once classified the waste can be removed to the appropriately licensed facilities, with some waste requiring pre-treatments prior to disposal.

Following the investigation, 6No. samples of the Made Ground were submitted to the analytical laboratory to undergo a suite of testing for contamination testing, as discussed in the previous sections. Sampling depths were chosen to reflect the receptor of concern, human health, and typically comprised a surface or near surface sample and periodically to 1.00m bgl. Any horizon where olfactory or visual evidence of contamination was present was also sampled.

Based on a risk phase analysis of the chemical laboratory test results, in accordance with EC Hazardous Waste Directive and undertaken by Ground and Water Limited, three of the samples were classified as Non-Hazardous. The results of the assessment are given within Appendix G.

It is important to note that whilst we consider our in-house assessment tool to be an accurate interpretation of the requirements of WM3, therefore producing an initial classification in accordance with the guidance, this method classifies soils as either non-hazardous or hazardous and landfill operators have their own assessment tools and can often come to different conclusions. As a result, some landfill operators could refuse to take apparently suitable waste. It is recommended that the receiving landfill views the results of this assessment and the chemical laboratory results to determine their own classification.

In addition to the samples described above, 1No. sample (BH2/0.20m bgl- source of Made Ground) was scheduled to undergo Waste Acceptance Criteria (WAC) testing with single batch leachate from samples with a range of depths. The results indicate that 1No. sample was classified as non inert or Stable non-reactive Hazardous Waste in a Non hazardous landfill (depending on the original classification) due to elevated Antimony concentrations.

It is recommended that further WAC testing be undertaken in the area of the proposed Basement due to the large excavation of soil for its construction which will consist of a mixture of Made Ground and natural soils. These soils will need to be taken off site and will need further testing once the soils for the basement have been excavated.

Where contaminated soils are to be removed, they should be placed on an impermeable membrane (visqueen or similar) to ensure that no cross-contamination of soils occurs.

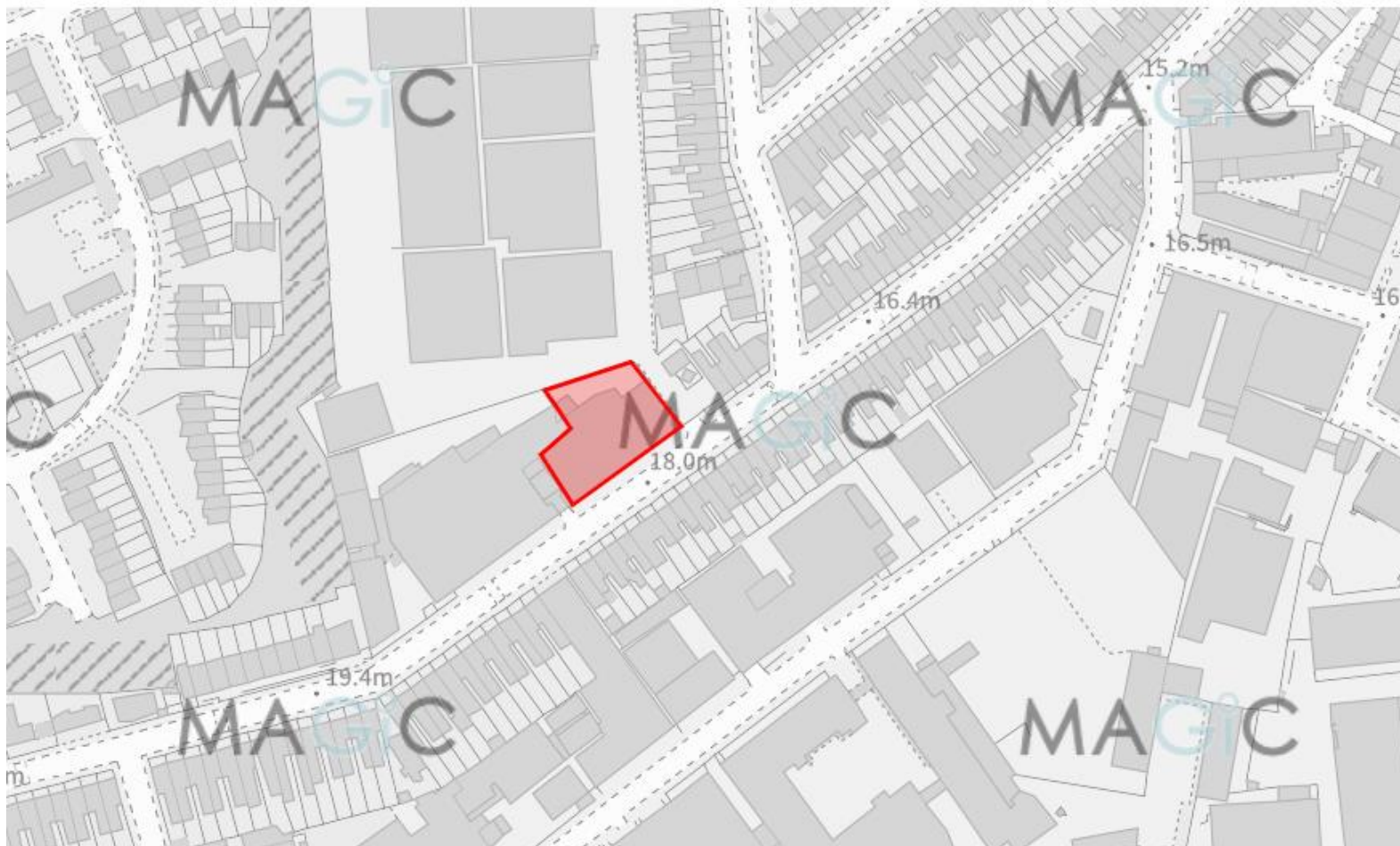
6.7. Duty of Care

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:

October 2022

Site Location Plan

Ref:

GWPR4712

Figure 1





Project:

167 Hermitage Road, Harringay, London N4 1LZ

Client:

Topfling

Date:

October 2022

Proposed Development – Ground Floor Plan

Ref:

GWPR4712

Figure 2







Project:

167 Hermitage Road, Haringay, London N4 1LZ

Client:

Topfling

Date:

October 2022

Proposed Development – Second Floor Plan

Ref:

GWPR4712

Figure 4





Project:

167 Hermitage Road, Harringay, London N4 1LZ

Client:

Topfling

Date:

October 2022

Proposed Development – Third Floor Plan

Ref:

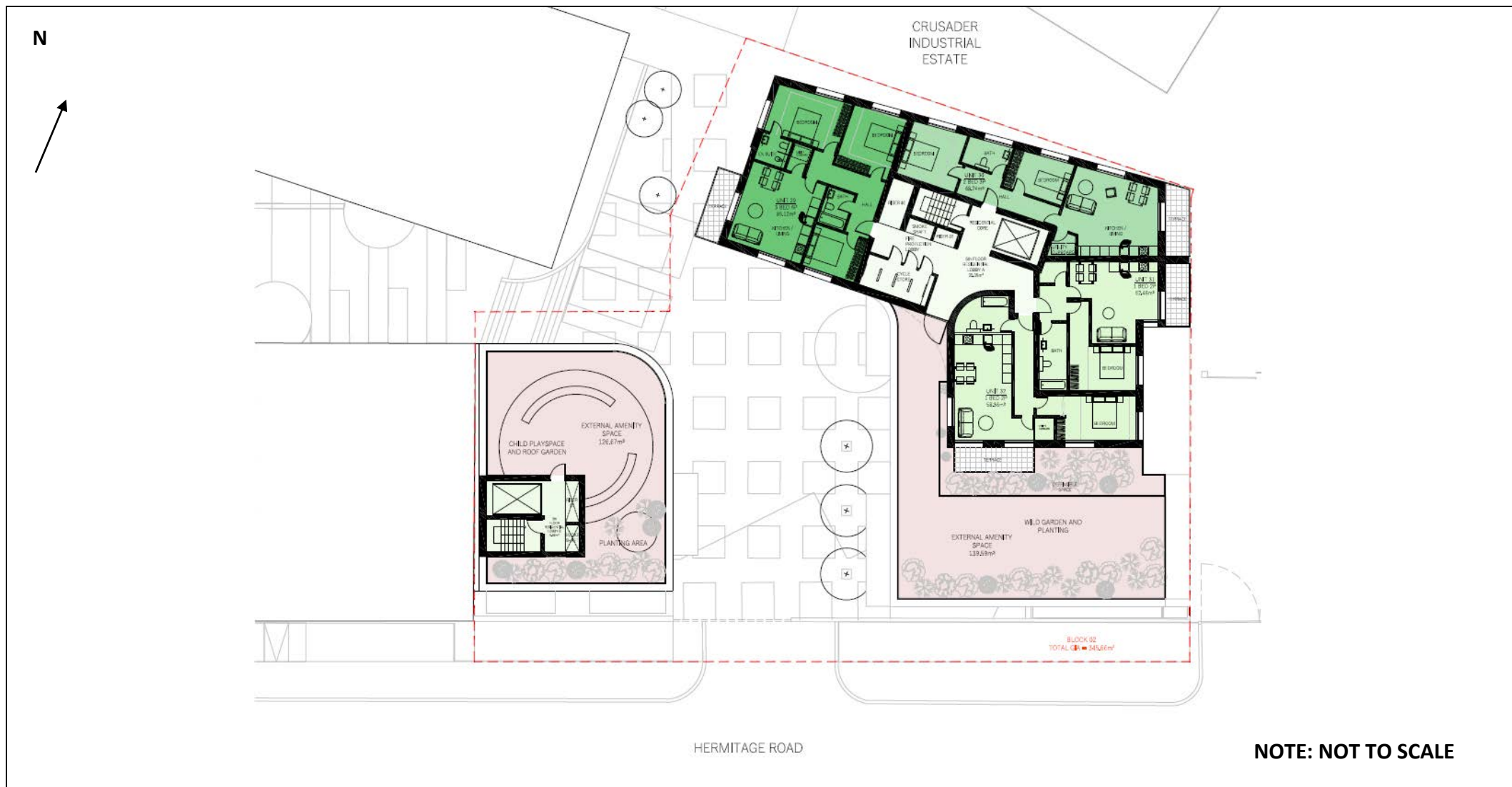
GWPR4712

Figure 5





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



Project:

167 Hermitage Road, Harringay, London N4 1LZ

Client:

Topfling

Date:

October 2022

Proposed Development – Fifth Floor Plan

Ref:

GWPR4712

Figure 7





Project:

167 Hermitage Road, Haringay, London N4 1LZ

Client:

Topfling

Date:

October 2022

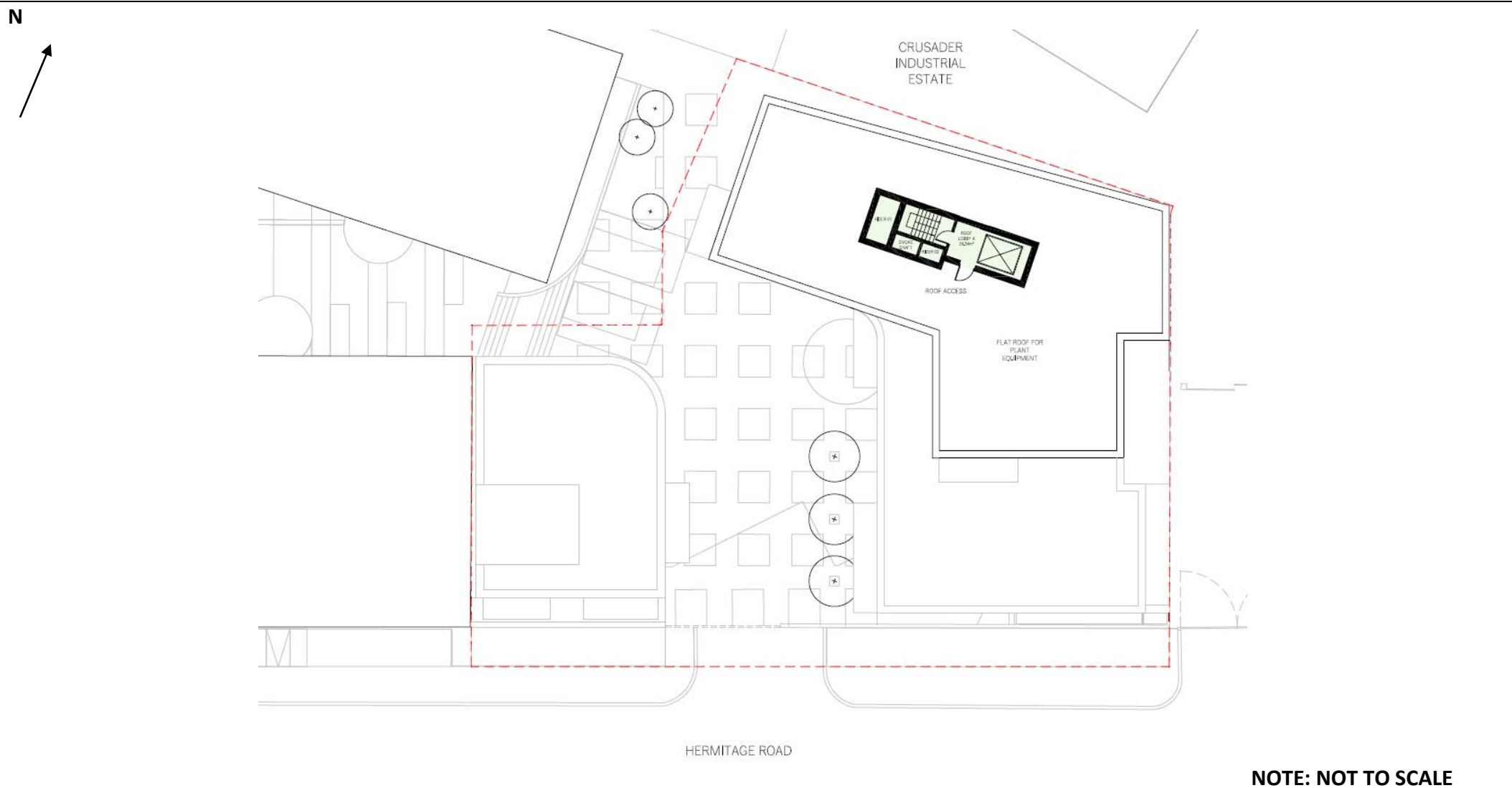
Proposed Development – Sixth Floor Plan

Ref:

