

# STAGE 1 REPORT – PHASE 1 DESK STUDY AND PHASE 2 SHALLOW SOIL INVESTIGATION REPORT

Edward Woods Estate, Hammersmith, London



HLEI69658  
Stage 1 Report  
v0  
July 2019

**Document status**

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
0	Draft	LH	NT	JL	25/07/2019
1	Final	LH	NT	JL	29/07/2019

**Approval for issue**

Jim Lightbown



29 July 2019

© Copyright RPS Group Plc. All rights reserved.

The report has been prepared for the exclusive use of our client and unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS'), no other party may use, make use of, or rely on the contents of this report. The report has been compiled using the resources agreed with the client and in accordance with the scope of work agreed with the client. No liability is accepted by RPS for any use of this report, other than the purpose for which it was prepared. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report. RPS does not accept any responsibility or liability for loss whatsoever to any third party caused by, related to or arising out of any use or reliance on the report.

RPS accepts no responsibility for any documents or information supplied to RPS by others and no legal liability arising from the use by others of opinions or data contained in this report. It is expressly stated that no independent verification of any documents or information supplied by others has been made. RPS has used reasonable skill, care and diligence in compiling this report and no warranty is provided as to the report's accuracy. No part of this report may be copied or reproduced, by any means, without the prior written consent of RPS.

Prepared by:

**RPS**

Liz Holland  
Senior Consultant

20 Farringdon Street  
London, EC4A 4AB

T +44 20 7280 3240  
E [rpslon@rps.com](mailto:rpslon@rps.com)

Prepared for:

**London Borough of Hammersmith and Fulham**

---

# Contents

<b>EXECUTIVE SUMMARY</b> .....	<b>I</b>
<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 Preamble .....	1
1.2 Objectives .....	1
1.3 Legislation and Guidance .....	2
1.4 Previous Reports .....	2
<b>2 PHASE 1 DESK STUDY</b> .....	<b>4</b>
2.1 Site Reconnaissance .....	4
2.2 Proposed Development .....	5
2.3 Local Authority Consultation .....	5
2.4 Site History .....	6
2.5 Authorised Processes and Pollution Incidents .....	9
<b>3 PRELIMINARY CONCEPTUAL SITE MODEL</b> .....	<b>10</b>
3.1 Background .....	10
3.2 Potential Pollutant Linkages .....	10
3.3 Outline Conceptual Site Model .....	11
3.4 Potential Contaminants of Concern associated with Identified Potential Sources .....	12
<b>4 PHASE 2 SHALLOW SOIL INVESTIGATION</b> .....	<b>14</b>
4.1 Introduction .....	14
4.2 Description of Works .....	14
4.3 Laboratory Testing .....	15
<b>5 SITE INVESTIGATION FINDINGS</b> .....	<b>16</b>
5.1 Ground Conditions .....	16
5.2 Field Evidence of Contamination .....	18
<b>6 CHEMICAL RESULTS AND ASSESSMENT</b> .....	<b>19</b>
6.1 Human Health Assessment Criteria .....	19
6.2 Comparison of Soil Analyses to Assessment Criteria .....	19
<b>7 REVISED CONCEPTUAL SITE MODEL</b> .....	<b>23</b>
7.1 Introduction .....	23
7.2 Potential Risk to Existing and Future Site Users .....	23
7.3 Revised Conceptual Site Model .....	23
<b>8 CONCLUSIONS AND RECOMMENDATIONS</b> .....	<b>25</b>

---

## Tables

Table 1 – Summary of on-site activities.....	4
Table 2 – Neighbouring Land Uses .....	5
Table 3 – Historical Site Uses .....	6
Table 4 – Historical Neighbouring Site Uses (within 100m) .....	7
Table 5 – Outline Conceptual Site Model .....	12
Table 6 – Encountered Ground Conditions and Details of Samples .....	16
Table 7 – Visual and Olfactory Evidence of Contamination .....	18
Table 8 – Summary of Contaminants of Concern within Surface Soil Samples at Concentrations exceeding their AC .....	19
Table 9 – Revised Conceptual Site Model .....	23

## Figures

Historical Map Extract: 1869 -1870  
Historical Map Extract: 1916  
Historical Map Extract: 1968  
Historical Map Extract: 1971  
Historical Map Extract: 1991

## Appendices

Appendix A General Notes  
Appendix B Site Walkover Photographs  
Appendix C LBHF and RBKC Consultation Responses  
Appendix D Part 2A (The Contaminated Land Regime)  
Appendix E Soil Sampling Photographs  
Appendix F Comparison of Analytical Data to Assessment Criteria  
Appendix G Laboratory Analytical Certificates

---

## EXECUTIVE SUMMARY

RPS Consulting Services Ltd (RPS) was commissioned by the London Borough of Hammersmith and Fulham (LBHF) to undertake a Phase 1 Desk Study and Phase 2 Shallow Soil Investigation of the Edward Woods Estate, Hammersmith, London W11. The estate is located within the LBHF, approximately 500m to the south-southwest of the Grenfell Tower. The estate is owned and maintained by the Council. Residents of the estate have raised concerns that contaminants originating from the Grenfell Tower fire of 14<sup>th</sup> June 2017 may have impacted the site.

RPS has therefore undertaken an assessment (comprising a Phase 1 Desk Study and Phase 2 Shallow Soil Investigation) to determine whether surface soils in areas of soft landscaping contain contaminants of concern that may have originated from the fire and, if present, whether the concentrations of these contaminants of concern may pose a potentially significant risk to site-users.

The site investigation was carried out between 6<sup>th</sup> and 11<sup>th</sup> June 2019 and comprised the collection of primary surface soil samples (S1 to S15) from 15 locations in areas of soft landscaping at the site; and collection of three samples of Made Ground (C1 to C3) from beneath areas of hardstanding across the site, for control purposes. Soil samples were generally taken from open areas that may have been exposed to wind entrained deposition of contaminants from the Grenfell Tower site. Areas beneath tree cover or other tall structures, either natural or man-made, were therefore avoided, as far as practicable. Samples were not taken from areas where there was evidence to suggest that the soil had been disturbed, cultivated or had fresh soil added since the Grenfell Tower fire.

The surface soil samples and control samples were analysed for a number of contaminants potentially associated with the Grenfell Tower fire, in addition to those typically associated with potential current and historical on and off-site sources of contamination.

The concentrations of contaminants detected within surface soil samples collected from areas of soft landscaping were compared to available generic assessment criteria (AC) protective of existing and future site users.

A limited number of contaminants were detected at concentrations above the available AC in isolated locations. However, it is considered that the detected concentrations of contaminants are unlikely to pose a potentially significant risk to existing and/or future site users.

The nature and isolated occurrence of the elevated concentrations of contaminants within soil samples are not considered to be consistent with the widespread deposition that would be anticipated from an airborne plume from the Grenfell Tower fire. Given the general absence of historical or current potential sources in areas of these elevated concentrations, the contaminants may have been pre-existing within the topsoil imported at this location upon development of the Edward Woods Estate (c.1968), or subsequent reconfigurations of soft landscaping (prior to the Grenfell Tower fire).

Although this report is not focused on any proposed development at the site, it is noted that several Council regeneration projects are under consideration; these include a Peace Garden and a Nourish Food Growing Site. It is therefore recommended that soil in areas of proposed landscaping projects at the estate (such as the Peace Garden and Nourish Food Growing site) is assessed to confirm suitability for use prior to redevelopment and that raised planters with suitable topsoil be used where it is intended to grow produce for consumption.

---

# 1 INTRODUCTION

## 1.1 Preamble

1.1.1 RPS Consulting Services Ltd (RPS) was commissioned by the London Borough of Hammersmith and Fulham (LBHF) to undertake a Phase 1 Desk Study and Phase 2 Shallow Soil Investigation of the Edward Woods Estate, Hammersmith, London W11.

1.1.2 The Edward Woods Estate is located within the LBHF, approximately 500m to the south-southwest of the Grenfell Tower. A site location plan is presented as Figure 1 and a site boundary plan as Figure 2. The estate is owned and maintained by the Council. Residents of the estate have raised concerns that contaminants originating from the Grenfell Tower fire of 14<sup>th</sup> June 2017 may have impacted the site. It has therefore been requested that RPS undertakes an assessment to determine whether soil in areas of soft landscaping at the estate may have been detrimentally impacted by the fire.

1.1.3 The scope of assessment is proposed to be phased as follows:

- Stage 1: To comprise a Phase 1 Desk Study and Phase 2 Shallow Soil Investigation to determine whether surface soils in areas of soft landscaping contain contaminants of concern that may have originated from the fire are present in surface soils at the site and, if present, whether the concentrations of these contaminants of concern may pose a potentially significant risk to site-users. Generic quantitative risk assessment will be carried out with chemical analytical data compared to industry recognised published screening values (generic assessment criteria, where available).
- Stage 2: Where contaminants of concern are identified in surface soils at concentrations that may pose a potentially significant risk to site users, further assessment will be undertaken to determine whether these concentrations are likely to have resulted from the Grenfell Tower fire. This will include chemical analysis of deeper soils at selected locations to determine contaminant concentration variations through the shallow soil profile and comparison of concentrations encountered to publicly available background soil concentration data, where available; and
- Stage 3: To comprise detailed quantitative risk assessment (DQRA) to determine whether any exceedances of generic assessment criteria, when accounting for site specific conditions, are still considered to pose a potential risk to site users. This will comprise the derivation of site specific assessment criteria for relevant contaminants of concern and recommendations for remediation/mitigation measures where these are exceeded by concentrations encountered.

