SITE INVESTIGATION PROPOSAL

19-37 Highgate Road
London
NW5 1NT

for GM Developments London

December 2021

J21343A




GEA

Document control

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Report title	SITE INVESTIGATION PROPOSAL		

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Rev No	Status	Amendment Details	Date	Approved for Issue
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Contents

1.0	INTRODUCTION	1
2.0	THE SITE	1
	2.1 Site History	1
	2.2 Geological and Environmental Setting	2
3.0	ANTICIPATED GROUND MODEL	3
	3.1 Conceptual Site Model	4
4.0	INVESTIGATION OBJECTIVES	5
	4.1 Proposed Testing	5
	4.2 Standpipe Installations	5
	4.3 Soil Gas and Vapour Monitoring	5
5.0	CONCLUSIONS	6

1.0 INTRODUCTION

Consideration is being given to the demolition of the existing building and subsequent construction of a part five-storey and part six-storey mixed use building. Parking and communal garden areas are also included in the proposals.

Conditional planning permission was granted in 2013 for a wider scheme that included this site, and this report details the sampling strategy for the proposed ground investigation at the above site to satisfy planning condition 21a issued by London Borough of Camden.

GEA previously carried out a desk study of a wider area incorporating the proposal site (report ref J10098 Issue 2, dated June 2010), and an updated desk study for this site is in preparation, in conjunction with this report.

A preliminary land quality statement report, including the findings of a ground investigation, has also been completed for the same wider site by Campbell Reith (report ref EJBsrm-11167-230813-LQS-F2, dated September 2013).

The previous reports contain data that is pertinent to the site and should be read in conjunction with this report at this stage.

GEA will be completing a separate site-specific ground investigation to confirm the findings in the above report, which is currently underway and will be reported separately upon completion.

2.0 THE SITE

The site is located in the London Borough of Camden, approximately 200 m to the northwest of Kentish Town railway and London Underground station. The site is accessed by Greenwood Place to the northwest and is bounded by Highgate Place to the northeast, by the Christ Apostolic Church to the southeast and by a part single-storey, part two-storey self-storage warehouse to the southwest. The site may additionally be located by National Grid Reference 528871, 185418.

A walkover of the site was carried out by a geotechnical engineer from GEA on 24th November 2021. It is approximately rectangular in shape, measuring roughly 60 m northwest to southeast by 20 m northeast to southwest. The site is occupied by a two-storey community centre in the southeast half, with a tarmac parking area and small soft landscaped area in the northwest. The car park is roughly 1 m below the surrounding roads, such that the northeastern boundary is supported by a brick retaining wall. A narrow paved courtyard is also located at the southeastern end of the site, at an elevation approximately 1 m above the rest of the site, and the community centre stretches across both levels.

A recent CCTV survey (report ref 29903, dated 17 November 2021, created by Amber Group and provided by the consulting engineers) identified the presence of an apparent petrol interceptor within the car park close to the north-western elevation of the building.

2.1 Site History

The research has indicated that at the time of the earliest map studied, dated 1871, the site was developed with terraced housing fronting onto Highgate Road. The remainder of the site appeared to comprise gardens associated with these houses. The church that adjoins the site to the southeast and Greenwood Place had been established by this time. A number of railway lines and associated sidings had been built by this time as close as 70 m to the south and southwest of the site, with a large structure comprising the 'Kentish Town Sheds' located approximately 175 m to the west of the site. At some time between 1873 and 1879, two factory buildings, referred to as bottling stores, were constructed 50 m to the west and 90 m northwest of the site.

The site and surrounding area remained essentially unaltered until some time between 1896 and 1915, when the bottling store had been extended to within 30 m of the southwest of the site. The terraced houses fronting onto Highgate

Road were still present, although a large rectangular warehouse had been constructed adjacent to the southwest of the site within the garden area of a number of the houses. The terraced housing, formerly present adjacent to the northwest of the site, had also been demolished over the same period, with this area now occupied by two long rectangular buildings understood to have been used as a warehouse and depository respectively. Further works buildings were also present from approximately 90 m to the northwest of the site.

The Kentish Town Sheds expanded over the period between 1896 and 1915 and remained essentially unaltered until some time between 1954 and 1968 when the railway sidings were removed, and the former railway sheds are shown as being used as a civil engineering depot. The depot remains in use to the present day and is currently occupied by the Murphy Group.

Goad insurance plans from 1930 show that the bottling stores, which occupied much of the area adjacent to the southwest of this site, were owned and operated by Read Bros Ltd and used as an ale store, with the rectangular warehouse immediately to the southeast of the site labelled as a timber yard including store, saw mill and fuel store.

The previously reported Preliminary UXO Risk Assessment report records a bomb strike in the south of the site during WWII and an incendiary shower over the entire area. However limited damage was recorded on site.

Subsequent plans from 1957 indicate that the bottling stores to the southwest were owned by Imperial Chemical Industries (ICI) Ltd. Whilst the exact use of these buildings is not known, ICI was involved in the production of chemicals, explosives, fertilisers, insecticides, dyestuffs, non-ferrous metals, fabrics and paints, as well as the development and production of pharmaceuticals. However, the former bottling stores remained listed throughout this period as warehouses and are therefore unlikely to have been involved in any form of production. A small garage was constructed during this time in the loading area of the ICI compound, approximately 35 m to the southwest.

The site remained essentially unaltered until between 1974 and 1979, when the terraced houses fronting onto Highgate Road were demolished and replaced with the existing irregular shaped building, later referred to as a day centre, with an adjoining car park on the northwestern part of the site. The site has since remained essentially unchanged. The warehouse adjacent to the southwest had been extended in a southeasterly direction over the same period and the former bottling store building was redeveloped with the existing Greenwood Centre, now also shown to be in use as a day centre, and the site surroundings have since remained essentially unchanged.

2.2 Geological and Environmental Setting

The Geological Survey map of the area (BGS sheet 256) indicates that the site is underlain by the London Clay Formation. Reference to The Lost Rivers of London[1] indicates that a tributary of the "lost" River Fleet flowed through the site, as such Alluvium may be present beneath the site. The BGS map also indicates the presence of areas of worked ground less than 150 m to the west of the site.

The previous investigation carried out by Campbell Reith on the wider area included a number of boreholes within this site. They found that, beneath a moderate to significant thickness of made ground including reworked Alluvium, and a localised layer of Alluvium, the London Clay was initially found to be reworked, beneath which unweathered London Clay was proved to the full depth of the investigation, of 35.00 m (1.90 m OD). Desiccation was observed within the shallow soils to a maximum depth of 1.20 m (36.30 m OD).

The London Clay is classified by the Environment Agency (EA) as Unproductive Strata, referring to rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. Alluvium is likely to be classified as Secondary Undifferentiated.