GWPR4712

Figure 8



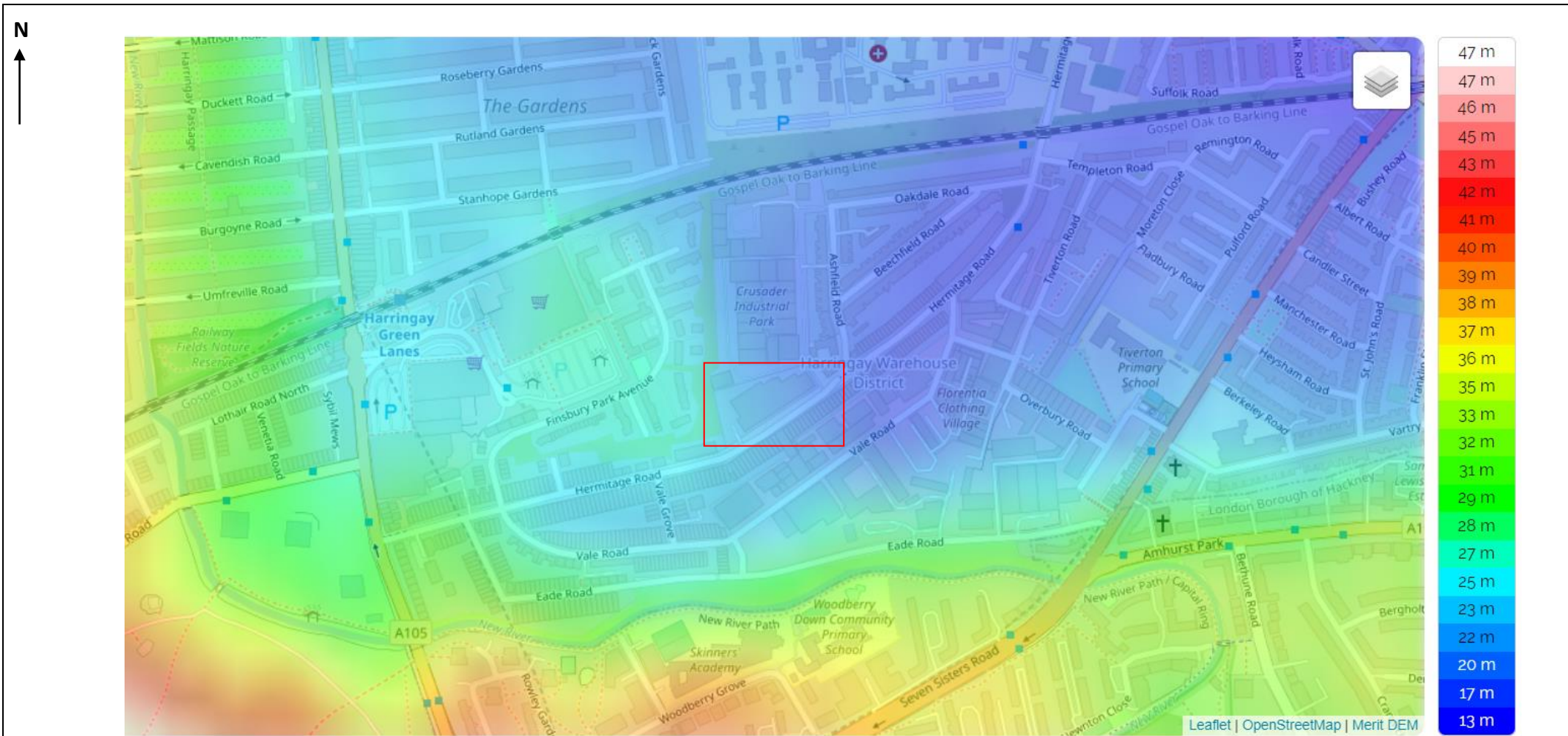


Project:		167 Hermitage Road, Harringay, London N4 1LZ		Figure 9 
Client:		Date:	October 2022	
Topfling		Ref:	GWPR4712	
Proposed Development – Roof Plan				



NOTE: NOT TO SCALE

Project:		167 Hermitage Road, Harringay, London N4 1LZ		Figure 10 
Client:		Topfling	Date:	
Proposed Development – Elevation View			Ref:	
			GWPR4712	



NOTE: NOT TO SCALE

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

Figure 11



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.

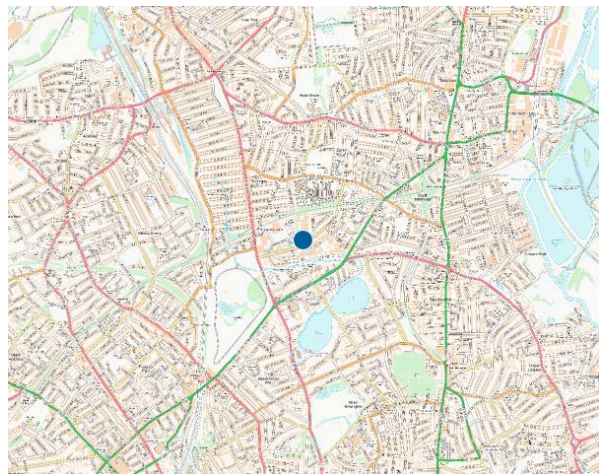
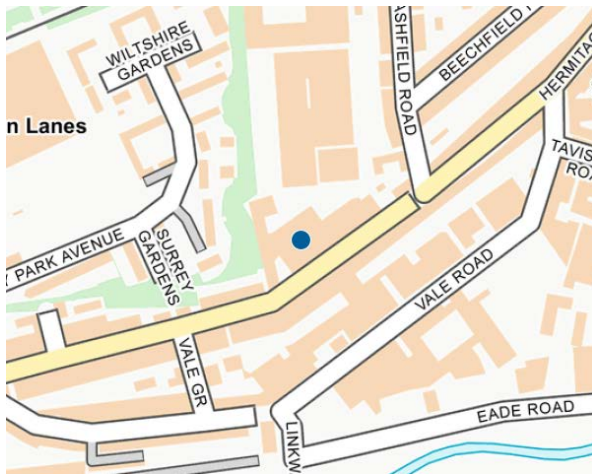
IN-SITU STRENGTH GEOTECHNICAL TESTING:

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 FIND Mapping Limited

Report reference: 504972

**SAFE, RELIABLE,
PROFESSIONAL**

The established market leader in
UXO risk mitigation

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Preliminary Unexploded Ordnance Threat Assessment

For:

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

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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

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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.

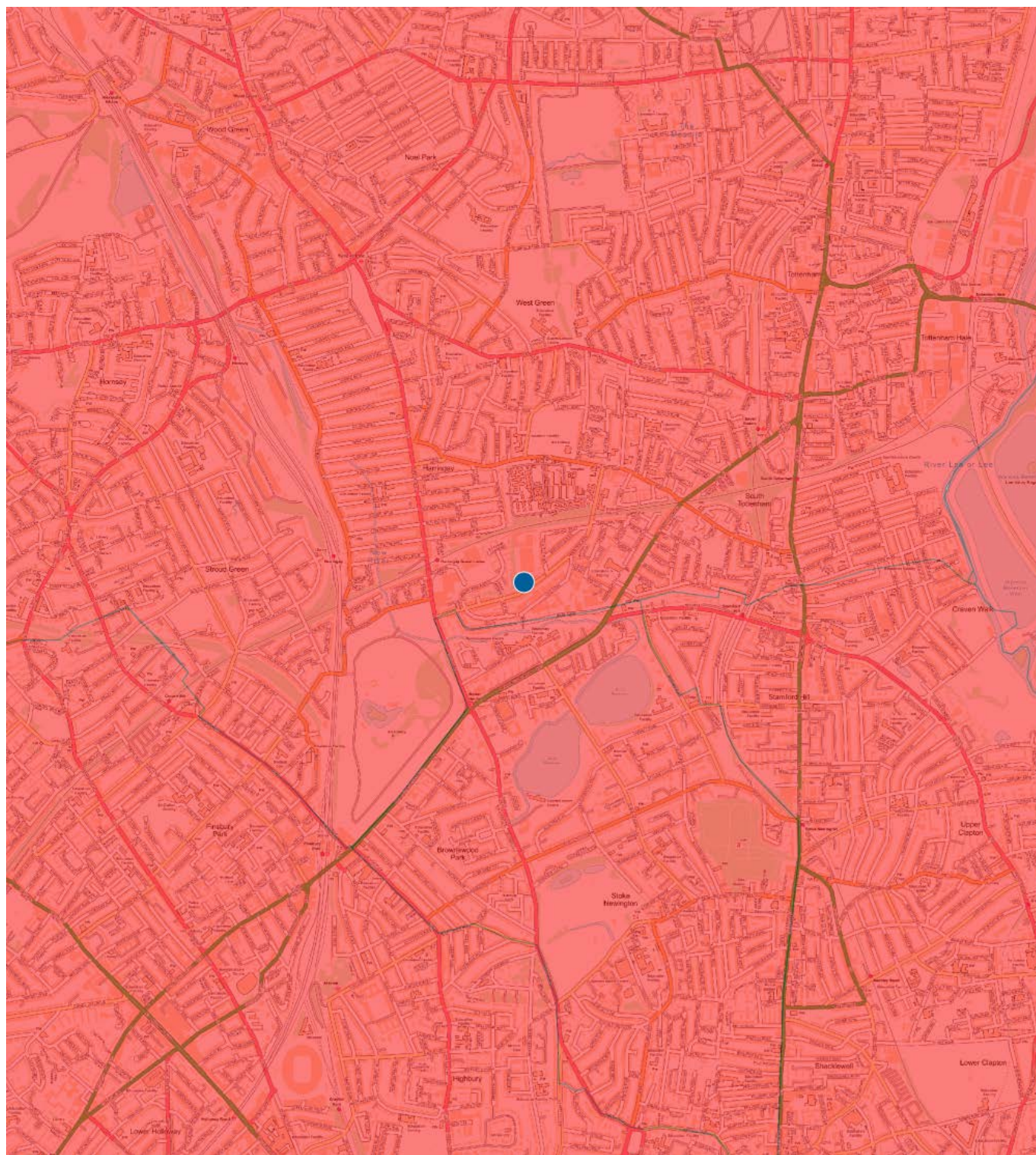
Given the inaccuracy of WWII records the location of ABs cannot be considered definitive. The geographic location of ABs must therefore be regarded as approximate.

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.

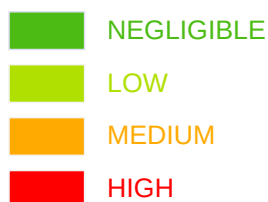


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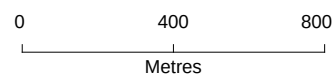
BOMB/RISK

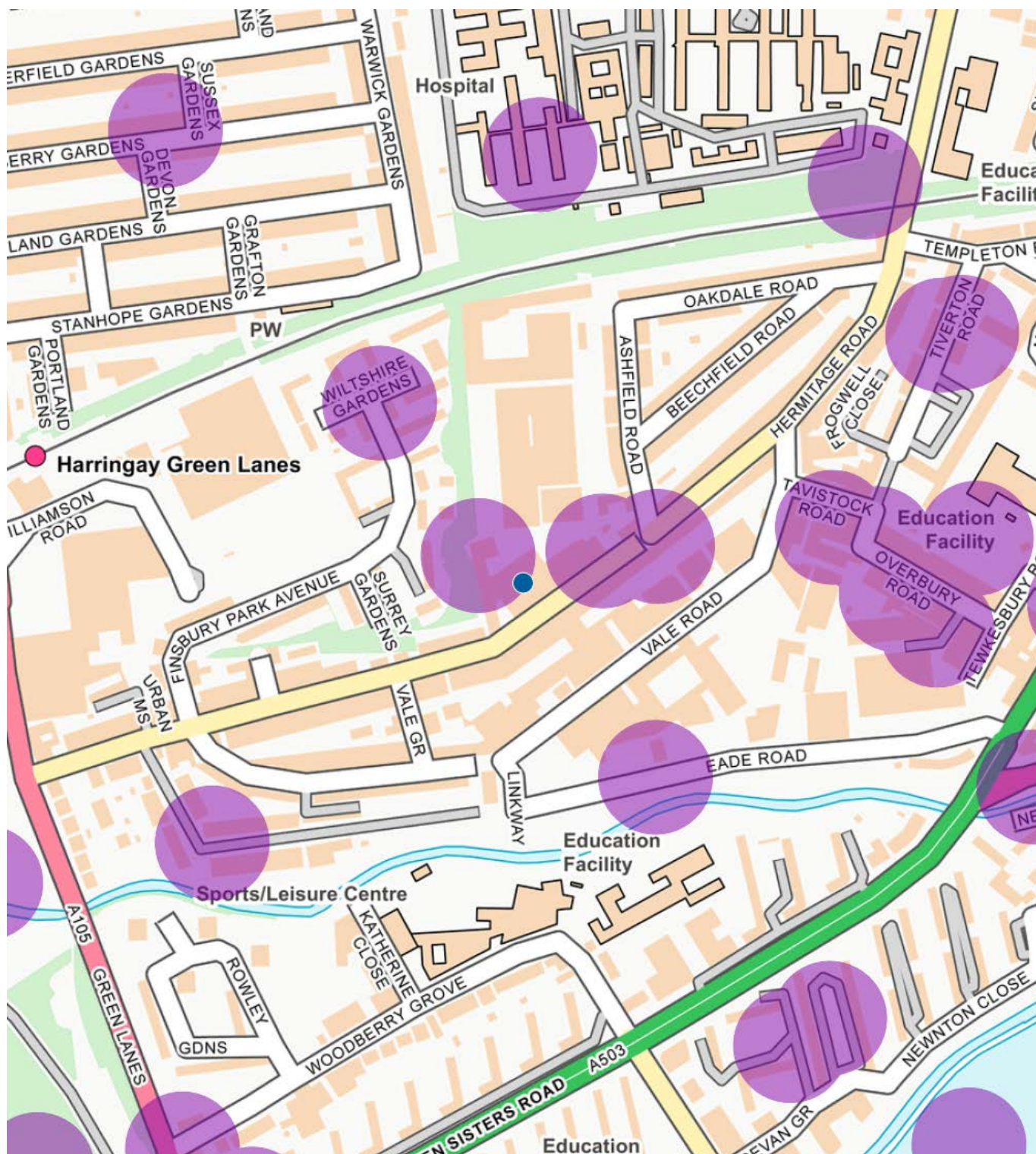
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1:20000





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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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Kent, ME8 0NZ, UK

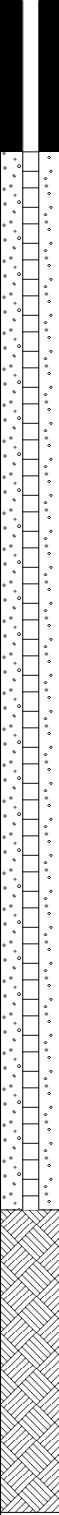
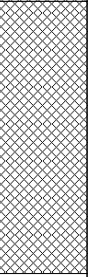
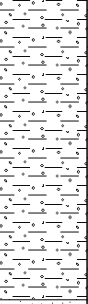
info@safelaneglobal.com
01634 471 340

www.safelaneglobal.com

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

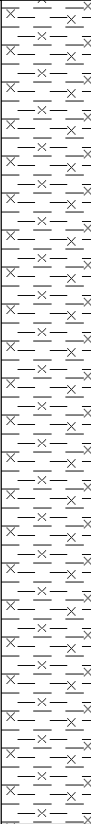
Remarks Groundwater recorded at 2.40m and 6.60m bgl Roots recorded at 2.70m bgl.										
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Percussion Drilling Log

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.