1.1.4 This document reports on the results of the Stage 1 phase of the works.

1.1.5 Although this report is not focused on any proposed development at the site, it is noted that several Council regeneration projects are under consideration; these include a Peace Garden and a Nourish Food Growing Site. The Peace Garden will feature new planting, benches, paths and some sculptures/art features. The garden will be located in the centre of the estate, behind the Evergreen Club Building. The proposed location of the Nourish Food Growing Site this project has not been finalised, however there are three preferred locations: Area 1, located in the east of the site (behind the Nourish Hub); Area 2, located in the southeast of the site (currently open space across from the Community Centre); and Area 3, located in the northwest of the site (currently green space at the base of Stebbing House).

## 1.2 Objectives

1.2.1 The principal objective of the Phase 1 Desk Study element of Stage 1 was to assess whether contaminants of concern that may have originated from the Grenfell Tower fire of 14<sup>th</sup> June 2017

---

are present in surface soils at the site and, if present, whether the concentrations of these contaminants of concern may pose a potentially significant risk to site-users.

- 1.2.2 As part of this assessment it is necessary to consider all potential sources of contaminants of concern, associated with historical and current land uses both on and off-site, which may have resulted in antecedent concentrations of contaminants of concern to be present prior to the fire or resulted in variations in the concentrations of contaminants (if present) through the shallow soil profile. This assessment will be restricted to the assessment of potential risks to existing and future on site residents from any potential contaminants of concern within shallow soils in areas of soft landscaping at the site only.
- 1.2.3 Chemical data obtained during the Phase 2 Shallow Soil Investigation will be compared to industry recognised screening values (generic assessment criteria, where available) and a generic quantitative risk assessment will be carried out to determine whether surface soils in areas of soft landscaping contain contaminants of concern at concentrations that may pose a potentially significant risk to site users. .

## 1.3 Legislation and Guidance

- 1.3.1 This report has been produced in general accordance with:
- Contaminated Land (England) Regulations 2006 (as amended);
  - DEFRA Environmental Protection Act 1990: Part 2A - *Contaminated Land Statutory Guidance* (2012);
  - DEFRA and Environment Agency (2004) Contaminated Land Report 11 (CLR 11): *Model Procedures for the Management of Land Contamination*;
  - British Standard requirements for the '*Investigation of potentially contaminated sites - Code of practice*' (ref. BS10175:2011+A1:2013); and
  - British Standard requirements for the '*Code of practice for ground investigations*' (ref. BS5930:2015).
- 1.3.2 Details of the limitations of this type of assessment are described in Appendix A.

## 1.4 Previous Reports

**Anna A Stec, Kathryn Dickens, Jessica L.J Barnes, and Clare Bedford. 2019. Environmental Contamination Following the Grenfell Tower Fire. Chemosphere, 226, pp. 576-586.**

- 1.4.1 A scientific paper was published by Stec et al. (Chemosphere, 226, pg. 576-586) titled Environmental Contamination Following the Grenfell Tower Fire.
- 1.4.2 The paper presented background information regarding potential contaminants of concern associated with fires, which were reported to include: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), isocyanates, polychloro- and polybromo dibenzo-p-dioxins and dibenzofurans (PCDD/Fs and PBDD/Fs) and polychlorinated biphenyls (PCBs).
- 1.4.3 Soil samples from six locations (up to 1.2km from the Grenfell Tower) as part of the study, together with semi-burnt fire debris and char samples, were collected one and six months after the fire. Additionally, dust samples and condensates were collected from a flat located approximately 160m from the Tower (after 17 months). Samples were analysed for common potentially toxic components of fire effluents and synthetic vitreous fibres.

- 
- 1.4.4 Samples collected within 140m of the Grenfell Tower showed elevated concentrations of a number of toxicants, these included: polychlorinated dibenzo-p-dioxin (at 60 times greater than UK urban reference soil level), benzene (40 times greater) and six PAHs (160 times greater). Benzene, PAHs, isocyanates and phosphorous flame retardants were recorded in the char and partially burnt debris samples.
- 1.4.5 RPS cannot vouch for the accuracy or validity of the information provided within third party reports.



---

## 2 PHASE 1 DESK STUDY

### 2.1 Site Reconnaissance

2.1.1 This section of the report is based upon observations made during a site visit carried out on 16<sup>th</sup> April 2019. It should be noted that the site inspection focussed on areas of soft landscaping across the site. It was therefore not considered that internal access to the buildings would be required. A site boundary plan is provided as Figure 2.

#### The Site

**Table 1 – Summary of on-site activities**

Section	Description
<i>Background:</i>	<p>The site is located to the east of Shepherd's Bush, approximately 185m to northeast of Shepherd's Bush Underground station. The site is centred at National Grid Coordinates 523850, 180260. It is irregular in shape and occupies an area of approximately 3.35ha.</p> <p>The estate includes the following residential buildings:</p> <p>Boxmoor House, an L-shaped building located in the west, five storeys in height. Lock up garages were present on the ground floor level on the western side of this building.</p> <p>Hume House, an L-shaped building located in the south, five storeys in height. Lock up garages were present on the ground floor level of this building.</p> <p>Mortimer House, a U-shaped building located in the northeast, five storeys in height. Lock up garages were present on the ground floor level of this building, along the eastern and northern sides. Several shops were also present on the ground floor level, as discussed below.</p> <p>Norland House, a rectangular tower block, located in the south.</p> <p>Poynter House, a rectangular tower block, located in the east.</p> <p>Stebbing House, a rectangular tower block, located in the northwest.</p> <p>Swanscombe House, a U-shaped building, located in the east, five storeys in height. Shops were present on the ground floor level of this building, as discussed below.</p> <p>In addition, offices were present in some parts of Norland House, Poynter House and Stebbing House.</p> <p>A row of shops was located in the east of the site on the ground floor of the Swanscombe House building. Uses included a pharmacy, hair &amp; beauty salon, bakery, butchers, grocers, newsagents and a laundrette &amp; dry cleaners.</p>
<i>Site Layout, Activity / Operations:</i>	<p>Several shops were located on part of the ground floor of Mortimer House, these included a furniture shop, carpet store, hardware shop and a salon.</p> <p>Areas of soft landscaping were present across the site. The main areas were located in the centre of the site, two of which comprised children's play areas (see Appendix B, Photos 1, 2 and 3).</p> <p>A strip of soft landscaping was present along the western boundary of the site, labelled as a dog exercise area (see Appendix B, Photo 4).</p> <p>A play area was present in the north of the site, associated with Mortimer House (see Appendix B, Photo 5). The site representative advised that works had recently been undertaken to the play area, these were started before the Grenfell Tower fire incident and were finished after the incident. RPS was advised that a limited amount of material was excavated and no soil was brought in as part of the works.</p> <p>An area of soft landscaping was located to the north of Swanscombe House.</p> <p>A small area of soft landscaping was present to the east of Poynter House (see Appendix B, Photo 6). The site representative advised that this was not maintained by LBHF, rather that this was associated with the offices located in Poynter House.</p> <p>Raised planters were present to the north of Boxmoor House (see Appendix B, Photo 7).</p> <p>Areas of car parking were present across the site. Designated visitor parking was located in the northwest of the site.</p>

Section	Description
<i>Bulk Storage / Tanks:</i>	No bulk storage of hazardous materials was observed during the walkover. The site representative confirmed that they were not aware of any storage of these types of materials on site.
<i>Waste:</i>	A number of 1,000 litre wheeled bins were observed across the site, for both general and recyclable waste items.
<i>Air Emissions:</i>	No potentially significant sources of air emissions were readily observable during the walkover.
<i>Electricity Substations / Transformers:</i>	Three electricity substations/transformers were noted during the site walkover. One was located on the ground floor of Poynter House, another on the ground floor of Norland House and one on the ground floor of Boxmoor House. Signage indicates that these were owned and operated by UK Power Networks.
<i>Visual evidence of Contamination:</i>	No visual evidence of contamination was observed during the site walkover. No evidence of any remnant material from bonfires/barbeques was noted on site during the walkover.
<i>Other Issues:</i>	A specialist RPS asbestos consultant attended site to carry out a visual inspection for asbestos containing materials (ACMs) in areas of soft landscaping. No readily observable ACMs were identified.