1 Barton, N, & Meyers, S (2016) *The Lost Rivers of London* (revised and extended edition with colour maps). Historical Publications Ltd.

Apart from a small area of soft landscaping, the site is entirely covered by the existing building and surrounding hardstanding. As such, infiltration of rainwater is therefore generally restricted to surface water drains, with the majority of surface runoff draining into combined sewers in the road.

3.0 ANTICIPATED GROUND MODEL

On the basis of the previous work on the site, the ground conditions at this site can be characterised as follows. A ground investigation is currently underway to verify the previous findings, provide additional coverage and to comprise a standalone site specific assessment.

- Beneath a moderate to significant thickness of made ground including reworked Alluvium, and a localised layer of Alluvium, London Clay is present;
- the made ground generally comprises brown clayey gravelly sand to sandy gravelly clay with fragments of extraneous material, roots and rootlets, and extended to depths of between 1.10 m (36.40 m OD) and 2.40 m (34.50 m OD);
- Alluvium is present at the northern end of the site and comprises firm becoming stiff brown gravelly clay to a depth of 3.15 m (33.75 m OD);
- the London Clay is initially naturally reworked to depths of between 2.10 m (32.40 m OD) and 4.15 m (34.60 m OD);
- the London Clay then comprises medium to extremely high strength firm becoming stiff and very stiff fissured brown becoming greyish brown silty clay with selenite crystals and silt partings, and was proved to the full depth of the previous investigation, of 35.00 m (1.90 m OD);
- desiccation was observed within the shallow soils to a maximum depth of 1.20 m (36.30 m OD).;
- groundwater was not encountered during drilling but was measured in combined standpipes installed through made ground, Alluvium and reworked London Clay at depths of between 2.56 m (34.34 m OD) and 3.75 m (33.15 m OD);
- elevated concentrations of lead and PAHs and fibres of asbestos were identified within the made ground on the site;
- elevated concentrations of chromium and selenium were measured in samples of groundwater; and
- gas monitoring as part of the previous investigation measured low concentrations of carbon dioxide and negligible flow rates. No methane was recorded. As such, the site was deemed to fall within Characteristic Situation 1.

3.1 Conceptual Site Model

On the basis of the desk study research and the initial investigation results, the following potential contamination linkages were noted, and methods of investigation have been identified below.

SOURCE	CONTAMINANTS	RECEPTOR	PATHWAY	PROPOSED INVESTIGATION	METHOD
Inorganic and organic contamination within near surface soils resulting from existing and past activities on and off site	Heavy metals, PAH, TPH, inorganic and organic contaminants (Lead and PAH have been identified in shallow soils)	End users	Ingestion of contaminated soil or dust, skin contact, inhalation	Sampling of shallow soils. Investigate gas and vapour (shallow depth)	Trial pits, boreholes, gas and vapour monitoring
		Vegetation	Plant uptake in landscaped areas	Sampling shallow soils	Trial pits, boreholes
		Groundwater (Secondary Aquifer)	Percolation and leaching of surface run-off mobilising soluble contaminants	Sampling shallow soils, gas and vapour investigation of shallow soils	Trial pits, boreholes Groundwater testing not considered to be necessary
		Buried services / foundation concrete	Direct contact	Sampling shallow soils	Trial pits, boreholes
		Buildings on adjacent sites	Surface water flow or drain runs		
		Human receptors on adjacent sites	Ingestion of contaminated soil or dust, skin contact, inhalation		
		Construction workers	Ingestion of contaminated soil or dust, skin contact, inhalation		
Soil gas and vapour contamination resulting from existing and past activities off site	Methane, carbon dioxide, hydrogen sulphide, carbon monoxide, solvent vapour	Human receptors, residential end users on site	Vapour: Inhalation including via ingress into building Gas: Ingress and accumulation leading to explosion	Gas monitoring, including PID, on four occasions over two months	Install standpipes at a range of depths to ensure sampling of made ground and unsaturated zone above groundwater
		Buildings on site	Vapour ingress leading to degradation of services Gas: Ingress and accumulation leading to explosion		
		Site workers	Vapour: Inhalation including via ingress into building Gas: Ingress and accumulation leading to explosion		

4.0 INVESTIGATION OBJECTIVES

This section details proposed works only. On the basis of the updated conceptual model above, the following objectives have been identified for investigation.

1. Testing of shallow soils across the site to assess the presence of a range of contaminants;
2. Testing of soils in proximity to the petrol interceptor to identify the presence of associated hydrocarbon contamination;
3. Installation of combined groundwater and gas and vapour standpipes across the site to facilitate monitoring;
4. Testing of shallow soils with a PID during sampling;
5. Gas and vapour monitoring of the shallow soils.

These objectives will be achieved by the following activities. The locations of the proposed sampling locations are shown on the plan included in the appendix.

OBJECTIVE	LOCATION	SAMPLE DEPTH (m)	TESTS
1)	BH1 to BH5 TP1	TBC	Suite 1 + asbestos screen
2)	BH	TBC	Suite 1 + asbestos screen
3)	BH1 to BH4	Standpipe response zones across suitable stratum	
4)	Head space analysis in all boreholes and trial pits on made ground and natural soil		
5)	BH1 to BH4	-	Groundwater and gas and vapour monitoring 4 visits over 2 months

4.1 Proposed Testing

Around six samples will be collected from made ground encountered in the boreholes and trial pits. These six samples will be tested for the GEA General Suite 1 analysis, which includes a range of common industrial contaminants including a range of metals, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. The samples will also be screened for the presence of asbestos.

If any soils are visibly impacted by contaminants, additional samples will be collected and tested. If any soils recovered from the trial pits are suspected of containing contamination either by visual inspection or as indicated by screening with the PID, additional samples will be scheduled for contamination testing.

4.2 Standpipe Installations

Standpipes will be installed in four of the boreholes to measure groundwater levels, and to monitor for the presence of ground gas and vapour. Response zones will depend on the ground conditions encountered and will be reported in due course. A well head, gas tap and lockable metal cover will be installed at the surface.

The standpipes will provide an indication of the shallow groundwater conditions and rising head tests could be carried out to assess likely inflow rates into shallow excavations.

If evidence of vapour contamination is identified during drilling or during screening of samples with the PID, the proposed installations will be adjusted accordingly, or an additional standpipe added to capture response zones within the potentially contaminated strata.

4.3 Soil Gas and Vapour Monitoring

Despite the absence of a significant risk of ground gas or vapour indicated by the desk study, standpipes will be installed and monitored for gas and vapour in accordance with the protocol below.

- CIRIA C665 (2007). *Assessing risks posed by hazardous ground gases to building.*

- BS 8485:2015+A1:2019. *Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.*

- BS 8576: 2013 *Guidance on Investigations for Ground Gas – Permanent gases and Volatile Organic Compounds (VOCs).*

- NHBC (2007). *Guidance on the Evaluation of Development proposals on sites where methane and carbon dioxide are present*.