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

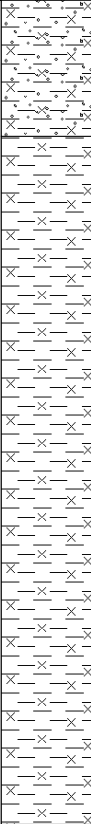
Remarks Groundwater recorded at 15.8m bgl. No roots recorded.										
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Percussion Drilling Log

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

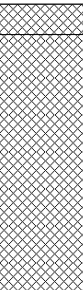
Groundwater recorded at 15.8m bgl.
No roots recorded.





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

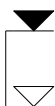
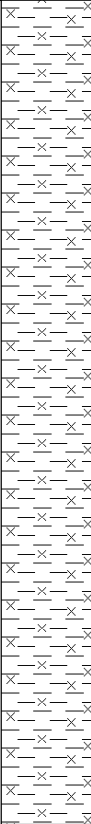
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

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

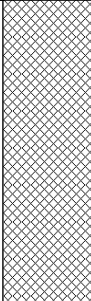
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			MADE GROUND: Concrete	
								End of Borehole at 0.400m	
									1
									2
									3
									4
									5

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

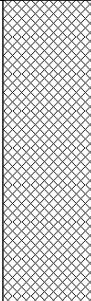
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		1.00			MADE GROUND. Light brown, black, grey gravelly sandy SILT Sand is fine. Gravel is fine to coarse sub-angular of concrete (10%), brick (60%) and ash/bituminous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

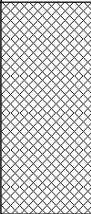
Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

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

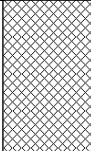
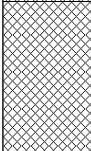
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		0.70			MADE GROUND. Brown, grey, cream, orange sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse sub-angular of flint (70%) and concrete (30%).	
		0.50	D	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

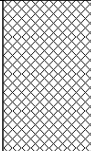
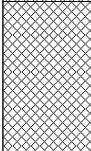
Remarks No groundwater record. No roots recorded.							
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Trial Pit Log

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 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						
		0.80	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%).	
		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.							
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APPENDIX E:

Chemical Laboratory Testing



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

Superseded Report:

PAH by GCMS

Results Legend			Customer Sample Ref.	TP2	TP8			
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.20 - 0.20	0.20 - 0.20			
M	mCERTS accredited.			Soil/Solid (S)	Soil/Solid (S)			
aq	Aqueous / settled sample.			03/05/2022	03/05/2022			
diss.filt	Dissolved / filtered sample.			12:00	12:00			
tot.unfilt	Total / unfiltered sample.			06/05/2022	06/05/2022			
*	Subcontracted - refer to subcontractor report for accreditation status.			220506-97	220506-97			
**	% 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			26237044	26237050			
(F)	Trigger breach confirmed							
1-4*§@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Naphthalene-d8 % recovery**	%	TM218	87.8	90				
Acenaphthene-d10 % recovery**	%	TM218	95.2	93.9				
Phenanthrene-d10 % recovery**	%	TM218	97.4	97.2				
Chrysene-d12 % recovery**	%	TM218	92.5	107				
Perylene-d12 % recovery**	%	TM218	91.6	101				
Naphthalene	<0.009 mg/kg	TM218	<0.09 M	0.0552 M				
Acenaphthylene	<0.012 mg/kg	TM218	0.528 M	0.161 M				
Acenaphthene	<0.008 mg/kg	TM218	<0.08 M	0.134 M				
Fluorene	<0.01 mg/kg	TM218	<0.1 M	0.0821 M				
Phenanthrene	<0.015 mg/kg	TM218	1.12 M	1.76 M				
Anthracene	<0.016 mg/kg	TM218	1.03 M	0.322 M				
Fluoranthene	<0.017 mg/kg	TM218	12.9 M	5.81 M				
Pyrene	<0.015 mg/kg	TM218	12.1 M	5.29 M				
Benzo(a)anthracene	<0.014 mg/kg	TM218	9.06 M	3.48 M				
Chrysene	<0.01 mg/kg	TM218	8.58 M	3.44 M				
Benzo(b)fluoranthene	<0.015 mg/kg	TM218	10.4 M	5.05 M				
Benzo(k)fluoranthene	<0.014 mg/kg	TM218	3.79 M	1.71 M				
Benzo(a)pyrene	<0.015 mg/kg	TM218	7.84 M	3.73 M				
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218	5.21 M	2.79 M				
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218	1.1 M	0.463 M				
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218	4.19 M	2.46 M				
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218	77.8	36.7				



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

Validated

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
Client Ref.: GWPR4712 167 Hermitage Road

Report Number: 647849
Location: Haringey, London N4 1LZ

Superseded Report:

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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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:	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		X	
Anions by Kone (w)	All	NDPs: 0 Tests: 1								X		
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 4							X		X	
Boron Water Soluble	All	NDPs: 0 Tests: 4							X		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		X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1							X			
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							X			
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2							X			



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

	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	26318847	26318843	BH4	BH4			5.90 - 5.90	0.20 - 0.20	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	S	S
26318839			BH3				1.00 - 1.00	1.00 - 1.00	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	S	S
26318836			BH2				12.00 - 12.00	12.00 - 12.00	1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE210)	S	S
26318832			BH2				1.00 - 1.00	1.00 - 1.00	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	S	S
26318827			BH2				0.20 - 0.20	0.20 - 0.20	60g VOC (ALE215)	250g Amber Jar (ALE210)	S	S
									1kg TUB with Handle (ALE260)	1kg TUB with Handle (ALE210)	S	S
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 4							X	X		
Loss on Ignition in soils	All	NDPs: 0 Tests: 1							X			
Magnesium (BRE)	All	NDPs: 0 Tests: 2										X
Mercury Dissolved	All	NDPs: 0 Tests: 1							X			
Metals in solid samples by OES	All	NDPs: 0 Tests: 4							X	X		
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 2										X
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 1							X			
PAH by GCMS	All	NDPs: 0 Tests: 4							X	X		
PCBs by GCMS	All	NDPs: 0 Tests: 1							X			
pH	All	NDPs: 0 Tests: 6							X	X	X	X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 4							X	X		
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1							X			
Sample description	All	NDPs: 0 Tests: 6							X	X	X	X
Total Dissolved Solids	All	NDPs: 0 Tests: 1							X			
Total Organic Carbon	All	NDPs: 0 Tests: 4							X	X		



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

SDG: 220520-132

Report Number: 648657

Superseded Report:

Client Ref.: GWPR4712 167 Hermitage Road

Location: Haringey, London N4 1LZ

[illegible]



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



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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



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Validated

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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.



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Validated

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

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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.

APPENDIX F:

Soil Assessment Criteria

Ground and Water Limited

Soil Guideline Values and Generic Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'. At preliminary risk assessment stage, risks are evaluated qualitatively. As the site investigation progresses to a generic or detailed quantitative risk assessment, data is collected and assessment criteria are utilised to evaluate whether the contaminants represent an unacceptable risk to the identified receptors.

1. Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:

- 1) EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
- 2) EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
- 3) EA CLEA Bulletin (2009).
- 4) CLEA software version 1.06 (2009)
- 5) Toxicological reports and SGV technical notes.

The CLEA guidance and tools:

- Do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures;
- Do not cover risks to the environment, such as groundwater, ecosystems or buildings;
- Do not provide a definitive test for telling when human health risks are significant; and
- Are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

1.1. Land-use Scenarios

The CLEA model uses a range of standard land-use scenarios to develop conceptual exposure models outlined in the following sections.

1.1.1. Residential (with home grown produce) (RwHP)

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil and indoor dust ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
- Building type is a two-storey small-terraced house.

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur. (Residential without homegrown produce (RwoHP)).

1.1.2. Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
- There is no building.

1.1.3. Commercial/Industrial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

- Critical receptor is a working female adult (aged 16 to 65 years old).
- Exposure duration is a working lifetime of 49 years.
- Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
- Building type is a three-storey office (pre 1970).

2. LQM/CIEH Suitable 4 Use Levels (S4UL)

For derivation of these S4UL reference must be made to:

Nathanial, P., McCaffrey, C., Gillet, A., Ogden, R., Nathanial, J., *The LQM/CIEH S4UL's for Human Health Risk Assessment*. Land Quality Press. 2015

2.1. S4UL Background

The Land Quality Management/Chartered Institute of Environmental Health (LQM/CIEH) S4UL for a given land use is the concentration of the contaminant in soil at which the predicted daily exposure,

as calculated by the CLEA software, equals the Health Criteria Value. The S4ULs have been derived for substances based on various generic land use and soil organic matter contents.

The final output for each contaminant represents a synthesis of new toxicological (and fate and transport) reviews published since the preparation of the 2nd edition LQM/CIEH GAC's (Nathanial et al., 2009).

In the derivation of LQM/CIEH S4UL's the principles of 'minimal' or 'tolerable' risk enshrined in SR2, which has not been withdrawn, has been maintained.

2.2. S4UL Land-use

S4UL's have been derived for the basic CLEA land-uses, as described in section 1.2, and for two new land uses:

- Public Open Spaces near Residential Housing (POSresi).
- Public Park (POSpark).

2.2.1. Public Open Spaces near Residential Housing (POSresi)

Includes the predominantly grassed areas adjacent to high density housing, the central green area on many 1930's – 1970's housing estates, and smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soils with planting. It is assumed that the close proximity to the place of residence will allow tracking back of soil to occur.

2.2.2. Public Park (POSpark)

An area of open space, usually owned and maintained by the local authority, provided for recreational uses including family visits and picnics, children's play area, informal sporting activities (not a dedicated sports pitch), and dog walking. It is assumed that tracking back of soils into places of residence will be negligible.

The following LQM/CIEH S4ULs (Copyright Land Quality Management Limited) have been reproduced with permission, to the publication number S4UL3072.

3. Category 4 Screening Levels (C4SLs)

In the case of Lead, no SGV or GAC has been published to date. This is likely to be due to the toxicity review that is currently being undertaken by the Environment Agency. In the absence of updated toxicity information the SGV derived using CLEA 1.06 methodology and related toxicity will be used.

The overall objective of the C4SLs research project was to assist the provision of technical guidance in support of Defra's revised Statutory Guidance (SG) for Part 2A of the Environmental Protection Act 1990 (Part 2A) (Defra, 2012a). Specifically, the project aimed to deliver:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised SG presented a new four category

system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high. More specific guidance on what type of land should be considered as Category 4 (Human Health) is provided in Paragraphs 4.21 and 4.22 of the revised SG, as follows:

“4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.

(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

4.22 The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4: Human Health if following a detailed quantitative risk assessment it is satisfied that the level of risk posed is sufficiently low.”

The C4SLs are intended as “relevant technical tools” (in relation to Paragraph 4.21(c)) to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

“The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land.”

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

“SGVs are guidelines on the level of long-term human exposure to individual chemicals in soil that, unless stated otherwise, are tolerable or pose a minimal risk to human health.”

The implication of Paragraph 47(h) of the IA is that minimal risk is well within Category 4 and that the C4SLs should describe a higher level of risk which, whilst not minimal, can still be considered low enough to allow a judgement to be made that land containing substances at, or below, the C4SLs would typically fall within Category 4. This reflects Paragraph 4.20 of the revised SG, which states:

“4.20 The local authority should not assume that land poses a significant possibility of significant harm if it considers that there is no risk or that the level of risk posed is low. For the purposes of this Guidance, such land is referred to as a “Category 4: Human Health” case. The authority may decide that the land is a Category 4: Human Health case as soon as it considers it has evidence to this effect, and this may happen at any stage during risk assessment including the early stages.”

C4SLs, therefore, should not be viewed as “SPOSH levels” and they should not be used as a legal trigger for the determination of land under Part 2A.

The generic screening values referred to before usually take the form of risk-based Soil Guideline Values (SGVs) or other Generic Assessment Criteria (GACs) that are most typically derived using the Environment Agency’s Contaminated Land Exposure Assessment (CLEA) model, as described in the Environment Agency’s SR2, SR3 and SR7 reports (EA, 2009b & c; EA, 2008). It is anticipated that C4SLs will be used in a similar manner; as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the SGVs.

The suggested approach to the development of C4SLs consists of the retention and use of the CLEA framework, modified according to considerations of the underlying science within the context of Defra’s policy objectives relating to the revised SG. Within this context, it is suggested that the development of C4SLs may be achieved in one of three ways, namely:

- By modifying the toxicological parameters used within CLEA (while maintaining current exposure parameters);
- By modifying the exposure parameters embedded within CLEA (while maintaining current toxicological “minimal risk” interpretations); and
- By modifying both toxicological and exposure parameters.

There is also a suggested check on “other considerations” (e.g., background levels, epidemiological data, sources of uncertainty) within the approach, applicable to all three options.

It is suggested that a new term is defined for the toxicological guidance values associated with the derivation of C4SLs – a Low Level of Toxicological Concern (LLTC). A LLTC should represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as SPOSH.

4. CL:AIRE Generic Assessment Criteria (GAC)

For derivation of the CL:AIRE Generic Assessment Criteria (GAC) reference should be made to the following report:

CL:AIRE, *The Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in the Real Environment*. 2009.

Within this report, Contaminated Land: Applications in Real Environments (CL:AIRE) provided Generic Assessment Criteria (GAC) in accordance with the CLEA software and the principles outlined previously for a further 35 contaminants sometimes encountered on land affected by contamination.

5. SoBRA Acute GAC

The Society of Brownfield Risk Assessment (SoBRA) identified that most human health risk assessments focus on the chronic risks arising from long-term exposure to specific substances. As chronic risks often occur at lower doses than acute risks, they are often the key drivers, however, in some instances the acute dose may also be an important consideration within risk assessments.

The methodology for deriving the acute GAC were related to two distinct receptor groups:

- Members of the public, where the 'critical' receptor for this group will typically be a female child, which is consistent with CLEA residential and Public Open Space/allotments land-uses;
- Workers involved with excavations. The critical receptor for this group is assumed to be a female working adult, without the use of PPE.

The acute GACs relate to short term exposure of high concentrations of a substance that lead to acute effects. They are not considered to be average exposures across a specific / defined area. As a result, the GACs should be normally be compared with the maximum likely concentration that the individual may be exposed to, and not the average concentration within a specific area.

The SoBRA acute GAC will primarily be used for contaminants that do not currently have any GAC, most notably Cyanide.

6. Detailed Quantitative Risk Assessments (DQRA)

Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a DQRA may be undertaken to develop site specific values for relevant soil contaminants.

- | |
|---|
| <ul style="list-style-type: none">▪ Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.▪ Developing more accurate parameters using site data. |
|---|

7. Phytotoxicity

CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

- BS3882:2015 – *Specification for Topsoil*

The trigger values are relevant only to those contaminants, where present in excess, have the potential to inhibit plant growth, or kill plants (Cu, Ni and Zn). The criteria have been based on a wide range of planting that are common within a multi-purpose topsoil.

8. Statistical Tests

DEFRA R&D Publication CLR 7 (DOE 1994) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95th percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

CL:AIRE published guidance in 2020, *Guidance in comparing soil contamination data with a critical concentration*, superseding the CL:AIRE/CIEH 2008 report of the same name. The guidance provides ways to assist land contamination stakeholders to apply statistical methods to their data to enable decisions under the legislative framework; either planning system or Part 2A of the Environmental Protection Act 1990.