## The Surrounding Area

2.1.2 The site is located in an area of mixed residential and commercial land use. At the time of the site inspection, neighbouring land consisted of the following:

**Table 2 – Neighbouring Land Uses**

Direction	Description
<i>North:</i>	Norland North Park with residential dwellings to the northwest.
<i>East:</i>	Residential dwellings (not associated with the estate) were present to the east of Poynter House. Student accommodation (Yara Central Holland Park) was present to the east of Mortimer House.
<i>Northeast:</i>	St Ann's Road was present to the east of the site with residential dwellings beyond.
<i>Southeast:</i>	Norland Road with Edward Woods Community Centre and a Sikh Temple beyond.
<i>South:</i>	Queensdale Crescent, with residential dwellings beyond.
<i>West:</i>	West Cross Route (A3220) with Westfield London beyond.

2.1.3 The Grenfell Tower is located approximately 500m to the south-southwest of the site.

## 2.2 Proposed Development

2.2.1 Although this report is not focussed on any proposed development at the site, it is noted that the following Council projects are being considered for the site:

- Peace Garden: The garden will feature new planting, benches, paths and some sculptures/art features. The garden will be located in the centre of the estate; and
- Nourish Food Growing Site: The proposed location of this project has not been finalised, however there are three preferred locations at the site. These include: Area 1, located in the east of the site (behind the Nourish Hub); Area 2, located in the southeast of the site (currently open space across from the Community Centre); and Area 3, located in the northwest of the site (currently green space at the base of Stebbing House). The Council has advised RPS that when considering food growing on estates they always use planters/raised beds which are lined to seal them off from the underlying ground. Imported soil is obtained from trusted suppliers and meets the safety standards required to be used for food growing.

## 2.3 Local Authority Consultation

2.3.1 As part of the assessment, the Environmental Quality Team at LBHF was consulted regarding the historical uses of the site and surrounding area and any known contamination issues the site. In addition, given that the eastern boundary and part of the northern boundary borders the Royal

Borough of Kensington and Chelsea (RBKC), the Environmental Quality Team at RBKC was also consulted.

- 2.3.2 Further to LBHF’s review of historical land uses, the site has been identified as potentially contaminated as per Part 2A of the Environmental Protection Act 1990 and is prioritised for further inspection under the Council’s Contaminated Land Strategy. The highest risk part of the site is placed in the third highest of eight categories. The Council advised that a timeframe for further investigation has not yet been established.
- 2.3.3 The information provided by LBHF and RBKC is incorporated into the following sections of the report, where relevant. Copies of the Councils’ responses are provided in Appendix C.

## 2.4 Site History

### Historical Map Review

- 2.4.1 The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500 and 1:10,000 dated 1869 to 2019. Extracts from selected historical maps are given as Figure 3 to Figure 7.

**Table 3 – Historical Site Uses**

On-site Land Use and Features	Dates
The northern half of the site comprised rows of terraced residential dwellings and associated gardens, situated along Clifton Street.	1869 to c.1969
The majority of the south of the site comprised vacant land. St. George’s Road ran along the western boundary of the site.	1869 to c.1896
Queen’s Road was present in the far south of the site, with several terraced residential dwellings.	1869 to c.1969
A public house was present in the north of the site.	1869 to c.1969
Additional rows of terraced residential dwellings were present across the centre and south of the site, along Boundary Road and Saunders Road.	1896 to c.1915
A school was indicated to be present in the west of the site.	1896 to c.1954
<i>Then</i> the school was labelled as Saunders Grove Primary School.	1954 to c.1968
A laundry was indicated to be situated partially in the north of the site.	1896 to c.1954
Industrial type buildings of unspecified use were indicated to be present in the north of the site, between Clifton Street and Boundary Road.	1896 to c.1954
<i>Then</i> the industrial type buildings had been further extended.*	1954 to c.1968
Clifton Street and Boundary Road had been renamed as Poynter Street and Swanscombe Road respectively.	1954 to c.1969
A further industrial type building had been constructed between Poynter Street and Swanscombe Road, with a separate entrance evident in the western end of Swanscombe Road.**	1954 to c.1968
Queens Road had been renamed as Hume Road.	1915 to c.1969
The site had undergone significant redevelopment with the terraced properties and industrial type buildings in the north of the site no longer indicated to be present. The site comprised a large building of unspecified use in the south and Clifton House in the northwest (likely residential buildings).	1968 to c.1971
Poynter House and Swanscombe House were indicated to be present in the east of the site and Mortimer House in the northeast (all likely residential buildings).	1968 to Present
An electricity substation was indicated to be present in the east.	1968 to at least 1994
A row of terraced buildings was present in the east, one of which was labelled as a surgery.	1968 to Present
Clifton House in the northwest had been renamed as Stebbing House, with the building having been extended westwards. Boxmoor House was present in the centre of the site. The existing large building of unspecified use in the south was labelled as Norland House. Hume House was present in the south, beyond Norland House. An area of trees was indicated to be present along the western boundary of the site.	1971 to Present
A playground was indicated to be present in the east of the site.	1984 to Present
An additional area of playground was indicated to be present in the east of the site.	1994 to Present

\* A series of planning applications were approved in the 1950s regarding the use of this site as a joinery in connection with a builder and contractor – Y.J. Lovell & Son Ltd. Permission ref: 1952/00205/HIST was granted in September 1952 for the installation of a sawdust extraction plant at this site. Planning permission ref: 1953/00376/HIST was approved in April 1953 for the installation of a petrol pump and underground tank at a premises to the rear of Swanscombe Road; the applicant was Y. J. Lovell & Son Ltd. Planning permission ref: 1953/00261/HIST was granted in February 1952 for this

site to be occupied by, amongst other industrial features, an enclosure to a petrol and diesel store. Permission ref: 1954/00287/HIST was granted in April 1954 for the retention of an extension at the existing joinery workshop at this site.

\*\* Council records indicate that planning permission ref: 1952/00321/HIST was granted in May 1952 for the retention of a scaffolding rack, a shed for storage, French Polishing and wire fence in connection with the continued use of 68 Norland Gardens by Y.J. Lovell and Son Ltd.

2.4.2 In addition, LBHF council records indicate that in 1829, a deep sewer bisected the site, running north to south. LBHF has also provided a map dated 1830 (pre-dating readily available OS mapping) which indicates that the site primarily comprised undeveloped land. Several buildings of unspecified use were shown in the south of the site and part of a large area of excavation was located in the northwest of the site (extending 130m from the western site boundary). From at least 1852, the excavation was no longer indicated to be present, having been potentially infilled. Council records indicate that deep Made Ground was present adjacent to the north of the site, indicative of this area also having been used as a brickfield. Data provided as part of an environmental report indicates that this likely comprised Norland Brick Fields, which operated as an open cast site, and the commodity comprised 'common clay and shale'.

**Table 4 – Historical Neighbouring Site Uses (within 100m)**

Surrounding Land Uses (100m radius)	Orientation	Distance	Dates	
			From	To
Builders yard*	Northwest	5m	1954	c.1968
Masonry works	Southwest	10m	1954	c.1968
Electricity substation	Southeast	10m	1954	c.1968
Railway lines		20m	1869	c.1968
<i>Then</i> a number of the railway lines were labelled as a dismantled railway. Several railway lines remained.	West	25m	1968	Present
Engineering works	North	25m	1954	c.1968
Laundry	North	30m	1916	c.1968
Scrap yard	North	30m	1991	c.1993
Industrial type building of unspecified use			1896	c.1954
<i>Then</i> garage	Southeast	35m	1954	At least 1994
Engineering works			1954	c.1973
<i>Then</i> works	East	70m	1973	c.1991
Coal depot, sidings and weighing machines associated with the railway line			1869	c.1916
<i>Then</i> the coal depot had expanded westwards and was labelled as a goods and coal yard with associated sidings and cranes	West	75m	1916	c.1971
Timber yard	South	80m	1954	c.1968
Carton Factory			1969	c.1971
<i>Then</i> printing works	North	90m	1971	c.1984
<i>Then</i> works				c.1999
Commercial vehicle park	West	100m	1984	c.2019

\* Council records indicate that in 1954, the builders' yard was occupied by Ferguson's Timber Yard.