- CIRIA C682 (2009). *The VOCs Handbook. Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination*.

4.3.1 Gas Monitoring Parameters

The standpipes installed will be monitored for the presence of oxygen, methane, carbon dioxide, Lower Explosive Limit (LEL), carbon monoxide and hydrogen sulphide using a *GA 2000* gas analyser. A Tiger Ion Photo-ionisation Detector (PID) fitted with a 10.6 eV lamp, which detects a broad range of volatiles, will be used to determine the presence of volatile vapours. During monitoring, bulk ground gas concentrations will be allowed to equilibrate over at least a three minute duration prior to taking a final reading, with the peak values, in addition to any final or constant values, recorded.

The site is considered to have low gas generation potential and the sensitivity of the end use is considered to be moderate to high. Based on the guidance provided by CIRIA, a minimum of four rounds of monitoring is proposed over a period of two months at a range of atmospheric pressures. If it is not possible to carry out monitoring during significant falls in atmospheric pressure the limitations of the observations will be noted, and the readings will be assessed in accordance with the guidance. The acquired data will be used to complete a ground gas risk assessment to assess potential risks associated with bulk ground gases (carbon dioxide and methane) and volatile vapours to future site users and built development. Assessment of the results will be carried out by reference to BS 8576: 2013 Guidance on Investigations for Ground Gas and C682.

5.0 CONCLUSIONS

The results of the proposed investigation will provide a minimum of six general suite analyses on samples of made ground, plus asbestos. Gas and vapour monitoring will be carried out on four occasions over a period of two months.

The investigation is using soil testing plus gas monitoring including soil vapour headspace analysis, as multiple lines of evidence to determine the presence of any contamination which warrants remediation. The above proposals are considered to be sufficient for this site.

If unexpected, additional or significant contamination is encountered during the ground investigation, there will be a requirement for additional investigation and testing. In the event that the investigation described above does not achieve the objectives, the requirement for additional investigation will be reviewed and agreed with the local authority.

The findings of the ground investigation will be published in a Ground Investigation Report, which will include a comprehensive ground model and site-specific final contamination risk assessment. Where necessary, a separate Remediation Method Statement will be produced to outline the proposals for remedial measures. These reports should be submitted to the local authority to discharge associated conditions.

If any remedial measures are required, once the measures have been implemented they will be verified, after which a final verification report would be produced.

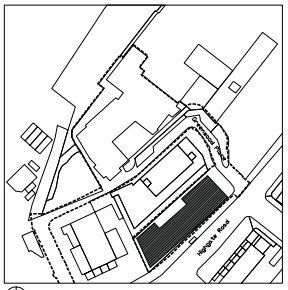
APPENDIX

Proposed site plan

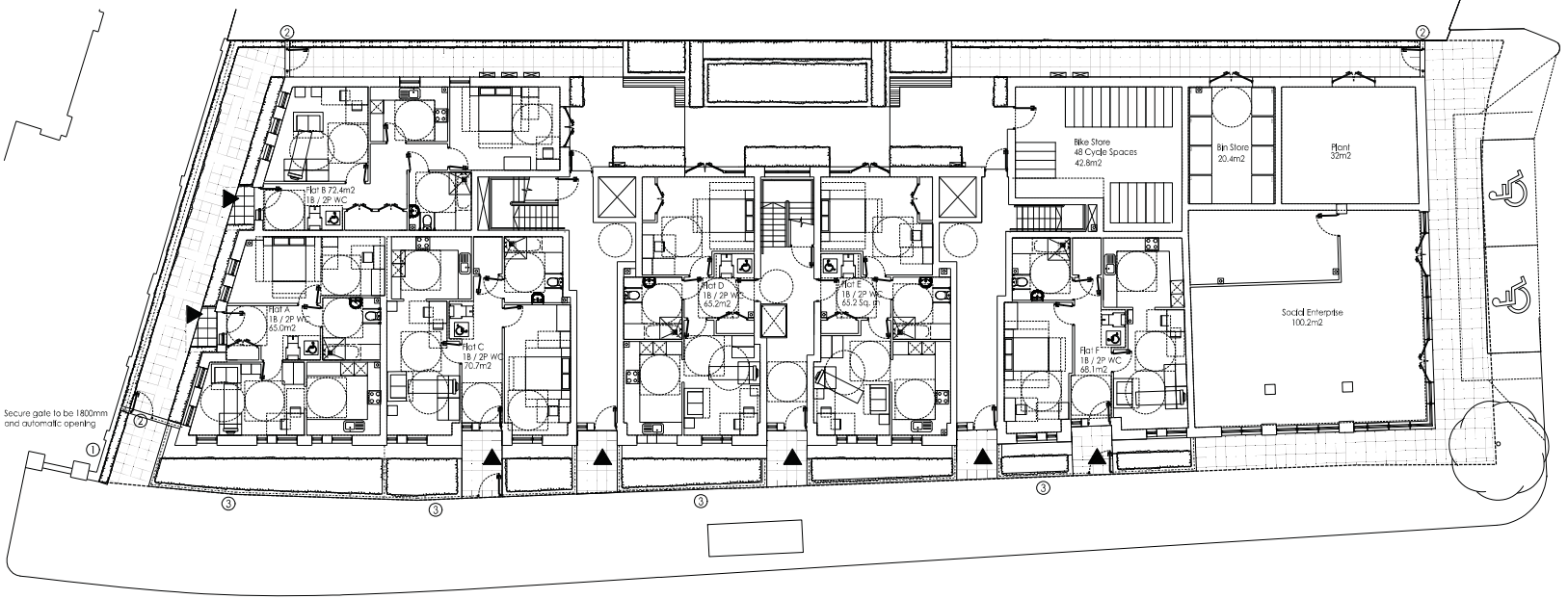
Laboratory testing suites & i2 Analytical accreditations

Generic Guideline Values

PID certificate



KEY PLAN 1:1250



KEY:

1. Existing church wall with steel railings to 2.1m
2. Secure access gate
3. Low brick wall with steel railings to 1.2m

▲ Entrance

Indicative cooling unit location

GENERAL NOTES

NOTE:
All flats to achieve Lifetime Homes Standards. Please refer to section 7.32 of the Design, Planning and Access statement for full detail.