The use of the statistical tests should only be applied if the following statements are valid for the datasets:

- Averaging areas, as well as the smallest area of concern have been identified on the basis of the CSM, including the desk study and/or the site walkover;
- The sample locations were chosen using a simple random, stratified random or stratified systematic (square, herringbone or triangular grid) sampling pattern, rather than being targeted to locations suspected of being contaminated;
- The sample locations are relatively evenly spread across the area and are not clustered, to avoid giving undue weight to some parts of the site over others in the calculated statistics;
- The analyses do not suggest a hotspot or outlier of contamination that should be treated as a separate zone. This has been established by a histogram and/or a names statistical test;
- The sample locations are all taken from one population (i.e. the same material);
- Where an averaging zone encompasses several averaging areas, analyses do not show a spatial trend or other spatial pattern across that zone; and
- The number of samples has been shown to be sufficient for a statistical analysis.

Any included statistical spreadsheet is based on an in-house method of statistical analysis, in line with those outlined within the CL:AIRE guidance (2020).

Treatment of Hot-Spots

- A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.
- Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.

9. Ground and Water Limited Soil Assessment Criteria

The Soil Assessment Criteria used in the preparation of the Generic Quantitative Risk Assessment are tabulated in the following pages, where the source of each has been outlined in the previous sections.

9.1. Inorganics

SoBRA – Acute Generic Assessment Criteria						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Cyanide	24	24	24	1400	24	24

9.2. Metals

C4SL Low Level of Toxicological Concern						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Lead	< 200	< 310	< 80	< 2300	< 630	< 1300

LQM/CIEH Suitable 4 Use Levels – Metals and Semi-metals						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Arsenic	37	40	43	640	79	170
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11000	45	240000	21000	46000
Cadmium	11	85	1.9	190	120	532
Chromium (III)	910	910	18000	8600	1500	33000
Chromium (VI)	6	6	1.8	33	7.7	220
Copper	2400	7100	520	68000	12000	44000
Elemental Mercury	1.2	1.2	21	58	16	30
Inorganic Mercury	40	56	19	1100	120	240
Methylmercury	11	15	6	320	40	68
Nickel	180	180	53	980	230	800
Selenium	250	430	88	12000	1100	1800
Vanadium	410	1200	91	9000	2000	5000
Zinc	3700	40000	620	730000	81000	170000

Phytotoxicity (Harmful to Plants) Threshold Trigger Values			
Determinand	Soil pH < 6.0 (mg/kg)	Soil pH 6.0 – 7.0 (mg/kg)	Soil pH > 7.0 (mg/kg)
Copper	100	135	200
Nickel	60	75	110
Zinc	200	200	300
Notes: BS3882:2015 – <i>Specification for Topsoil</i> . Based on a wide range of common plants that will be exposed to multi-purpose topsoil. Toxicity of contaminant may also be impacted by pH of soils. Site observation of plant vitality may give additional guidance.			

CL:AIRE Soil Generic Assessment Criteria				
Determinand	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Antimony	ND	550	ND	7500
Barium	ND	1300	ND	22000
Molybdenum	ND	670	ND	17000
ND – Not derived				

9.3. Total Petroleum Hydrocarbons (TPHs)

9.3.1. BTEX Compounds

LQM/CIEH Suitable 4 Use Levels – BTEX Compounds							
Determinand	Soil Organic Matter	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Benzene	1.0% SOM	0.087	0.38	0.017	27	72	90
	2.5% SOM	0.170	0.70	0.034	47	72	100
	6.0% SOM	0.370	1.40	0.075	90	73	110
Toluene	1.0% SOM	130	880	22	56000	56000	87000
	2.5% SOM	290	1900	51	110000	56000	95000
	6.0% SOM	660	3900	120	180000	56000	100000
Ethylbenzene	1.0% SOM	47	83	16	5700	24000	17000
	2.5% SOM	110	190	39	13000	24000	22000
	6.0% SOM	260	440	91	27000	25000	27000
o-Xylene	1.0% SOM	60	88	28	6600	41000	17000
	2.5% SOM	140	210	67	15000	42000	24000
	6.0% SOM	330	480	160	33000	43000	33000
m-Xylene	1.0% SOM	59	82	31	6200	41000	17000
	2.5% SOM	140	190	74	14000	42000	24000
	6.0% SOM	320	450	170	31000	43000	33000
p-Xylene	1.0% SOM	56	79	29	5900	41000	17000
	2.5% SOM	130	180	69	14000	42000	23000
	6.0% SOM	310	430	160	30000	43000	31000

SOM = Soil Organic Matter Content (%)

9.3.2. Total Petroleum Hydrocarbons – Aliphatic

LQM/CIEH Suitable 4 Use Levels For TPH							
Aliphatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-6	1.0% SOM	42	42	730	3,200 (304) sol	570,000 (304) sol	95,000 (304) sol
	2.5% SOM	78	78	1,700	5,900 (558) sol	590,000	130,000 (558) sol
	6.0% SOM	160	160	3,900	12,000 (1150) sol	600,000 (1150) sol	180,000 (1150) sol
EC >6-8	1.0% SOM	100	100	2,300	7,800 (144) sol	600,000	150,000 (144) sol
	2.5% SOM	230	230	5,600	17,000 (322) sol	610,000	220,000 (322) sol
	6.0% SOM	530	530	13,000	40,000 (736) sol	620,000	320,000 (736) sol
EC >8-10	1.0% SOM	27	27	320	2,000 (78) sol	13,000	14,000 (78) sol
	2.5% SOM	65	65	770	4,800 (118) vap	13,000	18,000 (118) vap
	6.0% SOM	150	150	1,700	11,000 (451) vap	13,000	21,000 (451) vap
EC >10-12	1.0% SOM	130 (48) vap	130 (48) vap	2,200	9,700 (48) sol	13,000	21,000 (48) sol
	2.5% SOM	330 (118) vap	330 (118) vap	4,400	23,000 (118) vap	13,000	23,000 (118) vap
	6.0% SOM	760 (283) vap	760 (283) vap	7,300	47,000 (283) vap	13,000	24,000 (283) vap
EC >12-16	1.0% SOM	1,100 (24) sol	1,100 (24) sol	11,000	59,000 (24) sol	13,000	25,000 (24) sol
	2.5% SOM	2,400 (59) sol	2,400 (59) sol	13,000	82,000 (59) sol	13,000	25,000 (59) sol
	6.0% SOM	4,300 (142) sol	4,400 (142) sol	13,000	90,000 (142) sol	13,000	26,000 (142) sol
EC >16-35	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000
EC >35-44	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000

SOM = Soil Organic Matter Content (%)

vap – GAC presented exceeds the vapour saturation limit, which is presented in brackets.

sol – GAC presented exceeds the soil saturation limit, which is presented in brackets.

9.3.3. Total Petroleum Hydrocarbons – Aromatic

LQM/CIEH Suitable 4 Use Levels For TPH							
Aromatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-7 (Benzene)	1.0% SOM	70	370	13	26,000 (1220) ^{sol}	56,000	76,000 (1220) ^{sol}
	2.5% SOM	140	690	27	46,000 (2260) ^{sol}	56,000	84,000 (2260) ^{sol}
	6.0% SOM	300	1,400	57	86,000 (4710) ^{sol}	56,000	92,000 (4710) ^{sol}
EC >7-8 (Toluene)	1.0% SOM	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{sol}
	2.5% SOM	290	1,800	51	110,000 (1920) ^{sol}	56,000	95,000 (1920) ^{sol}
	6.0% SOM	660	3,900	120	180,000 (4360) ^{vap}	56,000	100,000 (4360) ^{vap}
EC >8-10	1.0% SOM	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}
	2.5% SOM	83	110	21	8,100 (1500) ^{vap}	5,000	8,500 (1500) ^{vap}
	6.0% SOM	190	270	51	17,000 (3850) ^{vap}	5,000	9,300 (3580) ^{vap}
EC >10-12	1.0% SOM	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}
	2.5% SOM	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (889) ^{sol}
	6.0% SOM	380	1,200	74	34,000 (2150) ^{sol}	5,000	10,000
EC >12-16	1.0% SOM	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000
	2.5% SOM	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000
	6.0% SOM	660	2,500	130	38,000	5,000	10,000
EC >16-21	1.0% SOM	260	1,900	46	28,000	3,800	7,600
	2.5% SOM	540	1,900	110	28,000	3,800	7,700
	6.0% SOM	930	1,900	260	28,000	3,800	7,800
EC >21-35	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >35-44	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >44-70	1.0% SOM	1,600	1,900	1,200	28,000	3,800	7,800
	2.5% SOM	1,800	1,900	2,100	28,000	3,800	7,800
	6.0% SOM	1,900	1,900	3,000	28,000	3,800	7,900
SOM = Soil Organic Matter Content (%)							
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

9.4. Polycyclic Aromatic Hydrocarbons (PAHs)

LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAHs)							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Acenaphthene	1.0% SOM	210	3,000 (57.0) ^{sol}	34	84,000(57.0) ^{sol}	15,000	29,000
	2.5% SOM	510	4,700(141) ^{sol}	85	97,000(141) ^{sol}	15,000	30,000
	6.0% SOM	1100	6,000(336) ^{sol}	200	100,000	15,000	30,000
Acenaphthylene	1.0% SOM	170	2,900(86.1) ^{sol}	28	83,000(86.1) ^{sol}	15,000	29,000
	2.5% SOM	420	4,600(212) ^{sol}	69	97,000(212) ^{sol}	15,000	30,000
	6.0% SOM	920	6,000(506) ^{sol}	160	100,000	15,000	30,000
Anthracene	1.0% SOM	2,400	31,000(1.17) ^{vap}	380	520,000	74,000	150,000
	2.5% SOM	5,400	35,000	950	540,000	74,000	150,000
	6.0% SOM	11,000	37,000	2,200	540,000	74,000	150,000
Benzo(a)anthracene	1.0% SOM	7.20	11	2.90	170	29	49
	2.5% SOM	11	14	6.50	170	29	56
	6.0% SOM	13	15	13	180	29	62
Benzo(a)pyrene	1.0% SOM	2.20	3.20	0.97	35	5.70	11
	2.5% SOM	2.70	3.20	2.00	35	5.70	12
	6.0% SOM	3.00	3.20	3.50	36	5.70	13
Benzo(b)fluoranthene	1.0% SOM	2.60	3.90	0.99	44	7.10	13
	2.5% SOM	3.30	4.00	2.10	44	7.20	15
	6.0% SOM	3.70	4.00	3.90	45	7.20	16
Benzo(ghi)perylene	1.0% SOM	320	360	290	3,900	640	1,400
	2.5% SOM	340	360	470	4,000	640	1,500
	6.0% SOM	350	360	640	4,000	640	1,600
Benzo(k)fluoranthene	1.0% SOM	77	110	37	1,200	190	370
	2.5% SOM	93	110	75	1,200	190	410
	6.0% SOM	100	110	130	1,200	190	440
Chrysene	1.0% SOM	15	30	4.10	350	57	93
	2.5% SOM	22	31	9.40	350	57	110
	6.0% SOM	27	32	19	350	57	120
Dibenzo(ah)anthracene	1.0% SOM	0.24	0.31	0.14	3.50	0.57	1.10
	2.5% SOM	0.28	0.32	0.27	3.50	0.57	1.30
	6.0% SOM	0.30	0.32	0.43	3.60	0.58	1.40
Fluoranthene	1.0% SOM	280	1,500	52	23,000	3,100	6,300
	2.5% SOM	560	1,600	130	23,000	3,100	6,300
	6.0% SOM	890	1,600	290	23,000	3,100	6,300
Flourene	1.0% SOM	170	2,800 (30.9) ^{sol}	27	63,000(30.9) ^{sol}	9,900	20,000
	2.5% SOM	400	3,800(76.5) ^{sol}	67	68,000	9,900	20,000
	6.0% SOM	860	4,500(183) ^{sol}	160	71,000	9,900	20,000
Indeno(123-cd)pyrene	1.0% SOM	27	45	9.50	500	82	150
	2.5% SOM	36	46	21	510	82	170
	6.0% SOM	41	46	39	510	82	180
Naphthalene	1.0% SOM	2.30	2.6	4.10	190 (76.4) ^{sol}	4,900	1,200(76.4) ^{sol}
	2.5% SOM	5.60	5.6	10	460 (183) ^{sol}	4,900	1,900(183) ^{sol}
	6.0% SOM	13	13	24	1,100 (432) ^{sol}	4,900	3,000
Phenanthrene	1.0% SOM	95	1,300(183) ^{sol}	15	22,000	3,100	6,200
	2.5% SOM	220	1,500	38	22,000	3,100	6,200
	6.0% SOM	440	1,500	90	23,000	3,100	6,300
Pyrene	1.0% SOM	620	3,700	110	54,000	7,400	15,000
	2.5% SOM	1200	3,800	270	54,000	7,400	15,000
	6.0% SOM	2000	3,800	620	54,000	7,400	15,000
Coal Tar (Benzo(a)pyrene used as marker compound)	1.0% SOM	0.79	1.2	0.32	15	2.20	4.40
	2.5% SOM	0.98	1.2	0.67	15	2.20	4.70
	6.0% SOM	1.10	1.2	1.20	15	2.20	4.80
SOM = Soil Organic Matter Content (%)							
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