## Site Planning History

2.4.3 LBHF has provided information regarding a number of historical planning applications relating to the site, as listed below:

- Planning permission refs: 1955/00327/HIST, 1956/00346/HIST and 1957/00290/HIST were approved in July 1955, November 1956 and October 1957 respectively for the retention of an extension to the joinery workshop at the site (in the north of the site), the retention of a scaffold rack, shed for storage and French Polishing and a wire fence and the continued use of No 6 Norland Gardens in connection with the business of Builder and Contractor, Y.J. Lovell and Son Ltd.'s premises at 13 Latimer Road and 68 Norland Gardens;

- Planning permission ref: 1972/00184/HIST was granted in May of 1972 for the infilling of open space below the podium deck at 10 Swanscombe Road in the centre of the site for the use as a cold storage room in connection with the butcher shop at 10 Swanscombe Road;
- Planning permission ref: 1983/00054/FUL was granted in March of 1983 for the change of use of the car park at Poynter House to enclosed storage with an ancillary workshop facility;
- A planning application, ref: 1987/01105/FUL, withdrawn in March 1989, lists the current use of the under-podium parking area at Swanscombe House as a workshop, store and offices;
- Council records indicate that planning permission ref: 1999/02681/FUL was granted in June 2000 for the redevelopment of the subject property area and land to the immediate north. The redevelopment comprised the demolition of Saunders House (located to the north of the subject site) and the podium decks of Swanscombe House and Mortimer House and the erection of 122 replacement dwellings and associated landscaping. The records indicate that a condition was placed on this permission requiring contaminated land to be addressed. The Council holds records that a contaminated land site investigation was undertaken and remediation recommended, including the installation of gas abatement measures and the importation of clean topsoil in landscaping areas. These records show that remediation of future garden areas and soft landscaping on land to the immediate north of the site was undertaken with imported soils meeting accepted industry standards at the time. Gas protection measures in the form of passive venting and a damp proof membrane were recommended on the basis of elevated concentrations of carbon dioxide at two locations. However, the council advised that it is not known if these measures were implemented or validated in the final construction; and
- Planning permission ref: 2007/03907/FR3 was granted in May 2008 at Norland, Poynter and Stebbing Houses for the creation of additional residential and office space and re-landscaping. Planning conditions related to the assessment of potentially contaminated land at the site were attached. The Council advised that formal submissions have not yet been made to address these conditions. However, LBHF is aware that validation of remediation work was undertaken in 2003 by Casella Stanger for an area to the north of the subject site named Hunt's Close (which was redeveloped to comprise flats). LBHF advised that as part of the redevelopment works, a clean cover layer (at least 0.50m in thickness) was installed across an area of soft landscaping (associated with the flats). The material was sampled as part of the validation work.

2.4.4 In addition, LBHF has advised RPS of planning applications relating to two redevelopments in the immediate area of the site, namely:

- Planning permission ref: 1998/00063/FUL was granted in February of 1998 for the erection of houses and flats with associated parking and landscaping at 7 Swanscombe Road. RPS understands that 7 Swanscombe Road is located adjacent to the south of the site; and
- Planning permission ref: 2012/01358/FUL was granted for the redevelopment of the site of the former public house, located adjacent to the northeast of the site, by the erection of a part 5, part 6 storey building comprising housing for student housing with ancillary accommodation building. Conditions requiring the investigation, assessment and, if necessary, remediation of land contamination were applied to this permission. These were discharged in full, to the satisfaction of the local authority between June 2013 and September 2014 (under planning applications ref: 2013/02349/DET, ref: 2013/04479/DET and ref: 2014/04273/DET). RPS carried out the assessments to support the discharge of the conditions relating to potentially contaminated land, including a Phase 1 and Phase 2 Environmental and Geotechnical Site Investigation (ref: HLEI18962/001R, dated 2012), a Gas Monitoring Letter Report (ref: HLEI27687/002R, dated September 2013), a Remediation Method Statement (ref: HLEI27687/003L, dated 11th October 2013) and a Final Validation report (ref: HLEI27687/005L, dated 30th July 2014).

---

## 2.5 Authorised Processes and Pollution Incidents

### Landfills and Waste Sites

- 2.5.1 Data provided by the EA, Local Authority and BGS indicates that there are no recorded licensed or known historical landfill sites located within 250m of the site. There are also no active waste treatment / transfer sites recorded within 250m of the site.

### Environmental Permits

- 2.5.2 EA and Local Authority data indicates that there are no active processes regulated by an Environmental Permit (under the Environmental Permitting (England and Wales Regulations 2016)) within 250m of the subject site.

### COMAH Sites

- 2.5.3 There are no records of any operations under the Control of Major Accident Hazards (COMAH) Regulations 1999, located within 500m of the site.

### Pollution Incidents

- 2.5.4 Environment Agency data indicates that there are no records of 'major' or 'significant' pollution incidents to land or water within 500m of the site.

### Contemporary Trade Directory Entries

- 2.5.5 Information provided as part of an environmental data report indicates that there is one active entry listed as being present at the site. This relates to Azpa Hardware Store, which is located in the northeast of the site.
- 2.5.6 There are also five inactive entries listed as being present at the site, these include:
- Ecl Contract – a cladding suppliers and installers, located in the south;
  - Elgy Group Rentals – radio communication equipment, located in the northwest;
  - Cara – Breakdown and recovery, located in the northwest;
  - Bidwell Metals Ltd – Scrap metal merchants, located in the northwest; and
  - Pristine Laundrette – Laundries and laundrettes, located in the east.
- 2.5.7 RPS notes that at the time of the walkover, Pristine Laundrette was operational. The Azpa Hardware Store was located in a row of shops on the ground floor level of Mortimer House.

---

## 3 PRELIMINARY CONCEPTUAL SITE MODEL

### 3.1 Background

3.1.1 An outline conceptual site model (CSM) consists of an appraisal of the *source-pathway-receptor* 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.

- **Source** referring to the source of contamination (Hazard).
- **Pathway** for the contaminant to move/migrate to receptor(s).
- **Receptor** (Target) that could be affected by the contaminant(s).

3.1.2 Further details on the Part 2A regime are presented within Appendix D.

### 3.2 Potential Pollutant Linkages

3.2.1 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained as part of the Phase 1 Desk Study and are discussed in the following section. Given the objectives of the assessment, the following section focuses solely on potential risks to existing and future site users from potential contaminants of concern in areas of soft landscaping.

#### Potential Contaminant Sources

3.2.2 This assessment only considers sources that may have resulted in contaminants of concern being present within the shallow soil profile at the site. These have been split into the following main categories:

##### 1) Airborne Sources

3.2.3 Airborne sources may have resulted in the deposition of airborne contaminants of concern (including those on carrier particles). The primary airborne source of concern, with regards to this assessment, is the Grenfell Tower fire.

3.2.4 Consideration should also be given to vehicle exhaust effluents from the West Cross Route (A3220) located adjacent to the west of the site boundary.

3.2.5 Historical airborne sources prior to redevelopment of the site to its current form are not to be considered in this section as any deposition of these would subsequently be represented as potential contamination within historical Made Ground (see below).

##### 2) Surface Sources

3.2.6 On site, or nearby off-site sources of contamination that may have resulted in direct entry of contaminants of concern into surface soils. The only current significant surface source is considered to be the electrical substations at the site and the potential for spillage of polychlorinated biphenyls (PCBs) during historical maintenance.

3.2.7 Several historical on site potential sources of contamination have been identified, including: a laundry partially situated in the north of the site (c.1896 to c.1954); industrial type buildings in the north of the site (c.1896 to c.1954) further extended from c.1954 to c.1968; and an electricity substation in the east (c.1968 to at least 1994). Given that these land uses are no longer indicated to be present on site, their demolition could represent a potential source of contamination within historical Made Ground (see below).

- 
- 3.2.8 No surface water drains were observed in the areas of soft landscaping at the site during the walkover. RPS has not been provided with a copy of drainage plans for the site, however in their assumed absence, such features are not considered to represent either potential sources or pathways.

### **3) Historical Made Ground**

- 3.2.9 There is the potential for the presence of contaminants of concern within historical Made Ground resulting from previous infilling of excavations at the site and/or demolition/construction activities. Although historical Made Ground may be present deeper in the shallow soil profile, consideration should be given to bioturbation resulting in the upward migration of associated contaminants of concern.

### **4) Importation of Topsoil Material**

- 3.2.10 There is the potential for contaminants of concern to be present within topsoil material imported as part of any redevelopment of the site or reconfiguration of areas of soft landscaping. It is considered likely that topsoil material was imported as part of the development of the Edward Woods Estate (which began from c.1968) and that this is unlikely to have been subject to validation requirements. There is also potential for topsoil material to have been imported as part of recent developments. Planning permission (2007/03907/FR3) was granted in May 2008 at Norland, Poynter and Stebbing Houses for the creation of additional residential and office space and re-landscaping. There is potential that imported topsoil material was used as part of the re-landscaping works. LBHF has advised that planning conditions relating to the assessment of potentially contaminated land at the site were attached, however submissions have not yet been made to address these conditions.

### **Potential Pathways**

- 3.2.10 In areas of existing soft landscaping, there are potential risks to site users via the dermal contact and ingestion pathways. There is also the potential for the airborne migration of contaminants of concern in soil or dust originating from on site areas of soft landscaping.
- 3.2.11 The potential volatile pathway to impact site users has not been considered as this will not be active in external areas.

### **Potential Receptors**

- 3.2.12 Potential human health receptors comprise existing and future site users. Off-site human health receptors are not being considered as part of this assessment.