N

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PROJECT	Greenwood Place
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DATE	2013.08
CHECKED BY	GM
DRAWING NO.	PL 110
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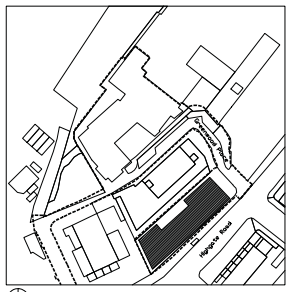

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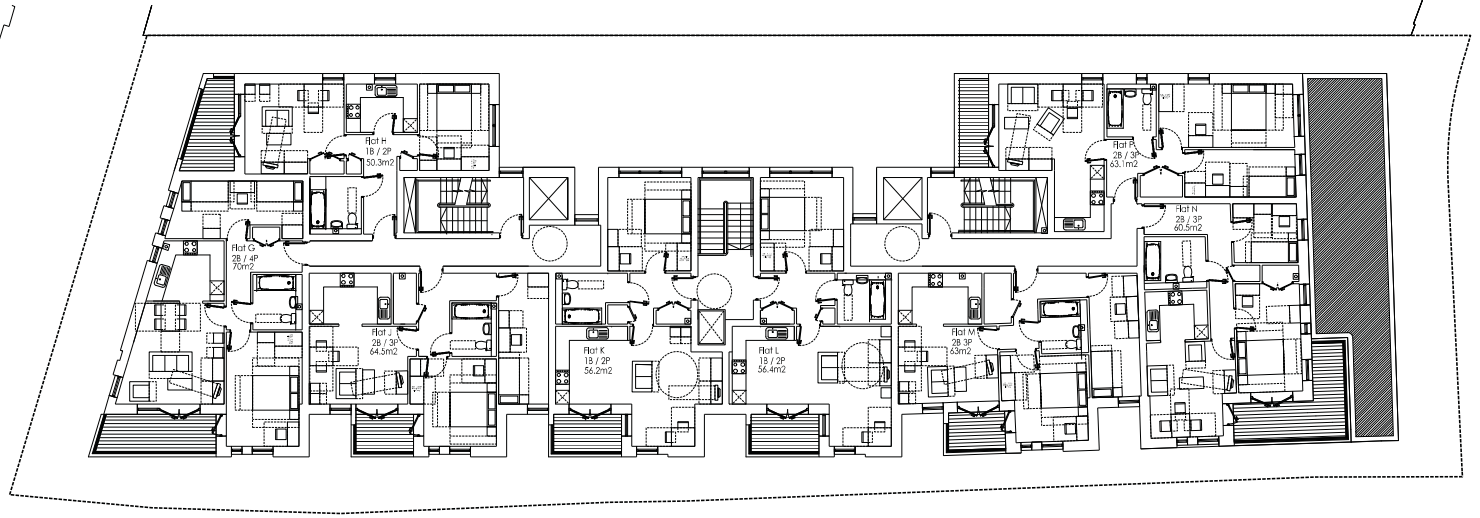

GENERAL NOTES

NOTE:
All flats to achieve lifetime Homes Standards.
Please refer to section 7.32 of the Design Planning and Access statement for full detail.

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CLIENT	LB Camden
PROJECT	Greenwood Place
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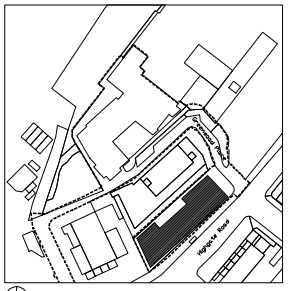

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GENERAL NOTES:

NOTE:
All flats to achieve Lifetime Homes Standards.
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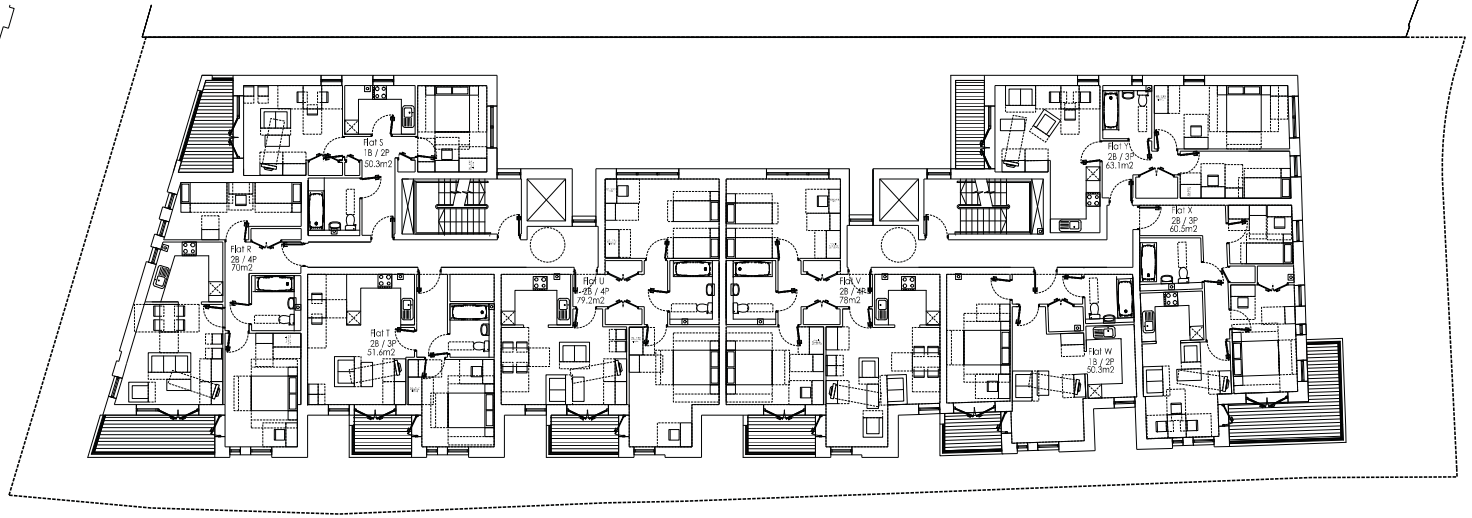

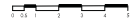

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STAGE	PLANNING
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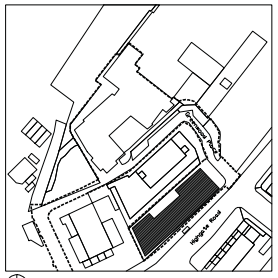