9.5. Volatile and Semi-volatile Organic Compounds

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
<i>Chloroalkanes & alkenes</i>							
1,2 Dichloroethane	1.0% SOM	0.11	0.16	0.054	12	300	300
	2.5% SOM	0.18	0.24	0.100	17	310	330
	6.0% SOM	0.31	0.41	0.190	29	310	380
1,1,2,2 Tetrachloroethane	1.0% SOM	1.60	3.90	0.41	270	1,400	1,800
	2.5% SOM	3.40	8.00	0.89	550	1,400	2,100
	6.0% SOM	7.50	17	2.00	1,100	1,400	2,300
1,1,1,2 Tetrachloroethane	1.0% SOM	1.20	1.50	0.79	110	1,400	1,500
	2.5% SOM	2.80	3.50	1.90	250	1,400	1,800
	6.0% SOM	6.40	8.20	4.40	560	1,400	2,100
Tetrachloroethene	1.0% SOM	0.31	0.32	2.0	24	3,200	1,400
	2.5% SOM	0.70	0.71	4.8	55	3,300	1,900
	6.0% SOM	1.60	1.60	11.0	130	3,400	2,500
1,1,1 Trichloroethane	1.0% SOM	8.80	9.00	48	660	140,000	57,000 ^{vap} (1425)
	2.5% SOM	18	18	110	1,300	140,000	76,000 ^{vap} (2915)
	6.0% SOM	39	40	240	3,000	140,000	100,000 ^{vap} (6392)
Tetrachloromethene	1.0% SOM	0.026	0.026	0.45	2.90	890	190
	2.5% SOM	0.056	0.056	1.00	6.30	920	270
	6.0% SOM	0.130	0.130	2.40	14	950	400
Trichloroethene	1.0% SOM	0.0093	0.0097	0.0320	0.73	76	41
	2.5% SOM	0.0200	0.0200	0.0720	1.50	78	54
	6.0% SOM	0.0430	0.0450	0.1600	3.40	79	69
Trichloromethane	1.0% SOM	0.91	1.20	0.42	99	2,500	2,600
	2.5% SOM	1.70	2.10	0.83	170	2,500	2,800
	6.0% SOM	3.40	4.20	1.70	350	2,500	3,100
Vinyl Chloride	1.0% SOM	0.0064	0.0150	0.0017	1.1	7.8	18
	2.5% SOM	0.0100	0.0190	0.0031	1.4	7.8	19
	6.0% SOM	0.0170	0.0290	0.0058	2.2	7.8	19
<i>Explosives</i>							
2,4,6 Trinitrotoluene	1.0% SOM	1.60	65	0.24	1,000	130	260
	2.5% SOM	3.70	66	0.58	1,000	130	270
	6.0% SOM	8.10	66	1.40	1,000	130	270
RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)	1.0% SOM	120	13,000	17	210,000	26,000	49,000(18.7) ^{sol}
	2.5% SOM	250	13,000	38	210,000	26,000	51,000
	6.0% SOM	540	13,000	85	210,000	27,000	53,000
HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)	1.0% SOM	5.70	67,00	0.86	110,000	13,000	23,000(0.35) ^{vap}
	2.5% SOM	13	67,00	1.90	110,000	13,000	23,000(0.39) ^{vap}
	6.0% SOM	26	67,00	3.90	110,000	13,000	24,000(0.48) ^{vap}
Atrazine	1.0% SOM	3.30	610	0.50	9,300	1,200	2,300
	2.5% SOM	7.60	620	1.20	9,400	1,200	2,400
	6.0% SOM	17.40	620	2.70	9,400	1,200	2,400

^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Pesticides							
Aldrin	1.0% SOM	5.70	7.30	3.20	170	18	30
	2.5% SOM	6.60	7.40	6.10	170	18	31
	6.0% SOM	7.10	7.50	9.60	170	18	31
Dieldrin	1.0% SOM	0.97	7.00	0.17	170	18	30
	2.5% SOM	2.00	7.30	0.41	170	18	30
	6.0% SOM	3.50	7.40	0.96	170	18	31
Dichlorvos	1.0% SOM	0.032	6.40	0.0049	140	16	26
	2.5% SOM	0.066	6.50	0.0100	140	16	26
	6.0% SOM	0.140	6.60	0.0220	140	16	27
Alpha - Endosulfan	1.0% SOM	7.40	160(0.003) ^{vap}	1.20	5,600(0.003) ^{vap}	1,200	2,400
	2.5% SOM	18	280(0.007) ^{vap}	2.90	7,400(0.007) ^{vap}	1,200	2,400
	6.0% SOM	41	410(0.016) ^{vap}	6.80	8,400(0.016) ^{vap}	1,200	2,400
Beta - Endosulfan	1.0% SOM	7.00	190(0.00007) ^{vap}	1.10	6,300(0.00007) ^{vap}	1,200	2,400
	2.5% SOM	17	320(0.0002) ^{vap}	2.70	7,800(0.0002) ^{vap}	1,200	2,400
	6.0% SOM	39	440(0.0004) ^{vap}	6.40	8700	1,200	2,500
Alpha - Hexachlorocyclohexanes	1.0% SOM	0.23	6.90	0.035	170	24	47
	2.5% SOM	0.55	9.20	0.087	180	24	48
	6.0% SOM	1.20	11	0.210	180	24	48
Beta - Hexachlorocyclohexanes	1.0% SOM	0.085	3.70	0.013	65	8.10	15
	2.5% SOM	0.200	3.80	0.032	65	8.10	15
	6.0% SOM	0.460	3.80	0.077	65	8.10	16
Gamma - Hexachlorocyclohexanes	1.0% SOM	0.06	2.90	0.0092	67	8.2	14
	2.5% SOM	0.14	3.30	0.0230	69	8.2	15
	6.0% SOM	0.33	3.50	0.0540	70	8.2	15
Chlorobenzenes							
Chlorobenzene	1.0% SOM	0.46	0.46	5.90	56	11,000	1,300(675) ^{sol}
	2.5% SOM	1.00	1.00	14	130	13,000	2,000(1520) ^{sol}
	6.0% SOM	2.40	2.40	32	290	14,000	2,900
1,2-Dichlorobenzene	1.0% SOM	23	24	94	2,000 (571) ^{sol}	90,000	24,000(571) ^{sol}
	2.5% SOM	55	57	230	4,800 (1370) ^{sol}	95,000	36,000(1370) ^{sol}
	6.0% SOM	130	130	540	11,000 (3240) ^{sol}	98,000	51,000(3240) ^{sol}
1,3-Dichlorobenzene	1.0% SOM	0.40	0.44	0.25	30	300	390
	2.5% SOM	1.00	1.10	0.60	73	300	440
	6.0% SOM	2.30	2.50	1.50	170	300	470
1,4-Dichlorobenzene	1.0% SOM	61	61	15	4,400 (224) ^{vap}	17,000 ^g	36,000 (224) ^{vap}
	2.5% SOM	150	150	37	10,000 (540) ^{vap}	17,000 ^g	36,000 (540) ^{vap}
	6.0% SOM	350	350	88 ^g	25,000 (1280) ^{vap}	17,000 ^g	36,000 (1280) ^{vap}
1,2,3,-Trichlorobenzene	1.0% SOM	1.50	1.50	4.70	102	1,800	770(134) ^{vap}
	2.5% SOM	3.60	3.70	12	250	1,800	1,100(330) ^{vap}
	6.0% SOM	8.60	8.80	28	590	1,800	1,600(789) ^{vap}
1,2,4,-Trichlorobenzene	1.0% SOM	2.60	2.60	55	220	15,000	1,700(318) ^{vap}
	2.5% SOM	6.40	6.40	140	530	17,000	2,600(786) ^{vap}
	6.0% SOM	15	15	320	1,300	19,000	4,000(1880) ^{vap}
1,3,5,-Trichlorobenzene	1.0% SOM	0.33	0.33	4.70	23	1,700	380(36.7) ^{vap}
	2.5% SOM	0.81	0.81	12	55	1,700	590(90.8) ^{vap}
	6.0% SOM	1.90	1.90	140	130	1,800	860(217) ^{vap}
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Chlorobenzenes (cont.)							
1,2,3,4,- Tetrachlorobenzene	1.0% SOM	15	24	4.40	1,700(122) ^{vap}	830	1,500(122) ^{vap}
	2.5% SOM	36	56	11	3,080(304) ^{vap}	830	1,600
	6.0% SOM	78	120	26	4,400(728) ^{vap}	830	1,600
1,2,3,5,- Tetrachlorobenzene	1.0% SOM	0.66	0.75	0.38	49(39.4) ^{vap}	78	110(39) ^{vap}
	2.5% SOM	1.60	1.90	0.90	120(98.1) ^{vap}	79	120
	6.0% SOM	3.70	4.30	2.20	240(235) ^{vap}	79	130
1,2,4, 5,- Tetrachlorobenzene	1.0% SOM	0.33	0.73	0.06	42(19.7) ^{sol}	13	25
	2.5% SOM	0.77	1.70	0.16	72(49.1) ^{sol}	13	26
	6.0% SOM	1.60	3.50	0.37	96	13	26
Pentachlorobenzene	1.0% SOM	5.80	19	1.20	640(43.0) ^{sol}	100	190
	2.5% SOM	12	30	3.10	770(107) ^{sol}	100	190
	6.0% SOM	22	38	7.00	830	100	190
Hexachlorobenzene	1.0% SOM	1.80(0.20) ^{vap}	4.10 (0.20) ^{vap}	0.47	110(0.20) ^{vap}	16	30
	2.5% SOM	3.30(0.50) ^{vap}	5.70 (0.50) ^{vap}	1.10	120	16	30
	6.0% SOM	4.90	6.70 (1.2) ^{vap}	2.50	120	16	30
Phenols & Chlorophenols							
BTEX	1.0% SOM	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)
	2.5% SOM	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir} (11,000)	1,500 ^{dir} (9,700)
	6.0% SOM	1100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)
Chlorophenols (4 Congeners)	1.0% SOM	0.87	94	0.13	3,500	620	1,100
	2.5% SOM	2.00	150	0.30	4,000	620	1,100
	6.0% SOM	4.50	210	0.70	4,300	620	1,100
Pentachlorophenols	1.0% SOM	0.22	27(16.4) ^{vap}	0.03	400	60	110
	2.5% SOM	0.52	29	0.08	400	60	120
	6.0% SOM	1.20	31	0.19	400	60	120
Others							
Carbon Disulphide	1.0% SOM	0.14	0.14	4.80	11	11,000	1,300
	2.5% SOM	0.29	0.29	10	22	11,000	1,900
	6.0% SOM	0.62	0.62	23	47	12,000	2,700
Hexachloro-1,3- Butadiene	1.0% SOM	0.29	0.32	0.25	31	25	48
	2.5% SOM	0.70	0.78	0.61	68	25	50
	6.0% SOM	1.60	1.80	1.40	120	25	51
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds					
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
1,1,2 Trichloroethane	1.0% SOM	0.60	0.88	0.28	94
	2.5% SOM	1.20	1.8	0.61	190
	6.0% SOM	2.70	3.9	1.40	400
1,1-Dichloroethane	1.0% SOM	2.40	2.50	9.20	280
	2.5% SOM	3.90	4.10	17	450
	6.0% SOM	7.40	7.70	35	850
1,1-Dichloroethene	1.0% SOM	0.23	0.23	2.80	26
	2.5% SOM	0.40	0.41	5.60	46
	6.0% SOM	0.82	0.82	12	92
1,2,4-Trimethylbenzene	1.0% SOM	0.35	0.41	0.38	42
	2.5% SOM	0.85	0.99	0.93	99
	6.0% SOM	2.00	2.30	2.20	220
1,2-Dichloropropane	1.0% SOM	0.024	0.024	0.62	3.3
	2.5% SOM	0.042	0.042	1.20	5.9
	6.0% SOM	0.084	0.085	2.60	12
2,4-Dimethylphenol	1.0% SOM	19	210	3.10	16000*
	2.5% SOM	43	410	7.20	24000*
	6.0% SOM	97	730	17	30000*
2,4-Dinitrotoluene	1.0% SOM	1.50	170*	0.22	3700*
	2.5% SOM	3.20	170	0.49	3700*
	6.0% SOM	7.20	170	1.10	3800*
2,6-Dinitrotoluene	1.0% SOM	0.78	78	0.12	1900*
	2.5% SOM	1.70	84	0.27	1900*
	6.0% SOM	3.90	87	0.61	1900*
2-Chloronaphthalene	1.0% SOM	3.70	3.80	40	390*
	2.5% SOM	9.20	9.30	98	960*
	6.0% SOM	22	22	230	2200*
Biphenyl	1.0% SOM	66*	220*	14	18000*
	2.5% SOM	160	500*	35	33000*
	6.0% SOM	360	980*	83	48000*
Bis (2-ethylhexyl) phthalate	1.0% SOM	280*	2700*	47*	85000*
	2.5% SOM	610*	2800*	120*	86000*
	6.0% SOM	1100*	2800*	280*	86000*
Bromobenzene	1.0% SOM	0.87	0.91	3.2	97
	2.5% SOM	2.0	2.1	7.6	220
	6.0% SOM	4.7	4.9	18	520
Bromodichloromethane	1.0% SOM	0.016	0.019	0.016	2.1
	2.5% SOM	0.030	0.034	0.032	3.7
	6.0% SOM	0.061	0.070	0.068	7.6
Bromoform	1.0% SOM	2.8	5.2	0.95	760
	2.5% SOM	5.9	11	2.1	1500
	6.0% SOM	13	23	4.6	3100
Butyl benzyl phthalate	1.0% SOM	1400*	42000*	220*	940000*
	2.5% SOM	3300*	44000*	550*	940000*
	6.0% SOM	7200*	44000*	1300*	950000*

*soil concentration above saturation limit

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds					
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Chloroethane	1.0% SOM	8.3	8.4	110	960
	2.5% SOM	11	11	200	1300
	6.0% SOM	18	18	380	2100
Chloromethane	1.0% SOM	0.0083	0.0085	0.066	1.0
	2.5% SOM	0.0098	0.0099	0.13	1.2
	6.0% SOM	0.013	0.013	0.23	1.6
<i>Cis</i> 1,2 Dichloroethene	1.0% SOM	0.11	0.12	0.26	14
	2.5% SOM	0.19	0.20	0.50	24
	6.0% SOM	0.37	0.39	1.0	47
Dichloromethane	1.0% SOM	0.58	2.10	0.10	270
	2.5% SOM	0.98	2.80	0.19	360
	6.0% SOM	1.70	4.50	0.34	560
Diethyl Phthalate	1.0% SOM	120*	1800*	19*	150000*
	2.5% SOM	260*	3500*	41*	220000*
	6.0% SOM	570*	6300*	94*	290000*
Di- <i>n</i> -butyl phthalate	1.0% SOM	13*	450*	2.00	15000*
	2.5% SOM	31*	450*	5.00	15000*
	6.0% SOM	67*	450*	12	15000*
Di- <i>n</i> -octyl phthalate	1.0% SOM	2300*	3400*	940*	89000*
	2.5% SOM	2800*	3400*	2100*	89000*
	6.0% SOM	3100*	3400*	3900*	89000*
Hexachloroethane	1.0% SOM	0.20	0.22	0.27	22*
	2.5% SOM	0.48	0.54	0.67	53*
	6.0% SOM	1.10	1.30	1.60	120*
Isopropylbenzene	1.0% SOM	11	12	32	1400*
	2.5% SOM	27	28	79	3300*
	6.0% SOM	64	67	190	7700*
Methyl <i>tert</i> -butyl ether (MTBE)	1.0% SOM	49	73	23	7900
	2.5% SOM	84	120	44	13000
	6.0% SOM	160	220	90	24000
Propylbenzene	1.0% SOM	34	40	34	4100*
	2.5% SOM	82	97	83	9700*
	6.0% SOM	190	230	200	21000*
Styrene	1.0% SOM	8.10	35	1.60	3300*
	2.5% SOM	19	78	3.70	6500*
	6.0% SOM	43	170	8.70	11000*
Total Cresols (2-, 3-, and 4-methylphenol)	1.0% SOM	80	3700	12	160000
	2.5% SOM	180	5400	27	180000*
	6.0% SOM	400	6900	63	180000*
<i>Trans</i> 1,2 Dichloroethene	1.0% SOM	0.19	0.19	0.93	22
	2.5% SOM	0.34	0.35	1.90	40
	6.0% SOM	0.70	0.71	0.24	81
Tributyl tin oxide	1.0% SOM	0.25	1.40	0.042	130*
	2.5% SOM	0.59	3.10	0.100	180*
	6.0% SOM	1.30	5.70	0.240	200*

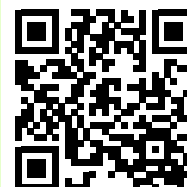
*soil concentration above saturation limit