## **3.3 Outline Conceptual Site Model**

- 3.3.1 An outline CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site and is summarised in the table below:



**Table 5 – Outline Conceptual Site Model**

Potential Source	Via	Potential Pathways	Linkage Potentially Active?	Receptors
<b>Grenfell Tower fire</b>		Direct contact/ingestion	✓	
<b>On site – current:</b> <ul style="list-style-type: none"> <li>Electricity substations</li> </ul>				
<b>On site – historical:</b> <ul style="list-style-type: none"> <li>Laundry, Industrial type buildings and electricity substation.</li> <li>Historical Made Ground (including from previous infilling of excavations at the site and demolition/ construction activities).</li> <li>Imported topsoil</li> </ul>	Surface Soil	Airborne migration of soil or dust	✓	Existing and Future site users
<b>Additional Off-site:</b> <ul style="list-style-type: none"> <li>Vehicle exhaust effluent from the West Cross Route (A3220)</li> </ul>				

### 3.4 Potential Contaminants of Concern associated with Identified Potential Sources

#### Grenfell Tower Fire

- 3.4.1 As discussed in Section 1.4, the Stec et al. study (Chemosphere, 226, pg. 576-586) 'Environmental Contamination Following the Grenfell Tower Fire' provided information on a number of potential contaminants of concern associated with fires, these include: VOCs, SVOCs, PAHs (including 7,12-dimethylbenz(a)anthracene), isocyanates (these have been positively identified in fire smoke and widely used in the manufacture of flexible polyurethane foams for upholstered furniture and rigid PU or polyisocyanurate (PIR) foams for insulation in buildings (Bengtström et al. (2016)<sup>1</sup>), PCDD/Fs and PBDD/Fs and PCBs. Phosphorous flame retardants such as tris(1-chloro-2-propyl)phosphate (TCPP) and tris(2-ethylhexyl)phosphate were also considered under the study.
- 3.4.2 LBHF contacted Public Health England (PHE) to discuss potential contaminants of concern which could be associated with fires. PHE responded that they would expect that the usual suites used for assessing soil contamination would identify potential contaminants after a fire, such as heavy metals (and trace elements), VOCs, SVOCs, cyanide complexes, asbestos, PCDD/Fs and PBDD/Fs, PCBs and sulphates. They noted that phosphorus compounds may also need to be considered.
- 3.4.3 In addition, the Environment Agency (EA) has identified a number of common products of combustion and firefighting chemicals that have been reported at many fire sites including: metals, PAHs, PCDD/Fs and PBDD/Fs and PCBs.
- 3.4.4 The Stec et al. study (Chemosphere, 226, pg. 576-586) notes that brominated fire retardants (used in furniture) have also been identified as potential contaminants of concern that may have originated from the fire.

<sup>1</sup> Bengtström L, Salden M and Stec AA. 2016. The role of isocyanates in fire toxicity. Fire Science Reviews 5: 4.

- 
- 3.4.5 A specialist RPS asbestos consultant attended site to carry out a visual inspection for asbestos ACMs in areas of soft landscaping. No readily observable ACMs were identified. However, it is noted that there is potential for asbestos fibres to have become airborne following the Grenfell Tower fire.

### **On Site - Current Electricity Substations**

- 3.4.6 PCBs are the main potential contaminants of concern associated with the on site current and historical electricity substations.

### **On Site - Historical Laundry**

- 3.4.7 VOCs are the main potential contaminants of concern associated with the historical laundry. The Department of the Environmental Industry Profile for dry cleaning (included under Miscellaneous Industries, 2016) notes that in the late 1920s trichloroethene was introduced and became the most popular dry cleaning solvent during the 1940s. By the mid 1950s a new solvent, perchloroethylene was developed. Perchloroethylene has been the dominant dry cleaning solvent used in the UK from the 1950s to the present day. The laundry partially occupied the north of the site from c.1896 to c.1954.

### **Industrial Type Buildings**

- 3.4.8 Potential contaminants of concern associated with the historical industrial type buildings include heavy metals, PAHs, VOCs and asbestos.

### **Historical Made Ground and Imported Topsoil**

- 3.4.9 Potential contaminants of concern associated historical Made Ground and imported topsoil included heavy metals, PAHs and asbestos.

### **Additional Off-Site Vehicle Exhaust Effluent**

- 3.4.10 Potential contaminants of concern associated with vehicle exhaust effluent from the West Cross Route (A3220) included PAH, VOC and, historically, lead.

---

## 4 PHASE 2 SHALLOW SOIL INVESTIGATION

### 4.1 Introduction

4.1.1 A Phase 2 Shallow Soil Investigation was undertaken to determine whether the potential pollutant linkages, as detailed within the CSM (presented as Table 5), may be active.

4.1.2 The methodology for the investigation was based on the information obtained as part of the desk study and site reconnaissance, including consideration of potential sources of contaminants of concern other than the Grenfell Tower fire.

### 4.2 Description of Works

4.2.1 The site investigation was carried out between 6<sup>th</sup> and 11<sup>th</sup> June 2019 and comprised:

- Collection of primary surface soil samples (S1 to S15) from 15 locations in areas of soft landscaping at the site;
- Collection of secondary deep soil samples at an approximate target depth of 250mm at each of these locations; and
- Collection of three samples of Made Ground (C1 to C3) from beneath areas of hardstanding across the site, for control purposes.

4.2.2 An exploratory hole location plan is provided as Figure 2.

4.2.3 Soil samples were generally taken from “open” areas that may have been exposed to wind entrained deposition of contaminants of concern from the Grenfell Tower site. Areas beneath tree cover or other tall structures, either natural or man-made, were therefore be avoided, as far as practicable. Samples were not taken from areas where there was evidence to suggest that the soil had been disturbed, cultivated or had fresh soil added since the Grenfell Tower fire.

4.2.4 Clinker and coal fragments were encountered in shallow soils at a number of locations across the site (see Section 5.2 below). In an attempt to avoid possible interference from these potential sources of contaminants of concern (particularly with regards to PAHs and PCDD/Fs) within the chemical analysis, individual locations were moved a minimum of three times. Samples of this material were only taken where it was apparent that these fragments were inherent in the material across the area of soft landscaping being assessed.

4.2.5 RPS had been advised by LBHF that an area to the north of the subject site named Hunt’s Close was redeveloped to comprise flats. As part of the redevelopment works, a clean cover layer (at least 0.50m in thickness) was installed across an area of soft landscaping (associated with the flats). The material was sampled as part of the validation of remediation work undertaken in 2003 by Casella Stanger. This area is shown as a hatched zone on Figure 2. One of the surface soil samples (S1) was taken from this area.

4.2.6 Once a location had been decided any surface vegetation was diligently cut away in a 250mm x 250mm squared area to the root and any surface debris (i.e. leaves, twigs and stones) was picked up and removed from the sample area. A clean stainless steel trowel was used to scrape soil from surface level to a maximum depth of 20mm until sufficient sample had been obtained.

4.2.7 Secondary deep soil samples were obtained at each of the locations with hand pits excavated using a clean stainless steel spade. Again, a clean stainless steel trowel was used to obtain the sample once the appropriate depth was reached, with materials other than soil being omitted from the sample wherever possible.

4.2.8 Although a target depth of 250mm was proposed for the secondary deep soil samples, the actual depth varied to, wherever feasible, ensure that the primary surface samples and secondary deep soil samples were sampled from the same parent material. For example, where any distinct visual

---

variation in material type, compared to the soil sampled at the surface was encountered at this depth, it was considered appropriate to take the sample from the base of material consistent with the primary surface sample.

- 4.2.9 Control soil samples (C1 to C3) were taken from immediately beneath hardstanding at three well distributed locations across the site.
- 4.2.10 All material was placed onto HDPE plastic sheeting adjacent to the sampling location with materials other than soil (i.e. stones, rootlets, twigs) omitted from the sample wherever possible prior to being put into sample jars.
- 4.2.11 All equipment was cleaned with deionised water on each occasion prior to excavation/sampling.
- 4.2.12 Samples were placed into laboratory supplied containers (comprising one 60g glass jar, two 250g glass jars and two bags (for asbestos analysis) per sample) which were then packed into cool boxes and kept at a nominal temperature of  $+4^{\circ}\text{C} \pm 2^{\circ}\text{C}$  by the use of ice packs. The samples were then dispatched for analysis to a UKAS/MCERTS accredited laboratory, together with appropriate chain of custody documentation.

## 4.3 Laboratory Testing

### Environmental Laboratory Testing - Soil

- 4.3.1 As discussed in Section 3.4 above, a number of potential contaminants of concern associated with current and historical on and off-site sources have been identified. A preliminary suite of chemical analytical testing was developed in conjunction with LBHF.
- 4.3.2 The 15 primary surface soil samples and three control samples were therefore analysed for the following determinands:

#### Inorganic Determinands:

- 4.3.3 *arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, free cyanide, complex cyanide, total cyanide, sulphate, selenium, vanadium, zinc and asbestos screen*

#### Organic Determinands:

- 4.3.4 *PAH (including 7,12-dimethylben(a)anthracene), VOCs, SVOCs (including tentatively identified compounds (TICs)), PCBs, PCDD/Fs and dioxin-like PCBs*
- 4.3.5 In addition to the above, six of the 18 soil samples were analysed for an enhanced suite of determinands. This included those listed above and the following determinands:  
*Isocyanates, phosphorus, tris(1-chloro-2-propyl)phosphate (TCPP), tris(2-ethylhexyl) phosphate and tetrabromobisphenol A (a commonly used fire retardant)*
- 4.3.6 The soil samples which were analysed for the enhanced suite of analysis were chosen in order to provide spatial coverage across the site.
- 4.3.7 Should any ongoing investigations being completed to assess potential impacts to soil from the Grenfell Tower fire identify contaminants, other than those detailed above, to be of concern then this assessment may need to be revised to incorporate these.
- 4.3.8 All secondary deep soil samples were put on hold, pending the results of the chemical analysis of the primary surface soil samples.