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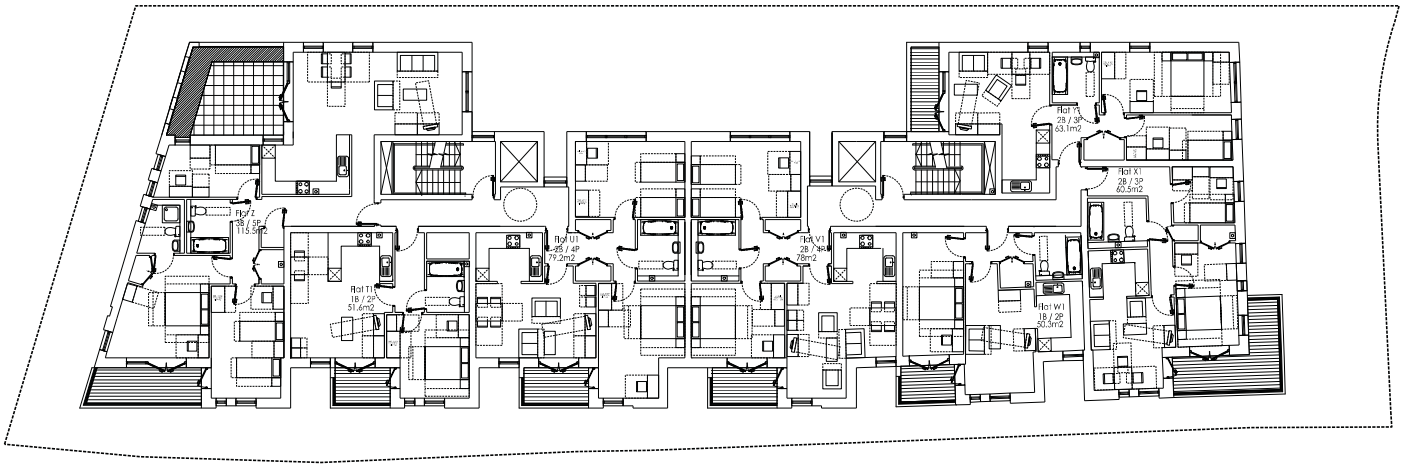
GENERAL NOTES

NOTE:
All flats to achieve Lifetime Homes Standards.
Please refer to section 7.32 of the Design Planning and Access statement for full detail.



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CLIENT: LB Camden

PROJECT: Greenwood Place

DRAWING TITLE: 4th Floor Plan
Highgate Site

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DRAWING NO:	PL 113	REVISION: /

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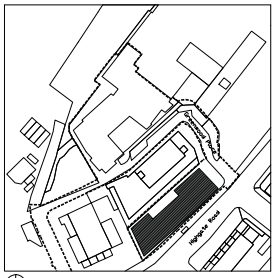
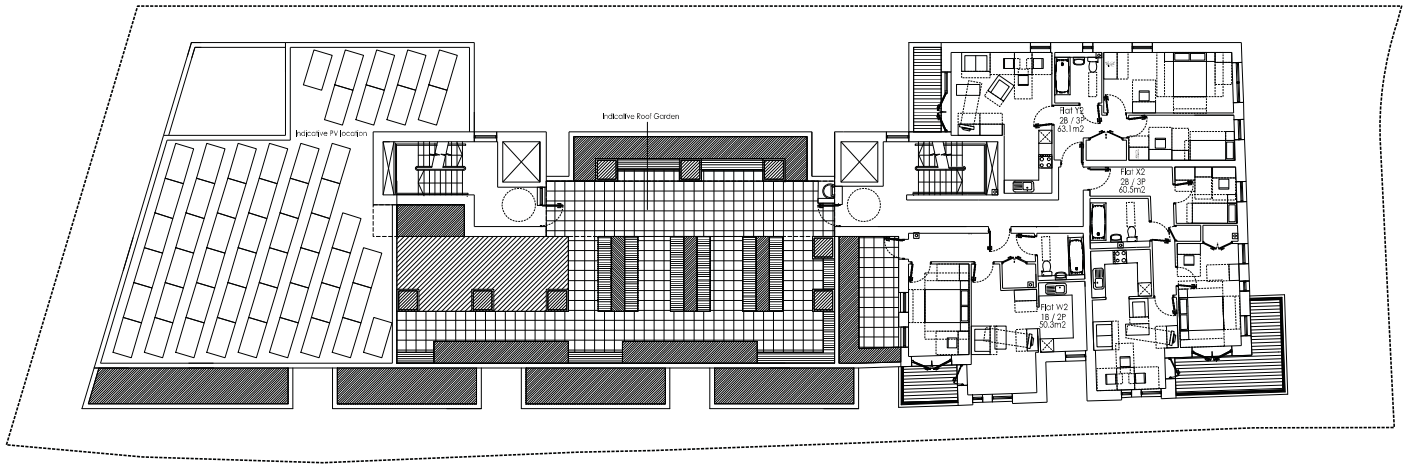


KEY PLAN 1:1250

GENERAL NOTES

NOTE:
All flats to achieve Lifetime Homes Standards. Please refer to section 7.32 of the Design Planning and Access Statement for full detail.



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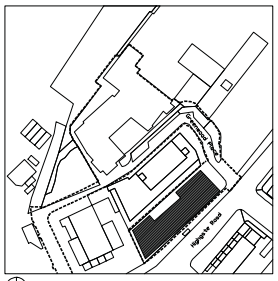

KEY PLAN 1:1250

GENERAL NOTES

NOTE:
All flats to achieve Lifetime Homes Standards.
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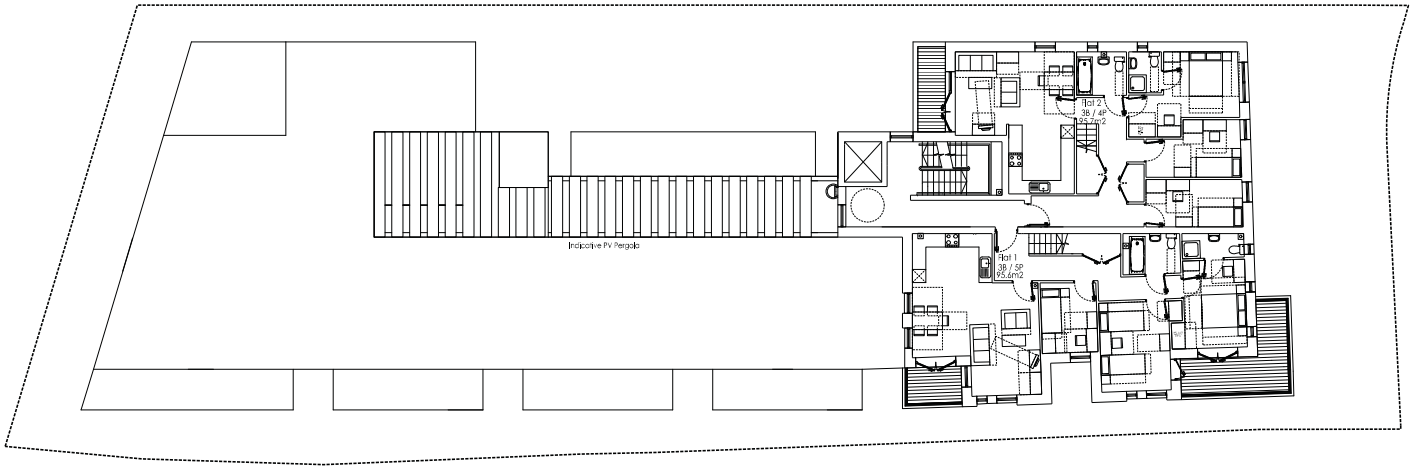