APPENDIX G: Waste Hazard Assessment

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



S0GD7-33U45-ILOQI

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

GWPR4712 167 Hermitage Road London

Description/Comments

Project

GWPR4712 167 Hermitage Road

Site

Hermitage Road London

Classified by

Name:
Alex Stratford
Date:
27 Jun 2022 14:15 GMT
Telephone:

Company:
Ground and Water
2 The Long Barn, Norton Farm, Selborne
Road
Alton
GU34 3NB

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

Course
Hazardous Waste Classification

Date

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	BH2-110522-0.20-0.20		Non Hazardous		2
2	BH2-110522-1.00-1.00		Non Hazardous		5
3	BH3-090522-1.00-1.00		Non Hazardous		7
4	BH4-100522-0.20-0.20		Non Hazardous		9
5	TP2-030522-0.20-0.20		Hazardous	HP 2, HP 7, HP 14	11
6	TP8-030522-0.20-0.20		Non Hazardous		14

Related documents

#	Name	Description
1	220506-97_220519-131_220520-132.hwol	.hwol file used to create the Job

Report

Created by: Alex Stratford

Created date: 27 Jun 2022 14:15 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	16
Appendix B: Rationale for selection of metal species	17
Appendix C: Version	18

Classification of sample: BH2-110522-0.20-0.20

 **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH2-110522-0.20-0.20	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
19% (wet weight correction)	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

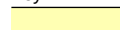
Determinands

Moisture content: 19% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	polychlorobiphenyls; PCB				<0.105 mg/kg		<0.105 mg/kg		<0.0000105 %		<LOD
	602-039-00-4	215-648-1	1336-36-3								
2	copper { dicopper oxide; copper (I) oxide }				85.1 mg/kg	1.126	77.609 mg/kg		0.00776 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
3	chrysene				3.06 mg/kg		2.479 mg/kg		0.000248 %	✓	
	601-048-00-0	205-923-4	218-01-9								
4	acenaphthene				0.239 mg/kg		0.194 mg/kg		0.0000194 %	✓	
		201-469-6	83-32-9								
5	fluorene				0.221 mg/kg		0.179 mg/kg		0.0000179 %	✓	
		201-695-5	86-73-7								
6	benzene				<0.18 mg/kg		<0.18 mg/kg		<0.000018 %		<LOD
	601-020-00-8	200-753-7	71-43-2								
7	anthracene				0.597 mg/kg		0.484 mg/kg		0.0000484 %	✓	
		204-371-1	120-12-7								
8	cadmium { cadmium sulfide }			1	0.54 mg/kg	1.285	0.562 mg/kg		0.0000437 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
9	benzo[b]fluoranthene				4.59 mg/kg		3.718 mg/kg		0.000372 %	✓	
	601-034-00-4	205-911-9	205-99-2								
10	naphthalene				0.104 mg/kg		0.0842 mg/kg		0.00000842 %	✓	
	601-052-00-2	202-049-5	91-20-3								
11	nickel { nickel dihydroxide }				16.5 mg/kg	1.579	21.11 mg/kg		0.00211 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
12	phenol				<0.01 mg/kg		<0.01 mg/kg		<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2								
13	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg		<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
14	benzo[k]fluoranthene				1.59 mg/kg		1.288 mg/kg		0.000129 %	✓	
	601-036-00-5	205-916-6	207-08-9								
15	acenaphthylene				<0.06 mg/kg		<0.06 mg/kg		<0.000006 %		<LOD
		205-917-1	208-96-8								
16	toluene				<0.14 mg/kg		<0.14 mg/kg		<0.000014 %		<LOD
	601-021-00-3	203-625-9	108-88-3								
17	lead { lead chromate }			1	332 mg/kg	1.56	419.465 mg/kg		0.0269 %	✓	
	082-004-00-2	231-846-0	7758-97-6								

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
18		indeno[123-cd]pyrene				2.79	mg/kg		2.26	mg/kg	0.000226 %	✓	
		205-893-2	193-39-5										
19		pyrene				5.49	mg/kg		4.447	mg/kg	0.000445 %	✓	
		204-927-3	129-00-0										
20		phenanthrene				3.29	mg/kg		2.665	mg/kg	0.000266 %	✓	
		201-581-5	85-01-8										
21		benzo[a]anthracene				2.96	mg/kg		2.398	mg/kg	0.00024 %	✓	
		601-033-00-9	200-280-6	56-55-3									
22		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
23		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
		034-002-00-8											
24		zinc { zinc chromate }				165	mg/kg	2.774	370.765	mg/kg	0.0371 %	✓	
		024-007-00-3	236-878-9	13530-65-9									
25		fluoranthene				6.42	mg/kg		5.2	mg/kg	0.00052 %	✓	
		205-912-4	206-44-0										
26		arsenic { arsenic trioxide }				17.7	mg/kg	1.32	18.93	mg/kg	0.00189 %	✓	
		033-003-00-0	215-481-4	1327-53-3									
27		dibenz[a,h]anthracene				0.492	mg/kg		0.399	mg/kg	0.0000399 %	✓	
		601-041-00-2	200-181-8	53-70-3									
28		ethylbenzene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
29		benzo[a]pyrene; benzo[def]chrysene				3.47	mg/kg		2.811	mg/kg	0.000281 %	✓	
		601-032-00-3	200-028-5	50-32-8									
30		boron { boron tribromide }				1.08	mg/kg	23.173	20.272	mg/kg	0.00203 %	✓	
		005-003-00-0	233-657-9	10294-33-4									
31		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
32		vanadium { divanadium pentaoxide; vanadium pentoxide }				45.3	mg/kg	1.785	65.504	mg/kg	0.00655 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
33		coronene				0.971	mg/kg		0.787	mg/kg	0.0000787 %	✓	
		205-881-7	191-07-1										
34		pH				9.2	pH		9.2	pH	9.2 pH		
				PH									
35		benzo[ghi]perylene				2.49	mg/kg		2.017	mg/kg	0.000202 %	✓	
		205-883-8	191-24-2										
36		mercury { mercury dichloride }				1.55	mg/kg	1.353	1.699	mg/kg	0.00017 %	✓	
		080-010-00-X	231-299-8	7487-94-7									
37		xylene				<0.4	mg/kg		<0.4	mg/kg	<0.00004 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
38		chromium in chromium(III) compounds {  chromium(III) oxide (worst case) }				12.2	mg/kg	1.462	14.443	mg/kg	0.00144 %	✓	
		215-160-9	1308-38-9										
Total:											0.0897 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH2-110522-1.00-1.00

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH2-110522-1.00-1.00	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
30% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 30% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	copper { dicopper oxide; copper (I) oxide }				85.5 mg/kg	1.126	67.384 mg/kg	0.00674 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
2	chrysene				0.961 mg/kg		0.673 mg/kg	0.0000673 %	✓	
	601-048-00-0	205-923-4	218-01-9							
3	acenaphthene				0.0908 mg/kg		0.0636 mg/kg	0.00000636 %	✓	
		201-469-6	83-32-9							
4	fluorene				0.173 mg/kg		0.121 mg/kg	0.0000121 %	✓	
		201-695-5	86-73-7							
5	benzene				<0.18 mg/kg		<0.18 mg/kg	<0.000018 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
6	anthracene				0.15 mg/kg		0.105 mg/kg	0.0000105 %	✓	
		204-371-1	120-12-7							
7	cadmium { cadmium sulfide }			1	0.0347 mg/kg	1.285	0.0312 mg/kg	0.00000243 %	✓	
	048-010-00-4	215-147-8	1306-23-6							
8	benzo[b]fluoranthene				1.5 mg/kg		1.05 mg/kg	0.000105 %	✓	
	601-034-00-4	205-911-9	205-99-2							
9	naphthalene				0.0536 mg/kg		0.0375 mg/kg	0.00000375 %	✓	
	601-052-00-2	202-049-5	91-20-3							
10	nickel { nickel dihydroxide }				19.4 mg/kg	1.579	21.45 mg/kg	0.00214 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
11	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
12	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
13	benzo[k]fluoranthene				0.497 mg/kg		0.348 mg/kg	0.0000348 %	✓	
	601-036-00-5	205-916-6	207-08-9							
14	acenaphthylene				0.0345 mg/kg		0.0242 mg/kg	0.00000242 %	✓	
		205-917-1	208-96-8							
15	toluene				<0.14 mg/kg		<0.14 mg/kg	<0.000014 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
16	lead { lead chromate }			1	390 mg/kg	1.56	425.83 mg/kg	0.0273 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
17	indeno[123-cd]pyrene				1.13 mg/kg		0.791 mg/kg	0.0000791 %	✓	
		205-893-2	193-39-5							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
18	pyrene	204-927-3	129-00-0		1.62 mg/kg		1.134 mg/kg	0.000113 %		✓	
19	phenanthrene	201-581-5	85-01-8		0.987 mg/kg		0.691 mg/kg	0.0000691 %		✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.994 mg/kg		0.696 mg/kg	0.0000696 %		✓	
21	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
22	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.18 mg/kg	1.405	1.161 mg/kg	0.000116 %		✓	
	034-002-00-8										
23	zinc { zinc chromate }	024-007-00-3	236-878-9		187 mg/kg	2.774	363.136 mg/kg	0.0363 %		✓	
24	fluoranthene	205-912-4	206-44-0		1.9 mg/kg		1.33 mg/kg	0.000133 %		✓	
25	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		18.8 mg/kg	1.32	17.375 mg/kg	0.00174 %		✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.154 mg/kg		0.108 mg/kg	0.0000108 %		✓	
27	ethylbenzene	601-023-00-4	202-849-4		<0.08 mg/kg		<0.08 mg/kg	<0.000008 %			<LOD
28	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		1.04 mg/kg		0.728 mg/kg	0.0000728 %		✓	
29	boron { boron tribromide }	005-003-00-0	233-657-9		2.6 mg/kg	23.173	42.175 mg/kg	0.00422 %		✓	
30	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
31	vanadium { divanadium pentaoxide; vanadium pentoxide }	023-001-00-8	215-239-8		57.8 mg/kg	1.785	72.229 mg/kg	0.00722 %		✓	
32	pH		PH		9.23 pH		9.23 pH	9.23 pH			
33	benzo[ghi]perylene	205-883-8	191-24-2		0.862 mg/kg		0.603 mg/kg	0.0000603 %		✓	
34	mercury { mercury dichloride }	080-010-00-X	231-299-8		1.75 mg/kg	1.353	1.658 mg/kg	0.000166 %		✓	
35	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]		<0.4 mg/kg		<0.4 mg/kg	<0.00004 %			<LOD
36	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		14 mg/kg	1.462	14.323 mg/kg	0.00143 %		✓	
Total:									0.0886 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH3-090522-1.00-1.00

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH3-090522-1.00-1.00	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
16% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	copper { dicopper oxide; copper (I) oxide }				83.1 mg/kg	1.126	78.592 mg/kg	0.00786 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
2	chrysene				0.754 mg/kg		0.633 mg/kg	0.0000633 %	✓	
	601-048-00-0	205-923-4	218-01-9							
3	acenaphthene				0.142 mg/kg		0.119 mg/kg	0.0000119 %	✓	
		201-469-6	83-32-9							
4	fluorene				0.0695 mg/kg		0.0584 mg/kg	0.00000584 %	✓	
		201-695-5	86-73-7							
5	anthracene				0.236 mg/kg		0.198 mg/kg	0.0000198 %	✓	
		204-371-1	120-12-7							
6	cadmium { cadmium sulfide }			1	0.317 mg/kg	1.285	0.342 mg/kg	0.0000266 %	✓	
	048-010-00-4	215-147-8	1306-23-6							
7	benzo[b]fluoranthene				1.28 mg/kg		1.075 mg/kg	0.000108 %	✓	
	601-034-00-4	205-911-9	205-99-2							
8	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
9	nickel { nickel dihydroxide }				27.9 mg/kg	1.579	37.017 mg/kg	0.0037 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
10	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
11	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
12	benzo[k]fluoranthene				0.445 mg/kg		0.374 mg/kg	0.0000374 %	✓	
	601-036-00-5	205-916-6	207-08-9							
13	acenaphthylene				0.0258 mg/kg		0.0217 mg/kg	0.00000217 %	✓	
		205-917-1	208-96-8							
14	lead { lead chromate }			1	334 mg/kg	1.56	437.622 mg/kg	0.0281 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
15	indeno[123-cd]pyrene				0.888 mg/kg		0.746 mg/kg	0.0000746 %	✓	
		205-893-2	193-39-5							
16	pyrene				1.93 mg/kg		1.621 mg/kg	0.000162 %	✓	
		204-927-3	129-00-0							
17	phenanthrene				2.08 mg/kg		1.747 mg/kg	0.000175 %	✓	
		201-581-5	85-01-8							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number										
18		benzo[a]anthracene				0.901	mg/kg		0.757	mg/kg	0.0000757 %		✓	
		601-033-00-9	200-280-6	56-55-3										
19		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %			<LOD
		006-007-00-5												
20		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.17	mg/kg	1.405	1.381	mg/kg	0.000138 %		✓	
		034-002-00-8												
21		zinc { zinc chromate }				291	mg/kg	2.774	678.112	mg/kg	0.0678 %		✓	
		024-007-00-3	236-878-9	13530-65-9										
22		fluoranthene				2.44	mg/kg		2.05	mg/kg	0.000205 %		✓	
			205-912-4	206-44-0										
23		arsenic { arsenic trioxide }				18.9	mg/kg	1.32	20.961	mg/kg	0.0021 %		✓	
		033-003-00-0	215-481-4	1327-53-3										
24		dibenz[a,h]anthracene				0.115	mg/kg		0.0966	mg/kg	0.00000966 %		✓	
		601-041-00-2	200-181-8	53-70-3										
25		benzo[a]pyrene; benzo[def]chrysene				0.848	mg/kg		0.712	mg/kg	0.0000712 %		✓	
		601-032-00-3	200-028-5	50-32-8										
26		boron { boron tribromide }				2.83	mg/kg	23.173	55.087	mg/kg	0.00551 %		✓	
		005-003-00-0	233-657-9	10294-33-4										
27		vanadium { divanadium pentaoxide; vanadium pentoxide }				48.9	mg/kg	1.785	73.328	mg/kg	0.00733 %		✓	
		023-001-00-8	215-239-8	1314-62-1										
28		pH				9.93	pH		9.93	pH	9.93 pH			
				PH										
29		benzo[ghi]perylene				0.613	mg/kg		0.515	mg/kg	0.0000515 %		✓	
			205-883-8	191-24-2										
30		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %			<LOD
		080-010-00-X	231-299-8	7487-94-7										
31		chromium in chromium(III) compounds {  chromium(III) oxide (worst case) }				11.9	mg/kg	1.462	14.61	mg/kg	0.00146 %		✓	
			215-160-9	1308-38-9										
Total:											0.125 %			