## 5 SITE INVESTIGATION FINDINGS

### 5.1 Ground Conditions

5.1.1 Details of the ground conditions encountered at each of the sample locations and the samples collected are presented in the table below. Photos of each of the sampling locations are provided in Appendix E.

**Table 6 – Encountered Ground Conditions and Details of Samples**

Sample Location	Sample Depths (m below ground level (bgl))	Soil Description
S1	Primary: 0.00 to 0.04 Secondary: 0.25	Ground Level (GL) to 0.04m: Grass over brown organic slightly gravelly sandy silt with frequent plant rootlets and wood/plant fragments. Gravel is angular fine flint with rare concrete and brick fragments. Sand is fine. 0.04m: Plastic netting. 0.04 to 0.25m: Brown gravelly sandy silt. Gravel is angular to subrounded fine to coarse of flint, brick, concrete, tarmacadam, chalk and occasional glass and metal fragments. Sand is fine.
S2	Primary: 0.00 to 0.02 Secondary: 0.25	GL to 0.05m: Grass over dark brown organic slightly gravelly slightly sandy silt with frequent plant rootlets. Gravel is angular to subangular fine flint, brick and concrete. Sand is fine to medium. 0.05 to 0.25m: Dark brown gravelly sandy silt. Gravel is angular to subrounded fine to medium flint, concrete, brick, rare clinker and granite. Sand is fine to medium.
S3	Primary: 0.00 to 0.02 Secondary: 0.05	GL to 0.05m: Grass over dark brown organic slightly gravelly slightly sandy silt with frequent plant rootlets. Gravel is angular to rounded fine flint and occasional decaying wood fragments. Sand is fine. 0.05 to 0.15m: Dark brown slightly organic slightly gravelly slightly sandy silt. Gravel is angular to subrounded fine to medium flint, clinker, coal and chalk. Sand is fine. 0.15 to 0.25m: Light brown sandy slightly gravelly silt. Gravel is angular to subrounded fine to coarse flint, brick, concrete and occasional coal fragments. Sand is fine.
S4	Primary: 0.00 to 0.02 Secondary: 0.25	GL to 0.03m: Grass over dark brown organic slightly sandy slightly gravelly clayey silt with frequent plant rootlets and occasional wood fragments. Gravel is angular to subangular fine to medium brick and flint. Sand is medium to coarse. 0.03 to 0.25m: Light brown very gravelly very sandy silt. Gravel is angular to rounded fine to coarse flint, concrete, chalk, coal, clinker and ceramic tile with rare black plastic. Sand is fine.
S5	Primary: 0.00 to 0.02 Secondary: 0.25	GL to 0.25m: Brown very organic peaty slightly gravelly silty fine sand with frequent brown organic fragments. Gravel is angular fine flint and chalk with rare fragments of yellow plastic.
S6	Primary: 0.00 to 0.02 Secondary: 0.25	GL to 0.03m: Dark brown organic slightly gravelly sandy silt. Gravel is angular to subangular fine flint and occasional brick. 0.03 to 0.25m: Brown slightly sandy gravelly silty clay. Gravel is angular to subangular fine to coarse brick, concrete and flint with fragments of glass and rare clinker. Sand is fine to coarse.
S7	Primary: 0.00 to 0.02 Secondary: 0.25	GL to 0.10m: Grass over brown organic slightly gravelly sandy silt with frequent plant rootlets. Gravel is angular to subrounded fine to medium flint, brick, concrete and rare ceramic tile. Sand is fine. 0.10 to 0.25m: Orange brown slightly gravelly very sandy silt with occasional plant rootlets. Gravel is angular to rounded fine to coarse flint, brick and chalk with rare ceramic and granite. Rare clinker at 0.15m. Sand is fine.
S8	Primary: 0.00 to 0.03 Secondary: 0.25	GL to 0.10m: Grass over brown organic sandy silt with frequent plant rootlets and organic fragments. Sand is fine. Angular to subrounded fine to medium flint at 0.08m.

Sample Location	Sample Depths (m below ground level (bgl))	Soil Description
		0.10 to 0.25m: Dark orange brown slightly sandy silt. Gravel is angular to subrounded fine to coarse flint, concrete and chalk with occasional rare metal and clinker fragments. Sand is fine.
S9	Primary: 0.00 to 0.02 Secondary: 0.10	GL to 0.10m: Grass over dark brown organic sandy slightly gravelly silt. Gravel is angular to rounded fine flint and brick. 0.10 to 0.25m: Dark orange brown very sandy slightly gravelly silt with rare black decaying wood fragments. Gravel is angular to subrounded fine to medium flint and concrete.
S10	Primary: 0.00 to 0.02 Secondary: 0.15	GL to 0.15m: Dark brown black organic sandy peaty slightly gravelly silt with frequent decaying organic fragments and plant rootlets. Gravel is angular to subangular fine flint and rare brick. Sand is fine to medium. 0.15m: Concrete.
S11	Primary: 0.00 to 0.03 Secondary: 0.25	GL to 0.25m: Grass over brown organic slightly sandy slightly gravelly silt with frequent plant rootlets and occasional wood fragments. Rare plastic fragments at 0.03m. Gravel is angular fine brick. Sand is fine. At 0.06 to 0.25m: Gravel is angular to subangular fine to medium flint, brick, concrete and chalk with occasional glass fragments.
S12	Primary: 0.00 to 0.02 Secondary: 0.25	GL to 0.03m: Grass over organic slightly gravelly slightly sandy clayey silt with frequent plant rootlets. Gravel is angular fine flint and brick. 0.03 to 0.25m: Brown organic slightly gravelly slightly sandy clayey silt with occasional rootlets. Gravel is angular to subrounded fine to coarse flint, brick, ceramic and rare clinker. Sand is fine to medium.
S13	Primary: 0.00 to 0.02 Secondary: 0.07	GL to 0.07m: Grass over brown organic sandy silt with frequent plant rootlets with rare angular fine flint. Sand is fine. 0.07 to 0.12m: Brown sandy slightly gravelly silt with occasional ceramic fragments. Gravel is angular to subangular fine to medium flint, concrete and rare glass. Sand is fine. 0.12 to 0.25m: Dark orange brown gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint, concrete and chalk.
S14	Primary: 0.00 to 0.02 Secondary: 0.09	GL to 0.09m: Grass over dark brown organic slightly sandy slightly gravelly silt with plant rootlets. Gravel is angular to subangular fine flint and brick. Sand is medium to coarse. 0.09 to 0.25m: Light brown slightly sandy gravelly silt. Gravel is subangular to rounded fine to coarse flint, brick and rare ceramic. Sand is fine to medium.
S15	Primary: 0.00 to 0.02 Secondary: 0.07	GL to 0.07m: Grass over brown organic slightly gravelly slightly sandy clayey silt with wood fragments. Gravel is angular to subangular fine to medium flint, brick, concrete and ceramic. 0.07 to 0.25m: Brown slightly gravelly sandy silt. Gravel is angular to subangular fine to coarse flint, brick and clinker. Sand is fine to medium.
C1	0.10 to 0.14	GL to 0.06m: Bricks. 0.06 to 0.10m: Concrete. 0.10 to 0.14m: Brown slightly gravelly slightly silty fine to coarse sand. Gravel is angular to rounded fine to coarse flint, concrete and rare brick.
C2	0.08 to 0.12	GL to 0.03m: Brick paving. 0.03 to 0.08m: Concrete. 0.08 to 0.12m: Orange brown very gravelly fine to coarse sand. Gravel is angular to subangular fine to medium flint and concrete. 0.12m: Concrete.
C3	0.06 to 0.08	GL to 0.06m: Concrete slab. 0.06 to 0.08m: Brown organic sandy slightly gravelly silt with occasional plant rootlets. Gravel is angular to subangular fine flint, concrete and rare brick.

---

## 5.2 Field Evidence of Contamination

5.2.1 Visual and olfactory evidence of contamination encountered during the intrusive investigation is summarised in the table below.