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CLIENT: LB Camden

PROJECT: Greenwood Place

DRAWING TITLE: 6th Floor Plan
Highgate Site

STATUS: PLANNING

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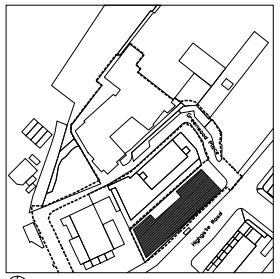

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GENERAL NOTES

NOTE:
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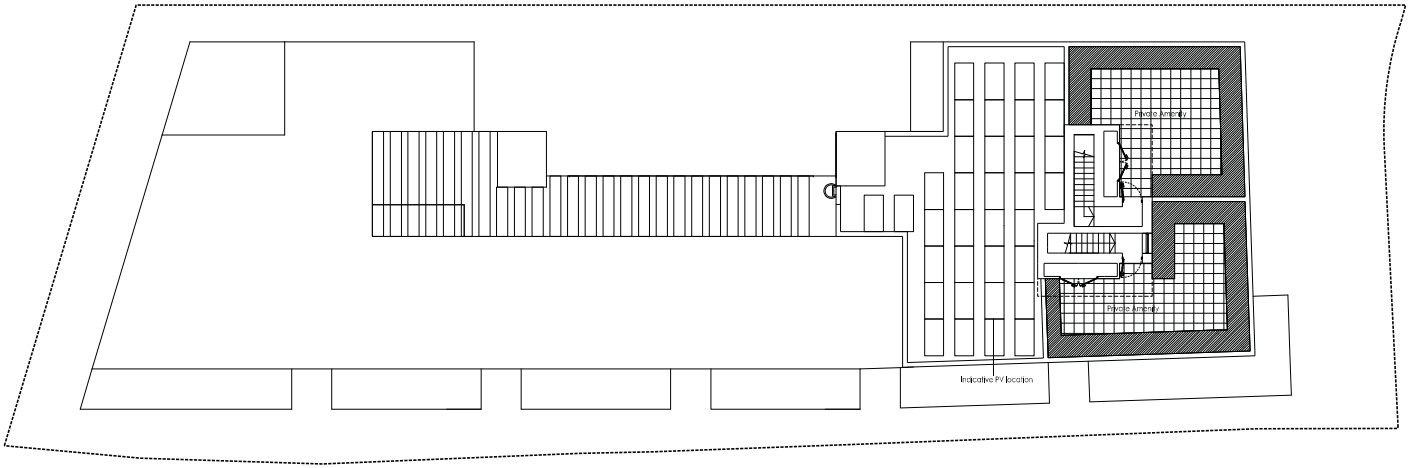

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CLIENT: LB Camden

PROJECT: Greenwood Place

DRAWING TITLE: Roof Plan Highgate Site

STATUS: PLANNING

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GEA Suite 1

Matrix	Determinand	Accreditation Status		Methodology	Detection Limit
Soil	pH	ISO17025	MCERTS	Potentiometric	+ / - 0.1
Soil	Arsenic (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Cadmium (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<0.2
Soil	Chromium (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Copper (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Lead (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Mercury (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<0.3
Soil	Nickel (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Selenium (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Zinc (aqua regia extractable)	ISO17025	MCERTS	ICP-OES	<1
Soil	Chloride - Water Soluble (2:1)	ISO17025	MCERTS	Titrimetry	<5
Soil	Sulphate (as SO4) - Total	ISO17025	None	ICP-OES	<100
Soil	Sulphate (as SO4) - Water Soluble (2:1)	ISO17025	MCERTS	ICP-OES	<0.005
Soil	Sulphide	ISO17025	MCERTS	ISE	<1
Soil	Phenols - Total (monohydric)	ISO17025	MCERTS	Skalar CFA	<2
Soil	Cyanide - Total	ISO17025	MCERTS	Skalar CFA	<1
Soil	Total Organic Carbon (TOC)	ISO17025	MCERTS	Titrimetry	<0.1
Soil	PAH - Speciated (EPA 16)	ISO17025	MCERTS	GC/MS	<0.05 - <0.1
Soil	TPH Banded	None	None	GC/MS	<0.1 - <10

TPH

Matrix	Determinand	Accreditation Status		Methodology	Detection Limit	Unit
Soil	TPH CWG - Aromatic (EC5 - EC7)	ISO17025	MCERTS	HS-GC/MS	<0.1	mg/kg
Soil	TPH CWG - Aromatic (EC7 - EC8)	ISO17025	MCERTS	HS-GC/MS	<0.1	mg/kg
Soil	TPH CWG - Aromatic (EC8 - EC10)	ISO17025	MCERTS	HS-GC/MS	<0.1	mg/kg
Soil	TPH CWG - Aromatic (EC10 - EC12)	ISO17025	MCERTS	GC/FID	<1	mg/kg
Soil	TPH CWG - Aromatic (EC12 - EC16)	ISO17025	MCERTS	GC/FID	<2	mg/kg
Soil	TPH CWG - Aromatic (EC16 - EC21)	ISO17025	MCERTS	GC/FID	<10	mg/kg
Soil	TPH CWG - Aromatic (EC21 - EC35)	ISO17025	MCERTS	GC/FID	<10	mg/kg
Soil	TPH CWG Total - Aromatic (EC5-EC35)	ISO17025	MCERTS	GC/MS	<10	mg/kg

Matrix	Determinand	Accreditation Status		Methodology	Detection Limit	Unit
Soil	TPH CWG - Aliphatic (C5 - C6)	ISO17025	MCERTS	HS-GC/MS	<0.1	mg/kg
Soil	TPH CWG - Aliphatic (C6 - C8)	ISO17025	MCERTS	HS-GC/MS	<0.1	mg/kg
Soil	TPH CWG - Aliphatic (C8 - C10)	ISO17025	MCERTS	HS-GC/MS	<0.1	mg/kg
Soil	TPH CWG - Aliphatic (C10 - C12)	ISO17025	MCERTS	GC/FID	<1	mg/kg
Soil	TPH CWG - Aliphatic (C12 - C16)	ISO17025	MCERTS	GC/FID	<2	mg/kg
Soil	TPH CWG - Aliphatic (C16 - C21)	ISO17025	MCERTS	GC/FID	<10	mg/kg
Soil	TPH CWG - Aliphatic (C21 - C34)	ISO17025	MCERTS	GC/FID	<10	mg/kg
Soil	TPH CWG Total - Aliphatic (C5-C34)	ISO17025	MCERTS	GC/MS	<10	mg/kg

Matrix	Determinand	Accreditation Status		Methodology	Detection Limit	Unit
Soil	MTBE (Methyl Tertiary Butyl Ether) inc BTE	ISO17025	MCERTS	HS-GC/MS	<1	µg/kg