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH4-100522-0.20-0.20

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH4-100522-0.20-0.20	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
25% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 25% Wet Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
1		copper { dicopper oxide; copper (I) oxide }				96.6 mg/kg	1.126	81.571 mg/kg	0.00816 %	✓	
		029-002-00-X	215-270-7	1317-39-1							
2		chrysene				0.321 mg/kg		0.241 mg/kg	0.0000241 %	✓	
		601-048-00-0	205-923-4	218-01-9							
3		acenaphthene				0.0197 mg/kg		0.0148 mg/kg	0.00000148 %	✓	
			201-469-6	83-32-9							
4		fluorene				0.0155 mg/kg		0.0116 mg/kg	0.00000116 %	✓	
			201-695-5	86-73-7							
5		anthracene				0.0434 mg/kg		0.0325 mg/kg	0.00000325 %	✓	
			204-371-1	120-12-7							
6		cadmium { cadmium sulfide }			1	0.822 mg/kg	1.285	0.792 mg/kg	0.0000616 %	✓	
		048-010-00-4	215-147-8	1306-23-6							
7		benzo[b]fluoranthene				0.455 mg/kg		0.341 mg/kg	0.0000341 %	✓	
		601-034-00-4	205-911-9	205-99-2							
8		naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3							
9		nickel { nickel dihydroxide }				24.9 mg/kg	1.579	29.497 mg/kg	0.00295 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
10		phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
11		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
		024-001-00-0	215-607-8	1333-82-0							
12		benzo[k]fluoranthene				0.16 mg/kg		0.12 mg/kg	0.000012 %	✓	
		601-036-00-5	205-916-6	207-08-9							
13		acenaphthylene				0.0162 mg/kg		0.0121 mg/kg	0.00000122 %	✓	
			205-917-1	208-96-8							
14		lead { lead chromate }			1	353 mg/kg	1.56	412.961 mg/kg	0.0265 %	✓	
		082-004-00-2	231-846-0	7758-97-6							
15		indeno[123-cd]pyrene				0.301 mg/kg		0.226 mg/kg	0.0000226 %	✓	
			205-893-2	193-39-5							
16		pyrene				0.528 mg/kg		0.396 mg/kg	0.0000396 %	✓	
			204-927-3	129-00-0							
17		phenanthrene				0.253 mg/kg		0.19 mg/kg	0.000019 %	✓	
			201-581-5	85-01-8							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
18	benzo[a]anthracene				0.319 mg/kg		0.239 mg/kg	0.0000239 %	✓	
	601-033-00-9	200-280-6	56-55-3							
19	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5									
20	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1 mg/kg	1.405	1.054 mg/kg	0.000105 %	✓	
	034-002-00-8									
21	zinc { zinc chromate }				327 mg/kg	2.774	680.359 mg/kg	0.068 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
22	fluoranthene				0.613 mg/kg		0.46 mg/kg	0.000046 %	✓	
		205-912-4	206-44-0							
23	arsenic { arsenic trioxide }				21.2 mg/kg	1.32	20.993 mg/kg	0.0021 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
24	dibenz[a,h]anthracene				0.0359 mg/kg		0.0269 mg/kg	0.00000269 %	✓	
	601-041-00-2	200-181-8	53-70-3							
25	benzo[a]pyrene; benzo[def]chrysene				0.317 mg/kg		0.238 mg/kg	0.0000238 %	✓	
	601-032-00-3	200-028-5	50-32-8							
26	boron { boron tribromide }				2.06 mg/kg	23.173	35.802 mg/kg	0.00358 %	✓	
	005-003-00-0	233-657-9	10294-33-4							
27	vanadium { divanadium pentaoxide; vanadium pentoxide }				71 mg/kg	1.785	95.061 mg/kg	0.00951 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
28	pH				8.25 pH		8.25 pH	8.25 pH		
			PH							
29	benzo[ghi]perylene				0.224 mg/kg		0.168 mg/kg	0.0000168 %	✓	
		205-883-8	191-24-2							
30	mercury { mercury dichloride }				0.771 mg/kg	1.353	0.783 mg/kg	0.0000783 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
31	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				16.3 mg/kg	1.462	17.868 mg/kg	0.00179 %	✓	
		215-160-9	1308-38-9							
Total:								0.123 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP2-030522-0.20-0.20

 **Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
TP2-030522-0.20-0.20	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
15% (wet weight correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1A; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

zinc chromate: (compound conc.: 0.266%)

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

Aquatic Chronic 1; H410 "Very toxic to aquatic life with long lasting effects."

Because of determinand:

zinc chromate: (compound conc.: 0.266%)

Hazard properties (substances considered hazardous until shown otherwise)

HP 2: Oxidizing "waste which may, generally by providing oxygen, cause or contribute to the combustion of other materials"

Hazard Statements hit:

Ox. Sol. 1; H271 "May cause fire or explosion; strong oxidiser."

Because of determinand:

chromium(VI) oxide: (compound conc.: 0.00216%)

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	 copper { dicopper oxide; copper (I) oxide }				223 mg/kg	1.126	213.412	mg/kg	0.0213 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
2	chrysene				8.58 mg/kg		7.293	mg/kg	0.000729 %	✓	
	601-048-00-0	205-923-4	218-01-9								
3	acenaphthene				<0.08 mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
		201-469-6	83-32-9								
4	fluorene				<0.1 mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		201-695-5	86-73-7								
5	benzene				<0.09 mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
	601-020-00-8	200-753-7	71-43-2								
6	anthracene				1.03 mg/kg		0.876	mg/kg	0.0000876 %	✓	
		204-371-1	120-12-7								

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
7		cadmium { cadmium sulfide }			1	0.431	mg/kg	1.285	0.471	mg/kg	0.0000366 %	✓	
		048-010-00-4	215-147-8	1306-23-6									
8		benzo[b]fluoranthene				10.4	mg/kg		8.84	mg/kg	0.000884 %	✓	
		601-034-00-4	205-911-9	205-99-2									
9		naphthalene				<0.09	mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
10		nickel { nickel dihydroxide }				97.7	mg/kg	1.579	131.17	mg/kg	0.0131 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
11		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
12		chromium in chromium(VI) compounds { chromium(VI) oxide }				13.2	mg/kg	1.923	21.577	mg/kg	0.00216 %	✓	
		024-001-00-0	215-607-8	1333-82-0									
13		benzo[k]fluoranthene				3.79	mg/kg		3.222	mg/kg	0.000322 %	✓	
		601-036-00-5	205-916-6	207-08-9									
14		acenaphthylene				0.528	mg/kg		0.449	mg/kg	0.0000449 %	✓	
			205-917-1	208-96-8									
15		toluene				<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		lead { lead chromate }			1	837	mg/kg	1.56	1109.73	mg/kg	0.0711 %	✓	
		082-004-00-2	231-846-0	7758-97-6									
17		indeno[123-cd]pyrene				5.21	mg/kg		4.429	mg/kg	0.000443 %	✓	
			205-893-2	193-39-5									
18		pyrene				12.1	mg/kg		10.285	mg/kg	0.00103 %	✓	
			204-927-3	129-00-0									
19		phenanthrene				1.12	mg/kg		0.952	mg/kg	0.0000952 %	✓	
			201-581-5	85-01-8									
20		benzo[a]anthracene				9.06	mg/kg		7.701	mg/kg	0.00077 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
22		selenium { selenium compounds with the exception of cadmium sulposelenide and those specified elsewhere in this Annex }				<10	mg/kg	1.405	<14.05	mg/kg	<0.00141 %		<LOD
		034-002-00-8											
23		zinc { zinc chromate }				1130	mg/kg	2.774	2664.568	mg/kg	0.266 %	✓	
		024-007-00-3	236-878-9	13530-65-9									
24		fluoranthene				12.9	mg/kg		10.965	mg/kg	0.0011 %	✓	
			205-912-4	206-44-0									
25		arsenic { arsenic trioxide }				53.1	mg/kg	1.32	59.593	mg/kg	0.00596 %	✓	
		033-003-00-0	215-481-4	1327-53-3									
26		dibenz[a,h]anthracene				1.1	mg/kg		0.935	mg/kg	0.0000935 %	✓	
		601-041-00-2	200-181-8	53-70-3									
27		ethylbenzene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
28		benzo[a]pyrene; benzo[def]chrysene				7.84	mg/kg		6.664	mg/kg	0.000666 %	✓	
		601-032-00-3	200-028-5	50-32-8									
29		boron { boron tribromide }				2.09	mg/kg	23.173	41.167	mg/kg	0.00412 %	✓	
		005-003-00-0	233-657-9	10294-33-4									
30		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
31		vanadium { divanadium pentaoxide; vanadium pentoxide }				121	mg/kg	1.785	183.606	mg/kg	0.0184 %	✓	
		023-001-00-8	215-239-8	1314-62-1									
32		pH				7.94	pH		7.94	pH	7.94 pH		
				PH									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used	
		EU CLP index number	EC Number	CAS Number											
33		benzo[ghi]perylene				4.19 mg/kg			3.562 mg/kg		0.000356 %		✓		
		205-883-8	191-24-2												
34		mercury { mercury dichloride }				<1 mg/kg		1.353	<1.353 mg/kg		<0.000135 %			<LOD	
		080-010-00-X	231-299-8	7487-94-7											
35		xylene				<0.2 mg/kg			<0.2 mg/kg		<0.00002 %			<LOD	
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]											
36		chromium in chromium(III) compounds {  chromium(III) oxide (worst case) }				161.8 mg/kg		1.462	201.008 mg/kg		0.0201 %		✓		
		215-160-9	1308-38-9												
Total:												0.431 %			

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Potentially Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1 Only the metal concentration has been used for classification	

Classification of sample: TP8-030522-0.20-0.20

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
TP8-030522-0.20-0.20	Chapter:
Moisture content:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
7.2% (wet weight correction)	Entry:
	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.2% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	copper { dicopper oxide; copper (I) oxide }				169	mg/kg	1.126	176.575	mg/kg	0.0177 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
2	chrysene				3.44	mg/kg		3.192	mg/kg	0.000319 %	✓	
	601-048-00-0	205-923-4	218-01-9									
3	acenaphthene				0.134	mg/kg		0.124	mg/kg	0.0000124 %	✓	
		201-469-6	83-32-9									
4	fluorene				0.0821	mg/kg		0.0762	mg/kg	0.00000762 %	✓	
		201-695-5	86-73-7									
5	anthracene				0.322	mg/kg		0.299	mg/kg	0.0000299 %	✓	
		204-371-1	120-12-7									
6	cadmium { cadmium sulfide }			1	0.781	mg/kg	1.285	0.932	mg/kg	0.0000725 %	✓	
	048-010-00-4	215-147-8	1306-23-6									
7	benzo[b]fluoranthene				5.05	mg/kg		4.686	mg/kg	0.000469 %	✓	
	601-034-00-4	205-911-9	205-99-2									
8	naphthalene				0.0552	mg/kg		0.0512	mg/kg	0.00000512 %	✓	
	601-052-00-2	202-049-5	91-20-3									
9	nickel { nickel dihydroxide }				30.4	mg/kg	1.579	44.56	mg/kg	0.00446 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
10	phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
11	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
12	benzo[k]fluoranthene				1.71	mg/kg		1.587	mg/kg	0.000159 %	✓	
	601-036-00-5	205-916-6	207-08-9									
13	acenaphthylene				0.161	mg/kg		0.149	mg/kg	0.0000149 %	✓	
		205-917-1	208-96-8									
14	lead { lead chromate }			1	303	mg/kg	1.56	438.595	mg/kg	0.0281 %	✓	
	082-004-00-2	231-846-0	7758-97-6									
15	indeno[123-cd]pyrene				2.79	mg/kg		2.589	mg/kg	0.000259 %	✓	
		205-893-2	193-39-5									
16	pyrene				5.29	mg/kg		4.909	mg/kg	0.000491 %	✓	
		204-927-3	129-00-0									
17	phenanthrene				1.76	mg/kg		1.633	mg/kg	0.000163 %	✓	
		201-581-5	85-01-8									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
18	benzo[a]anthracene				3.48 mg/kg		3.229 mg/kg	0.000323 %	✓	
	601-033-00-9	200-280-6	56-55-3							
19	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5									
20	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
	034-002-00-8									
21	zinc { zinc chromate }				272 mg/kg	2.774	700.239 mg/kg	0.07 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
22	fluoranthene				5.81 mg/kg		5.392 mg/kg	0.000539 %	✓	
		205-912-4	206-44-0							
23	arsenic { arsenic trioxide }				18.4 mg/kg	1.32	22.545 mg/kg	0.00225 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
24	dibenz[a,h]anthracene				0.463 mg/kg		0.43 mg/kg	0.000043 %	✓	
	601-041-00-2	200-181-8	53-70-3							
25	benzo[a]pyrene; benzo[def]chrysene				3.73 mg/kg		3.461 mg/kg	0.000346 %	✓	
	601-032-00-3	200-028-5	50-32-8							
26	boron { boron tribromide }				<1 mg/kg	23.173	<23.173 mg/kg	<0.00232 %		<LOD
	005-003-00-0	233-657-9	10294-33-4							
27	vanadium { divanadium pentaoxide; vanadium pentoxide }				37.2 mg/kg	1.785	61.627 mg/kg	0.00616 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
28	pH				11 pH		11 pH	11pH		
			PH							
29	benzo[ghi]perylene				2.46 mg/kg		2.283 mg/kg	0.000228 %	✓	
		205-883-8	191-24-2							
30	mercury { mercury dichloride }				0.381 mg/kg	1.353	0.479 mg/kg	0.0000479 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
31	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				15.7 mg/kg	1.462	21.294 mg/kg	0.00213 %	✓	
		215-160-9	1308-38-9							
Total:								0.137 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

■ **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

■ **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

■ **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

■ **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

■ **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

■ **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

▪ **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

▪ **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

▪ **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

▪ **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

GB MCL index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

▪ **coronene** (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.
Data source: <http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en>
Data source date: 16 Jun 2014
Hazard Statements: STOT SE 2; H371

Appendix B: Rationale for selection of metal species

copper {dicopper oxide; copper (I) oxide}

Most likely worst-case

cadmium {cadmium sulfide}

Most likely worst-case

nickel {nickel dihydroxide}

Most likely worst-case

chromium in chromium(VI) compounds {chromium(VI) oxide}

Most likely worst-case

lead {lead chromate}

Most likely worst case

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Most likely worst-case

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Most likely worst-case

zinc {zinc chromate}

worst-case

arsenic {arsenic trioxide}

Most likely worst-case

boron {boron tribromide}

worst-case

vanadium {divanadium pentaoxide; vanadium pentoxide}

Most likely worst-case

mercury {mercury dichloride}

Most likely worst-case

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

worst case

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2022.176.5209.9795 (25 Jun 2022)

HazWasteOnline Database: 2022.176.5209.9795 (25 Jun 2022)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK:

2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021

APPENDIX H:

Ground Gas Monitoring Results

Job No:	GWPR4712
Site name:	167 Hermitage Road
Operator:	JC

Date:	06/06/2022
Time:	13:50 to 14:10
Visit No:	1 of 4

Ground Gas Analyser:	GFM-436
Last Calibration:	Nov-20



	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA		Additional Remarks
Monitoring Point	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (m bgl)	Depth of well (m bgl)	
	Peak	Steady	Peak	Steady	Peak	Peak	Min	Steady			Peak	Steady				
Ambient air	0.00	0.00	0.00	0.00	0.00	0.00	20.10	20.10	-	-	0.00	0.00	0.00			
BH1	0.00	0.00	0.60	0.60	0.00	0.00	17.20	17.20	7.40	0.00	0.00	0.00	0.00	2.90	7.70	
BH2	0.00	0.00	1.20	1.20	0.00	0.00	16.80	16.80	14.10	0.00	0.00	0.00	0.00	1.60	5.20	
BH4	0.00	0.00	0.50	0.50	0.00	0.00	19.30	19.30	5.30	0.00	0.00	0.00	0.00	3.50	5.00	
Max	0.00	0.00	1.20	1.20	0	0	20.10	20.10	14.1	0	0.00	0.00	0.00	3.5		
Min	0.00	0.00	0.00	0.00	0	0	16.80	16.80	5.3	0	0.00	0.00	0.00	1.6		

SITE INFORMATION:

State of ground:	☒ Dry	☐ Wet	☐ Snow	☐ Frozen	☐ Hardstanding
Wind:	☒ Calm	☐ Moderate	☐ Strong		
Cloud cover:	☐ None	☐ Cloudy	☒ Overcast		
Precipitation:	☒ None	☐ Moderate	☐ Heavy		

METEOROLOGICAL INFORMATION:

Official Barometric Pressure (mbar): 3hr Before End of Monitoring (taken from www.metoffice.gov.uk station Tottenham)

Official Pressure Tendency:

(Change in atmospheric pressure for the preceding 3 hours of monitoring)

☐	Falling (decreasing change >1.6 mbar)
☒	Steady (change of 0.1 - 1.5 mbar)
☐	Rising (increasing change >1.6 mbar)

Job No:	GWPR4712
Site name:	167 Hermitage Road
Operator:	JC

Date:	21/06/2022		
Time:	10:45	to	11:05
Visit No:	2	of	4

Ground Gas Analyser:	GFM-436
Last Calibration:	Nov-20



	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA		Additional Remarks
Monitoring Point	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (m bgl)	Depth of well (m bgl)	
	Peak	Steady	Peak	Steady	Peak	Peak	Min	Steady			Peak	Steady				
Ambient air	0.00	0.00	0.00	0.00	0.00	0.00	20.10	20.10	-	-	0.00	0.00	0.00	-	-	
BH1	0.00	0.00	0.60	0.50	0.00	0.00	18.20	18.20	6.40	0.00	0.00	0.00	0.00	2.50	7.70	
BH2	0.00	0.00	0.90	0.90	0.00	0.00	17.40	17.40	12.30	0.00	0.00	0.00	0.00	1.50	5.20	
BH4	0.00	0.00	0.40	0.40	0.00	0.00	20.70	20.70	4.50	0.00	0.00	0.00	0.00	3.40	5.00	
Max	0.00	0.00	0.90	0.90	0	0	20.70	20.70	12.3	0	0.00	0.00	0.00	3.4		
Min	0.00	0.00	0.00	0.00	0	0	17.40	17.40	4.5	0	0.00	0.00	0.00	1.5		

SITE INFORMATION:

State of ground:	☐ Dry	☒ Wet	☐ Snow	☐ Frozen	☐ Hardstanding
Wind:	☐ Calm	☒ Moderate	☐ Strong		
Cloud cover:	☐ None	☐ Cloudy	☒ Overcast		
Precipitation:	☒ None	☐ Moderate	☐ Heavy		

METEOROLOGICAL INFORMATION:

Official Barometric Pressure (mbar): 3hr Before End of Monitoring (taken from www.metoffice.gov.uk station Tottenham)

Official Pressure Tendency:

(Change in atmospheric pressure for the preceding 3 hours of monitoring)

☒	Falling (decreasing change >1.6 mbar)
☐	Steady (change of 0.1 - 1.5 mbar)
☐	Rising (increasing change >1.6 mbar)

Job No:	GWPR4712
Site name:	167 Hermitage Road
Operator:	AA

Date:	28/06/2022		
Time:	11:45	to	12:00
Visit No:	3	of	4

Ground Gas Analyser:	GFM-436
Last Calibration:	Nov-20



	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA		Additional Remarks
Monitoring Point	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (m bgl)	Depth of well (m bgl)	
	Peak	Steady	Peak	Steady	Peak	Peak	Min	Steady			Peak	Steady				
Ambient air	0.00	0.00	0.10	0.10	0.00	0.00	19.70	20.10	0.10	0.00	0.00	0.00	0.00	-	-	
BH2	0.00	0.00	0.60	0.40	0.00	0.00	20.10	20.70	0.30	0.00	0.00	0.00	0.00	4.40	4.90	
Max	0.00	0.00	0.60	0.40	0	0	20.10	20.70	0.3	0	0.00	0.00	0.00	4.4		
Min	0.00	0.00	0.10	0.10	0	0	19.70	20.10	0.1	0	0.00	0.00	0.00	4.4		

SITE INFORMATION:

State of ground:	☒ Dry	☐ Wet	☐ Snow	☐ Frozen	☐ Hardstanding
Wind:	☒ Calm	☐ Moderate	☐ Strong		
Cloud cover:	☐ None	☒ Cloudy	☐ Overcast		
Precipitation:	☐ None	☒ Moderate	☐ Heavy		

METEOROLOGICAL INFORMATION:

Official Barometric Pressure (mbar): 3hr Before End of Monitoring (taken from www.metoffice.gov.uk station Tottenham)

Official Pressure Tendency:

(Change in atmospheric pressure for the preceding 3 hours of monitoring)

☐	Falling (decreasing change >1.6 mbar)
☒	Steady (change of 0.1 - 1.5 mbar)
☐	Rising (increasing change >1.6 mbar)

Job No:	GWPR4712
Site name:	167 Hermitage Road
Operator:	JC

Date:	05/07/2022			
Time:	11:45	to	12:05	
Visit No:	4	of	4	

Ground Gas Analyser:	GFM-436
Last Calibration:	Nov-20



	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA		Additional Remarks
Monitoring Point	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (m bgl)	Depth of well (m bgl)	
	Peak	Steady	Peak	Steady	Peak	Peak	Min	Steady			Peak	Steady				
Ambient air	0.00	0.00	0.00	0.00	0.00	0.00	20.10	20.10	0.00	0.00	0.00	0.00	0.00	-	-	
BH1	0.00	0.00	0.70	0.70	0.00	0.00	18.00	18.00	7.20	0.00	0.00	0.00	0.00	2.30	7.70	
BH2	0.00	0.00	0.80	0.80	0.00	0.00	17.70	17.70	13.10	0.00	0.00	0.00	0.00	1.20	5.20	
BH4	0.00	0.00	0.60	0.60	0.00	0.00	19.90	19.90	6.20	0.00	0.00	0.00	0.00	3.30	5.00	
Max	0.00	0.00	0.80	0.80	0	0	20.10	20.10	13.1	0	0.00	0.00	0.00	3.3		
Min	0.00	0.00	0.00	0.00	0	0	17.70	17.70	0.0	0	0.00	0.00	0.00	1.2		

SITE INFORMATION:

State of ground:	☐ Dry	☒ Wet	☐ Snow	☐ Frozen	☐ Hardstanding
Wind:	☐ Calm	☒ Moderate	☐ Strong		
Cloud cover:	☐ None	☐ Cloudy	☒ Overcast		
Precipitation:	☒ None	☐ Moderate	☐ Heavy		

METEOROLOGICAL INFORMATION:

Official Barometric Pressure (mbar): 3hr Before End of Monitoring (taken from www.metoffice.gov.uk station Tottenham)

Official Pressure Tendency:

(Change in atmospheric pressure for the preceding 3 hours of monitoring)

☐	Falling (decreasing change >1.6 mbar)
☒	Steady (change of 0.1 - 1.5 mbar)
☐	Rising (increasing change >1.6 mbar)

APPENDIX I: BRE Capping Calculations

The calculations undertaken within this spreadsheet are based on the BRE document Cover Systems For Land Regeneration, Thickness Design of Cover Systems for Contaminated Land, March 2004. This document, in tandem with the accompanying spreadsheet from which this spreadsheet is adapted, should be used for the design of simple cover systems only and is not suitable for the design of engineered cover systems, however a check is included within the graph of whether the simple cover system calculated is appropriate for the site.

Simple cover systems provide a reduction of the hazard to human health and provide a suitable medium for plant growth, however, they do not necessarily break the exposure pathways and therefore if a significant risk is identified, an engineered cover system should be implemented. Engineered cover systems should be designed to provide a complete separation of the receptor from the hazard, thus severing the exposure pathways. Alternative guidance should be followed for engineered cover systems.

Considerations:

Assuming that it is deemed appropriate to use a simple cover system, good quality soil should be used to make up the cover system, incorporating a topsoil layer, at least 150mm thick or 30% of the cover thickness, whichever is greater. Topsoil should ideally conform to BS 3882.

Prior to the placement of the cover system, the underlying ground should be suitably compacted to inhibit root penetration, infiltration, burrowing animals and instability but it should not be allowed to induce water logging. It may also be deemed necessary to include the provision of a physical barrier or visual marker to discourage the excavation below the cover system. This may be provided using synthetic material (geotextile membrane) or compacted granular free draining materials. This would also reduce the degree of intermixing and root penetration.

Design:

The model assumes that over time there will be complete natural intermixing of the cover materials with the underlying contaminated soils. This thickness is named the 'mixed zone'. For a residential dwelling a mixed zone of 600mm can be utilised, based on the recommended gardening process of double digging, where the top spade depth is removed and a second spade depth is loosened prior to the replacement of the soils. In commercial and public open space areas, the mixing zone can be reduced. The following further activities should be considered when considering the mixing depth. Research of earthworm activities indicated that the process brings soils from depth closer to the surface, with the main earthworm activities within the upper 150mm, with soil intermixing regularly to between 300 and 350mm. The effects of burrowing animals should also be considered, where the cover system may not be appropriate where these occur. Research undertaken into burrowing animals indicate that most burrows cause disturbance within the top 500mm, with the exception of rabbits and badgers, however, these are not considered to be significant within residential areas. Plants and tree roots will contribute to the mixing of soils, where grass root systems are concentrated within the top 150mm, garden plants extend to 200 - 300mm and shrubs extend to 500mm. Fruit trees and other trees will extend to 1.0 - 1.5m.

Assumptions:

The calculations have taken the maximum concentration observed during the site investigation and subsequent testing for use as the concentration of determinands within the ground.

The calculations assume that the imported soil will have the concentrations outlined within the spreadsheet. This data is based on two sources of information. The metal determinands are empirical in nature and are based on a database of Ground and Water validation laboratory analysis, where the 95%ile of the range of results has been used. This would provide a realistic expectation of what soils may be imported to site, whilst still providing a degree of conservatism. If the source of the imported soils are known, the spreadsheet can be updated. As PAHs are typically a result of anthropogenic activities, these are not common occurrences within good quality soil. It is therefore assumed that all soils imported to the site would have PAHs that are detected at the laboratory limit of detection.

The calculations have made the assumption that the target criteria for the determinands are those outlined within the Ground and Water Soil Assessment Criteria, principally the Suitable for Use Levels and the Category 4 Screening Levels. Where applicable phytotoxicity levels are also considered as these would be the most appropriate values for the assessment.

Validation:

As there are a number of variables within the design of the cover system, as well as it being used to reduce the risk to future receptors, the cover system must be validated upon completion. This should include validation of the thickness of topsoil, subsoil, as well as the chemical analysis of the soil to ensure that the design thickness is appropriate.

Determinand	Site Data				Expressed as a Factor of Target Guideline Value				Cover Thickness Required for Compliance to Specified Target Guideline Value	
	Contamination of Ground (Cg)	Contamination of Cover (Cc)	Target Guideline Value 1	Target Guideline Value 2	Soil / Target Guideline Value 1	Cover / Target Guideline Value 1	Soil / Target Guideline Value 2	Cover / Target Guideline Value 2	Target Guideline Value 1	Target Guideline Value 2
	Units		Units		Fraction				(mm)	
Arsenic	18.8	16	40	40	0.5	0.4	0.5	0.4	None	None
Cadmium	0.781	0.4	85	85	0.0	0.0	0.0	0.0	None	None
Chromium	15.7	25	910	910	0.0	0.0	0.0	0.0	None	None
Chromium (VI)	1.2	2	6	6	0.2	0.3	0.2	0.3	None	None
Copper	169	35	7100	7100	0.0	0.0	0.0	0.0	None	None
Lead	390	99	310	310	1.3	0.3	1.3	0.3	165	165
Nickel	30.4	16	60	60	0.5	0.3	0.5	0.3	None	None
Selenium	1.18	3	430	430	0.0	0.0	0.0	0.0	None	None
Vanadium	57.8	46	1200	1200	0.0	0.0	0.0	0.0	None	None
Zinc	272	143	40000	40000	0.0	0.0	0.0	0.0	None	None
Acenaphthene	0.239	0.1	3000	3000	0.0	0.0	0.0	0.0	None	None
Acenaphthylene	0.161	0.1	2900	2900	0.0	0.0	0.0	0.0	None	None
Anthracene	0.597	0.1	31000	31000	0.0	0.0	0.0	0.0	None	None
Benzo(a)anthracene	3.48	0.1	11	11	0.3	0.0	0.3	0.0	None	None
Benzo(a)pyrene	3.73	0.1	3.2	3.2	1.2	0.0	1.2	0.0	88	88
Benzo(b)fluoranthene	5.05	0.1	3.9	3.9	1.3	0.0	1.3	0.0	139	139
Benzo(ghi)perylene	2.49	0.1	360	360	0.0	0.0	0.0	0.0	None	None
Benzo(k)fluoranthene	1.71	0.1	110	110	0.0	0.0	0.0	0.0	None	None
Chrysene	3.44	0.1	30	30	0.1	0.0	0.1	0.0	None	None
Dibenzo(a,h)anthracene	0.492	0.1	0.31	0.31	1.6	0.3	1.6	0.3	279	279
Fluoranthene	6.42	0.1	1500	1500	0.0	0.0	0.0	0.0	None	None
Fluorene	0.221	0.1	2800	2800	0.0	0.0	0.0	0.0	None	None
Indeno(1,2,3-cd)pyrene	2.79	0.1	45	45	0.1	0.0	0.1	0.0	None	None
Naphthalene	0.104	0.1	2.6	2.6	0.0	0.0	0.0	0.0	None	None
Phenanthrene	3.29	0.1	1300	1300	0.0	0.0	0.0	0.0	None	None
Pyrene	5.49	0.1	3700	3700	0.0	0.0	0.0	0.0	None	None

Summary

	Target Guideline Value 1	Target Guideline Value 2
Number of determinands	26	26
Number of determinands with no thickness calculation	0	0
Breakdown - Number for which no TV specified	0	0
Breakdown - Number for which no soil specified	0	0
Breakdown - Number for which no cover specified	0	0
Breakdown - Number for which cover > TV	0	0
Number of determinands with thickness calculation	26	26
Breakdown - Number for which no cover required	22	22
Breakdown - Number for which cover required	4	4
Overall thickness of cover required	279	279