**Table 7 – Visual and Olfactory Evidence of Contamination**

Sample Location and Depth (m bgl)	Observations
S2: 0.05 to 0.25m	Rare clinker
S3: 0.05 to 0.15m	Clinker and coal fragments
S4: 0.03 to 0.25m	Clinker and coal
S6: 0.03 to 0.25m	Rare clinker
S7: 0.15m	Rare clinker
S8: 0.10 to 0.25m	Clinker fragments
S12: 0.03 to 0.25m	Rare clinker
S15: 0.07 to 0.25m	Clinker

5.2.2 It should be noted that none of the primary surface soil samples were collected from the material in which visual and olfactory evidence of contamination was observed.

## 6 CHEMICAL RESULTS AND ASSESSMENT

6.1.1 Chemical analysis has been carried out on the primary surface soils sampled from beneath the site. The concentrations of contaminants of concern within soil can be compared to assessment criteria (AC) to determine whether these represent a potentially unacceptable risk to site users. The derivation of AC to be used and the comparison of these criteria to the results of the chemical analyses are presented below.

### 6.1 Human Health Assessment Criteria

6.1.2 In order to assess risks to future site users, concentrations of contaminants of concern have been compared to Suitable 4 Use Levels (S4UL) generic assessment criteria (AC) published by Land Quality Management: Chartered Institute of Environmental Health (LQM:CIEH) in 2015. In accordance with the copyright notice the Publication Number for RPS Group is S4UL3177.

6.1.3 Given the current use of the site, the assessment has been based on a public open space (POS) associated with a residential use (POSresi). Concentrations of contaminants of concern in all samples have been compared to S4UL (1.0% SOM) value.

6.1.4 A notable exclusion from the S4ULs is lead. In the absence of a S4UL for lead, the Category 4 Screening Level (C4SL) has been selected, published by DEFRA in 2014. It is noted that the C4SL are based on the acceptance of a low level of toxicological concern, rather than the more conservative standard adopted in the derivation of S4ULs, which are based on a tolerable or minimal level of risk.

6.1.5 S4UL assessment criteria are currently unavailable for a number of VOC determinands. Where available, Environmental Industries Commission (EIC) screening criteria published by CL:AIRE in 2010 have been adopted for these contaminants of concern.

6.1.6 An EA Science Report titled 'Soil Guideline Values for dioxins, furans and dioxin-like PCBS in soils' was published in September 2009 (ref: SC050021). The report presented a Soil Guideline Value (SGV) for PCDDs, PCDFs and dioxin-like PCBs. This value has been adopted for these contaminants of concern.

### 6.2 Comparison of Soil Analyses to Assessment Criteria

6.2.1 Chemical analysis by a UKAS/MCERTS accredited laboratory was undertaken on 15 surface soil samples and three samples of Made Ground (control samples). A comparison of soil analyses to the relevant assessment criteria is summarised below and presented as Appendix F. Analytical certificates for soils are presented in Appendix G.

#### Primary Surface Soil Samples

6.2.2 The table below provides a summary of the contaminants of concern recorded at concentrations above their respective AC within the surface soil samples.

**Table 8 – Summary of Contaminants of Concern within Surface Soil Samples at Concentrations exceeding their AC**

Contaminant of Concern	Locations of Exceedances	Assessment Criteria	Concentration
<b>Heavy Metals</b>			
Arsenic	S13 at 0.00 to 0.02m	79mg/kg <sup>(1)</sup>	131.5mg/kg
Beryllium		2.2mg/kg <sup>(1)</sup>	12.9mg/kg
Lead		630mg/kg <sup>(2)</sup>	1299mg/kg
<b>VOCs</b>			
Chloromethane	S7 at 0.00 to 0.02m	8.5µg/kg <sup>(3)</sup>	9 to 39µg/kg



Contaminant of Concern	Locations of Exceedances	Assessment Criteria	Concentration
	S11 at 0.00 to 0.03m S13 at 0.00 to 0.02m S14 at 0.00 to 0.02m		
<b>PAHs</b>			
Benzo(a)pyrene	S12 at 0.00 to 0.02m	5,700µg/kg <sup>(1)</sup>	5,879µg/kg
Dibenzo(a,h)anthracene		570µg/kg <sup>(1)</sup>	1,032µg/kg
<b>Other Determinands</b>			
Sum of PCDD, PCDF and dioxin-like PCBs	S14 at 0.00 to 0.02m	8µg/kg <sup>(4)</sup>	9.4µg/kg

<sup>(1)</sup> S4UL for POS<sub>resi</sub> end use

<sup>(2)</sup> C4SL for POS<sub>resi</sub> end use

<sup>(3)</sup> EIC CL:AIRE value for a residential end use without homegrown produce

<sup>(4)</sup> SGV value for residential end use

- 6.2.3 Except for the concentrations of metals in sample S13, no other metals were recorded at concentrations in excess of their adopted AC.
- 6.2.4 Chloromethane was recorded above its AC in four surface soil samples (S7, S11, S13 and S14). There is no POS<sub>resi</sub> AC for this compound, so a more conservative residential AC has been used. No other VOCs were recorded at concentrations in excess of their AC.
- 6.2.5 PAHs (benzo(a)pyrene and dibenzo(a,h)anthracene) were recorded at concentrations in excess of their POS<sub>resi</sub> AC in one surface soil sample (S12). An elevated concentration of 2-methylnaphthalene was also recorded in this sample, however there is no readily available AC for this compound. Elevated concentrations of carbazole and dibenzofuran were also recorded in this surface soil sample. It is noted that there are no readily available ACs for these compounds.
- 6.2.6 A number of tentatively identified SVOCs have been recorded. There are no readily available AC for these compounds. However, the recorded concentrations are sporadic in nature and none of the compounds have been recorded consistently across the samples.
- 6.2.7 The SGV relating to the sum of PCDDs, PCDFs and dioxin-like PCBs has been produced for three land uses, namely residential, allotment and commercial. The conservative residential value (8µg/kg) has been used in the assessment. One surface soil sample, S14 (located in the far south of the site), recorded a concentration marginally in excess of the SGV. The recorded value was 9.4µg/kg. The concentrations in all other samples were less than 8µg/kg.
- 6.2.8 7,12-dimethylbenz(a)anthracene was not recorded at concentrations above the laboratory limit of detection in any of the surface soil samples.
- 6.2.9 All isocyanates were recorded at concentrations below their laboratory limit of detection in all of the surface soil samples.
- 6.2.10 Tetrabromobisphenol A, tris(1-chloro-2-propyl)phosphate TCPP and tris(2-ethylhexyl) phosphate were all recorded at concentrations below their laboratory limit of detection in all of the surface soil samples.
- 6.2.11 All primary surface soil samples were submitted for an asbestos screen. Asbestos was not identified in any of the soil samples.

## Control Samples

- 6.2.13 None of the contaminants of concern were recorded at concentrations in excess of their AC within the three control samples.

- 
- 6.2.14 7,12-dimethylbenz(a)anthracene, isocyanates, tetrabromobisphenol A, TCPP and tris(2-ethylhexyl) phosphate were recorded at concentrations below their laboratory limit of detection in all of the control soil samples.
- 6.2.15 All control samples were submitted for an asbestos screen. Asbestos was identified in one of the three samples submitted for screening. Amosite fibre bundles were identified in sample C1 at a depth of 0.10-0.14m bgl (beneath a layer of concrete and bricks).

## Summary of Soil Contamination

- 6.2.18 Only a small number of exceedances of the AC and elevated concentrations of contaminants of concern have been identified within the primary surface soil samples taken from areas of soft landscaping. The occurrence of these exceedances and elevated concentrations are predominantly isolated to single locations.
- 6.2.19 The only instance where exceedance of the AC for a compound has been identified at multiple locations is for chloromethane (identified at four locations: S7, S11, S13 and S14) a compound that is not typically cited as a product of combustion. The alignment of the four samples in which this contaminant of concern was detected, and consistency in sample descriptions/photographs, suggests that these samples may originate from the same parent material and that this compound may have been present in the material prior to its placement along the central tranche of soft landscaping at the site upon development of the site to its current use. It should be noted that the AC used for this compound was for a more conservative residential use, as one for public open space is not currently available.
- 6.2.20 Arsenic, beryllium and lead were detected at concentrations exceeding available AC in sample S13, located in the central/southern portion of the site. Again, these contaminants of concern are not typically cited as products of combustion and therefore the source of these contaminants (particularly in the absence of significant concentrations of combustion related contaminants) is unlikely to be the Grenfell Tower fire. No historical or current potential sources of contamination have been identified in this area and the lead exceedance is unlikely to be attributable to off-site vehicle exhaust effluent given exceedances were not detected within samples taken alongside the West Cross Route (A3220). The contaminants are therefore likely to have been present within topsoil imported to this area as part of the development of the Edward Woods Estate (c.1968), or subsequent reconfigurations of this area of soft landscaping (prior to the Grenfell Tower fire).
- 6.2.21 PAHs were detected at concentrations exceeding available AC within sample S12, located in the southwest of the site and the sum of PCDDs, PCDFs and dioxin-like PCBs within sample S14, located in the south. Whilst these are considered combustion products, these samples were amongst those taken furthest from the location of the Grenfell Tower (located to the north-northeast of the site) with no exceedances of these compounds detected at interceding sample locations. No historical or current sources of contamination have been identified in these areas. The PAH concentrations detected within sample S12 may therefore have originated from vehicle exhaust effluent from the nearby West Cross Route (A3220), although similar concentrations of these contaminants of concern were not detected in other samples along the western boundary of the site. In the absence of a readily identifiable source of the PCDDs, PCDFs and dioxin-like PCBs in sample S14, these contaminants may have been pre-existing within the topsoil imported at this location upon development of the Edward Woods Estate (c.1968) or subsequent reconfigurations of this area of soft landscaping (prior to the Grenfell Tower fire). It should be noted that the exceedance of the AC for the sum of PCDDs, PCDFs and dioxin-like PCBs in this sample was only marginal, with the AC derived for a more conservative residential, rather than a residential public open space, end use.
- 6.2.22 Asbestos fibres were only detected within one of the 18 soil samples screened from beneath the site, with the positive identification being within a control (C1) sampled from beneath hardstanding.