SVOC (Semi Volatile Organic Compounds) - Soil

Matrix	Determinand	Accreditation Status		Methodology	Detection Limit	Unit
Soil	Aniline	None	None	GC/MS	<0.05	mg/kg
Soil	Phenol	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	2-Chlorophenol	ISO17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Bis(2-chloroethyl)ether	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	1,3-Dichlorobenzene	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	1,2-Dichlorobenzene	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	1,4-Dichlorobenzene	ISO 17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Bis(2-chloroisopropyl)ether	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	2-Methylphenol	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Hexachloroethane	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Nitrobenzene	ISO17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	4-Methylphenol	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Isophorone	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	2-Nitrophenol	ISO17025	MCERTS	GC/MS	<0.1	mg/kg

Soil	2,4-Dimethylphenol	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Bis(2-chloroethoxy)methane	ISO17025	MCERTS	GC/MS	<0.3	mg/kg
Soil	1,2,4-Trichlorobenzene	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Naphthalene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	2,4-Dichlorophenol	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	4-Chloroaniline	None	None	GC/MS	<0.05	mg/kg
Soil	Hexachlorobutadiene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	4-Chloro-3-methylphenol	None	None	GC/MS	<0.1	mg/kg
Soil	2,4,6-Trichlorophenol	ISO17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	2,4,5-Trichlorophenol	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	2-Methylnaphthalene	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	2-Chloronaphthalene	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Dimethylphthalate	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	2,6-Dinitrotoluene	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Acenaphthylene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Acenaphthene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	2,4-Dinitrotoluene	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Dibenzofuran	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	4-Chlorophenyl phenyl ether	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Diethyl phthalate	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	4-Nitroaniline	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Fluorene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Azobenzene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Bromophenyl phenyl ether	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Hexachlorobenzene	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Phenanthrene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Anthracene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Carbazole	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Dibutyl phthalate	ISO 17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Anthraquinone	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Fluoranthene	ISO17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Pyrene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Butyl benzyl phthalate	None	None	GC/MS	<0.05	mg/kg
Soil	Benzo(a)anthracene	ISO17025	MCERTS	GC/MS	<0.2	mg/kg
Soil	Chrysene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Benzo(b)fluoranthene	ISO17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Benzo(k)fluoranthene	ISO17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Benzo(a)pyrene	ISO17025	MCERTS	GC/MS	<0.1	mg/kg
Soil	Indeno(1,2,3-cd)pyrene	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Dibenz(a,h)anthracene	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg
Soil	Benzo(ghi)perylene	ISO 17025	MCERTS	GC/MS	<0.05	mg/kg

VOC (Volatile Organic Compounds) - Soil

Matrix	Determinand	Accreditation Status		Methodology	Detection Limit	Unit
Soil	Chloromethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Chloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Bromomethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Vinyl chloride	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Trichlorofluoromethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1-Dichloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1,2-Trichloro 1,2,2-Trifluoroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	cis-1,2-Dichloroethene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	MTBE (Methyl Tertiary Butyl Ether)	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1-Dichloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	2,2-Dichloropropane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Trichloromethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1,1-Trichloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,2-Dichloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1-Dichloropropene	ISO17025	None	HS-GC/MS	1	µg/kg
Soil	trans-1,2-Dichloroethene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Benzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Tetrachloromethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,2-Dichloropropane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Trichloroethene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Dibromomethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Bromodichloromethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	cis-1,3-Dichloropropene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	trans-1,3-Dichloropropene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Toluene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1,2-Trichloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,3-Dichloropropane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Dibromochloromethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Tetrachloroethene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg

Soil	1,2-Dibromoethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Chlorobenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,1,1,2-Tetrachloroethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Ethylbenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	p & m-xylene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Styrene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Tribromomethane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	o-Xylene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Isopropylbenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Bromobenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	n-Propylbenzene	ISO17025	None	HS-GC/MS	1	µg/kg
Soil	2-Chlorotoluene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	4-Chlorotoluene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,3,5-Trimethylbenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	tert-Butylbenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,2,4-Trimethylbenzene	ISO17025	None	HS-GC/MS	1	µg/kg
Soil	sec-Butylbenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,3-Dichlorobenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	p-Isopropyltoluene	ISO17025	None	HS-GC/MS	1	µg/kg
Soil	1,2-Dichlorobenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,4-Dichlorobenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Butylbenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,2-Dibromo-3-chloropropane	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,2,4-Trichlorobenzene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	Hexachlorobutadiene	ISO17025	MCERTS	HS-GC/MS	1	µg/kg
Soil	1,2,3-Trichlorobenzene	ISO17025	None	HS-GC/MS	1	µg/kg

GEA
Widbury Barn
Widbury Hill
Ware
SG12 7QE

Generic Risk-Based Soil Screening Values

Site	19-37 Highgate Road, London NW5 1NT	**Job Number** J21343A
Client	GM Developments London	**Sheet** 1 / 2
Engineer	Engineeria	

Proposed End Use Residential without plant uptake

Soil Organic Matter content % 2.5

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	40	C4SL
Cadmium	149	C4SL
Chromium (III)	910	S4UL
Chromium (VI)	21	C4SL
Copper	7,100	S4UL
Lead	310	C4SL
Elemental Mercury	1.2	S4UL
Inorganic Mercury	56	S4UL
Nickel	180	S4UL
Selenium	595	SGV
Zinc	40,000	S4UL
Anions		
Soluble Sulphate	500 mg/l	Structures
Sulphide	50	Structures
Chloride	400	Structures
Others		
Organic Carbon (%)	6	Methanogenic potential
Total Cyanide	140	WRAS
Total Mono Phenols	420	SGV
PAH		
Naphthalene	5.60	S4UL
Acenaphthylene	4,600	S4UL
Acenaphthene	4,700	S4UL
Fluorene	3,800	S4UL
Phenanthrene	1,500	S4UL
Anthracene	35,000	S4UL
Fluoranthene	1,600	S4UL
Pyrene	3,800	S4UL
Benzo(a)anthracene	14.0	S4UL
Chrysene	31	S4UL
Benzo(b)fluoranthene	4.0	S4UL
Benzo(k)fluoranthene	110.0	S4UL
Benzo(a)pyrene	4.70	C4SL
Indeno(1 2 3 cd)pyrene	46.0	S4UL
Dibenz(a h)anthracene	0.32	S4UL
Benzo (g h i)perylene	360	S4UL
Total PAH Screen	**67.1**	B(a)P / 0.15

Contaminant	Screening Value mg/kg	Data Source
Hydrocarbons		
Banded TPH (8-10)	169	Calc1
Banded TPH (10-12)	908	Calc1
Banded TPH (12-16)	3538	Calc1
Banded TPH (16-21)	2923	Calc1
Banded TPH (21-35)	2923	Calc1
Benzene	1.4	C4SL
Toluene	320	SGV
Ethyl Benzene	180	SGV
Xylene	120	SGV
Aliphatic C5-C6	78	S4UL
Aliphatic C6-C8	230	S4UL
Aliphatic C8-C10	65	S4UL
Aliphatic C10-C12	330	S4UL
Aliphatic C12-C16	2400	S4UL
Aliphatic C16-C35	92,000	S4UL
Aromatic C6-C7	See Benzene	S4UL
Aromatic C7-C8	See Toluene	S4UL
Aromatic C8-C10	110	S4UL
Aromatic C10-C12	590	S4UL
Aromatic C12-C16	2300	S4UL
Aromatic C16-C21	1900	S4UL
Aromatic C21-C35	1900	S4UL
PRO (C_5 –C_{10})	804	Calc2
DRO (C_{12} –C_{28})	98,600	Calc2
Lube Oil (C_{28} –C_{44})	93,900	Calc2
TPH	**500**	Trigger to consider speciated testing
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	18	S4UL
tetrachloroethane (PCA)	3.5	S4UL
tetrachloroethene (PCE)	0.4	S4UL
trichloroethene (TCE)	0.036	S4UL
1,2-dichloroethane (DCA)	0.013	S4UL
vinyl chloride (Chloroethene)	0.001	S4UL
tetrachloromethane (Carbon tetra	0.056	S4UL
trichloromethane (Chloroform)	2.1	S4UL

Notes

Concentrations measured below these screening values may be considered to represent 'uncontaminated conditions' which pose a 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009 - where not superseded by C4SL

S4UL - LQM/CIEH Suitable for use Level (2015) based on 'minimal' level of risk

Calc1 - sum of thresholds for Ali & Aro fractions - assuming a 35% Aro:65% Ali ratio as is commonly encountered in the soil

Calc2 - sum of nearest available carbon range specified including BTEX for PRO fraction

Total PAH based on B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene rarely exceeds 15% of the total PAH concentration

SERVICE / INSPECTION SHEET

Instrument House
91-92 Shrivenham Hundred Business Park
Watchfield
Oxfordshire
SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

JOB NUMBER: 69040
INSTRUMENT: Phocheck Tiger

SERIAL NUMBER: T-114545
DATE RECEIVED: 15/09/2020

FIRMWARE: V0.5.12
UPGRADED TO:

CUSTOMER: Geotechnical & Environmental Associates Ltd

ITEMS RECEIVED	Received	RTN?
Instrument	yes	
Rubber Boot	yes	
Battery Charger		
Charging Cradle		
Operation Manual		
Quick Start Guide		
Spares Kit		
Comms Cable		
Probe FLEXI		
Peli Case		
Tubing		
Regulator		
Software (Memory Stick)		
PLASTIC CASE		
	SIGNED:	

TESTS	Pre Service	Post Service
Charger Test		N/A
Battery charge Test		OK
Lamp Test		OK
Air Flow Test ≥ 200ml/min	682ml/min	258ml/min
Block Flow Test ≤ 15ml/min		OK
Moisture Sensitivity = 0.0ppm		0.0ppm
Switch Test		OK
Sensor Test		OK
Alarm Test		OK
PC Comms Test		OK
Datalog Test		OK
Display Test		OK
Physical Inspection		OK
PAT Test		N/A
Firmware Upgrade		N/A
Software Upgrade (usb)		N/A
Function Test	FAIL	OK

Pump flow error when unit first turned on
Upon further inspection, found pump was blowing out and not drawing in. Replaced the pump
Screw housing damaged on sensor basket, replaced
Sensor cover damaged while removing basket as screw was only free spinning, replaced
Replaced inlet outlet seals, stack and filter as part of the service
Flow measured at 147ml/min with new pump, replaced pneumatics and now flow is reading 258ml/min
Cleaned the lamp with aluminium oxide
Unit has been repaired, calibrated and tested

TECHNICIAN: Jack Cheshire DATE: 22/09/2020

shawcity LIMITED
LIFE-SAVING SOLUTIONS

CERTIFICATE OF CALIBRATION
Phocheck Tiger

CALIBRATION CERTIFICATE NO: 69040

ISSUED BY: SHAWCITY LIMITED
DATE: 22-Sep-20

APPROVED SIGNATORY: JCheshire

NAME: Jack Cheshire

CUSTOMER: Geotechnical & Environmental Associates Ltd
INSTRUMENT: PhoCheck Tiger
SERIAL NUMBER: T-114545

CALIBRATION METHOD: CM03
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference value is that generated by the certified source and the indicated value is that measured by the instrument.

CALIBRATION RESULTS

GAS	LOT No	REF. VALUE	INDICATED VALUE
Isobutylene	WO260295-3	100 ppm	100 ppm
Isobutylene	WO163878-1	5000 ppm	5000 ppm

COMMENTS:
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is ±2 %
The results indicate that the instrument conforms to the applicable parts of the published specification.

Tel: 01793 780622
www.shawcity.co.uk
Instrument House, 91-92 Shrivenham Hundred Business Park
Watchfield, Oxfordshire, SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

PARTS REQUIRED FOR JOB NUMBER:

DESCRIPTION	PART NO.	QTY	Serial No.	LOC
10.6 Lamp	LA4TM600			S4H B1
Lamp Stack	A-846267			S4H B3
PTFE Filter Disk	861221-1	1		S4H B2
Probe O-Ring	5/OV-02			S4H B4
Sensor seal	A-861214			S4H B1
Probe	880207			S4E B1
Probe Kit	A-880210			S4H B4
Filter Clamp (black)	880201			S4E B1
Probe Seal	880202			S4E B5
Filter Clamp (clear)	861219			S4H B6
Pump	A-861298	1		S4F B2
Manifold	861213			S4E B6
Outlet Barbs	5/JHS-03			S4E B6
Sensor Basket	861203-8	1		S4H B2
Sensor Cover	A-861259	1		S4G B5
Tubing Inv Cone	5/JO-01			S4D B1
Tiger Battery	A-861240			S4G B1
Inlet Outlet Seal	861215	2		S4H B5
Display	1/OM-05			S4E B3
Battery Charging Cradle/Dock	A-861220			S4F B2
Charger Lead	1/VS-22			S4F B3
Fuse FU100/101/103/105/106	1/FB-10			S4G B3
FU1 fuse	1/FB-12			S3A B1
Top Housing	A-861551			service
Charging Dock Magnet	2/AP-08			S4C B2
Bottom Housing	861203-2			S4F B4
Pneumatics Kit	A-861509	1		S4F B3
Tiger Battery	A-861240			S4G B1
Sensor PCB	A-861103			S4E B5
Orange stack for Tiger LT	A-846496	1		S4C B1
PAT Test	PAT 1			
Mainboard Assembly	A-861120			