---

Due to the hardstanding cover above this location, the asbestos detected is not considered to be sourced from the Grenfell Tower fire.

- 6.2.23 No contaminants of concern without available assessment criteria were recorded at consistently elevated concentrations in more than one of the primary surface soil samples analysed.

## 7 REVISED CONCEPTUAL SITE MODEL

### 7.1 Introduction

7.1.1 The potential pollutant linkages identified as part of the outline CSM have been assessed in light of the findings of the site investigation and are discussed below for existing and future site users.

### 7.2 Potential Risk to Existing and Future Site Users

7.2.1 Only a limited number of contaminants of concern have been detected within surface soil samples analysed from areas of soft landscaping beneath the site at levels exceeding available AC.

7.2.2 Concentrations of PAHs (benzo(a)pyrene and dibenzo(a,h)anthracene) in sample S12 and heavy metals (arsenic, beryllium and lead) in sample S13 were recorded at concentrations exceeding AC protective of residential site users under a public open space scenario. Given their isolated occurrence - particularly in consideration of the number and coverage of samples taken – these concentrations are not considered to pose a potentially significant risk to existing and/or future site users.

7.2.3 Concentrations of chloromethane in soil samples S7, S11, S13 and S14 and the sum of PCDDs, PCDFs and dioxin-like PCBs in soil sample S14 were detected at concentrations exceeding AC protective of a more conservative residential end use scenario (based on private gardens rather than public open space). Given the relatively modest exceedances of these AC and the anticipated significant increase in the permissible minimal risk concentrations that would typically accompany derivation of these criteria for a residential public open space scenario, these concentrations are also not considered to pose a potentially significant risk to existing and/or future site users.

7.2.4 Asbestos fibres were only detected within one of the 18 soil samples screened from beneath the site. This was within control sample (C1), taken from beneath hardstanding, which was reinstated following collection of the sample.

### 7.3 Revised Conceptual Site Model

7.3.1 The potential source-pathway-receptor linkages and associated risks upon completion of the proposed development at the site, as identified following completion of the assessment, are summarised in the revised CSM below.

**Table 9 – Revised Conceptual Site Model**

Potential Source	Via	Potential Pathways	Linkage Potentially Active?	Receptors
<b>Grenfell Tower fire</b>				
<b>On site – current:</b>				
<ul style="list-style-type: none"> <li>Electricity substations</li> </ul>		Direct contact/ingestion	x	
<b>On site – historical:</b>				
<ul style="list-style-type: none"> <li>Laundry, Industrial type buildings and electricity substation.</li> <li>Historical Made Ground (including from previous infilling of excavations at the site and demolition/ construction activities).</li> <li>Imported topsoil</li> </ul>	Surface Soil			Existing and Future site users
<b>Additional Off-site:</b>				
<ul style="list-style-type: none"> <li>Vehicle exhaust effluent from the West Cross Route (A3220)</li> </ul>		Airborne migration of soil or dust	x	

---

7.3.2 The risk assessment is based upon the currently available information relating to the site. Should further information come to light regarding assessment methodology or ground conditions inconsistent with those outlined in this report be encountered, RPS should be contacted to enable further assessment.

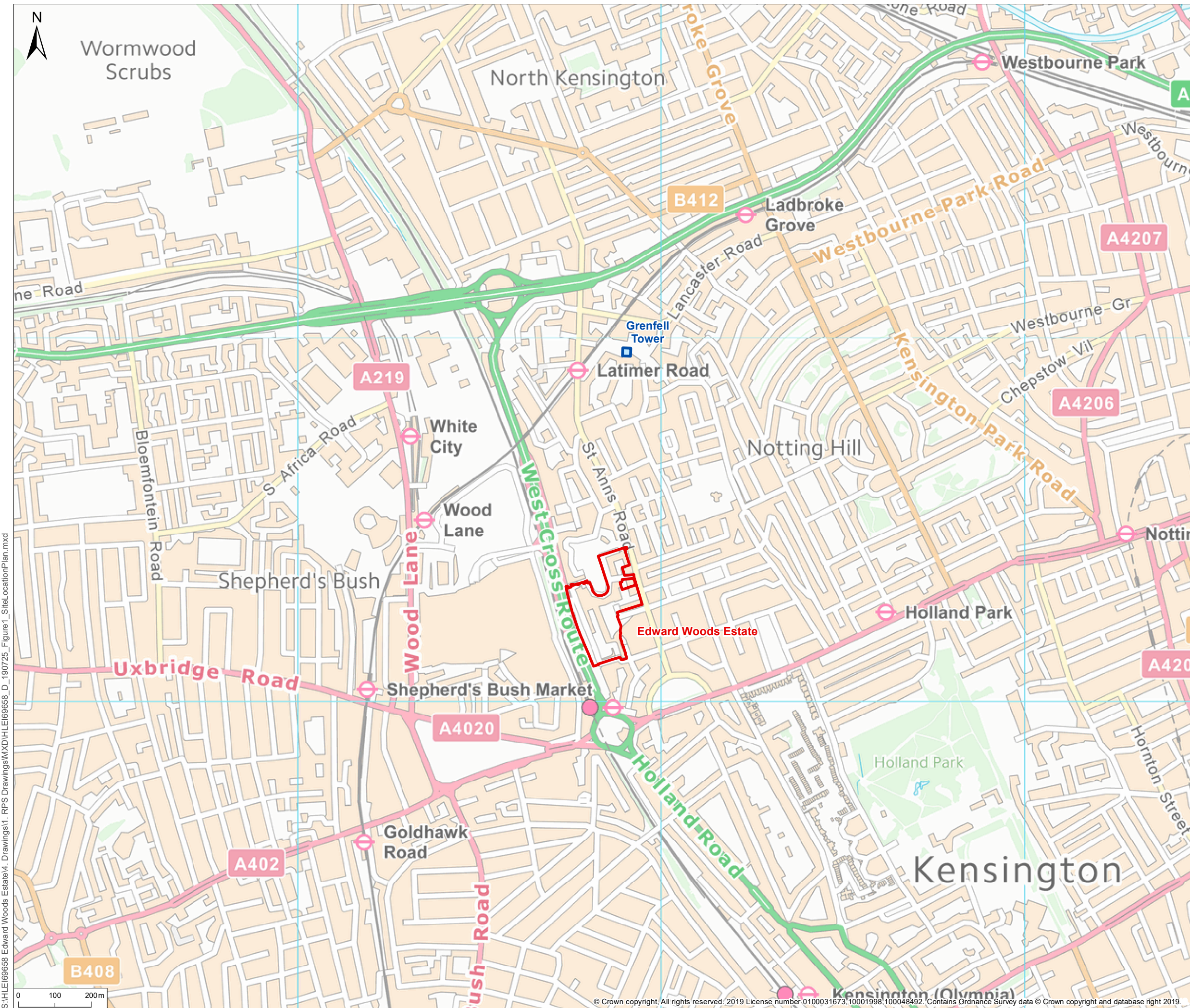
---

## 8 CONCLUSIONS AND RECOMMENDATIONS

- 8.1.1 The concentrations of contaminants detected within surface soil samples collected from areas of soft landscaping at the Edward Woods Estate have been compared to available generic AC protective of existing and future site users.
- 8.1.2 A limited number of contaminants were detected at concentrations above the screening criteria in isolated locations. However, the detected concentrations of contaminants are unlikely to pose a potentially significant risk to existing and/or future site users.
- 8.1.3 The nature and isolated occurrence of the elevated concentrations of contaminants within soil samples are not considered to be consistent with the widespread deposition that would be anticipated from an airborne plume from the Grenfell Tower fire. Given the general absence of historical or current potential sources in areas of these elevated concentrations, the contaminants may have been pre-existing within the topsoil imported at this location upon development of the Edward Woods Estate (c.1968), or subsequent reconfigurations of soft landscaping (prior to the Grenfell Tower fire).
- 8.1.4 As such, it is not considered necessary to progress to Stage 2 of the proposed assessment methodology (as outlined in Section 1.1).
- 8.1.5 It is recommended that soil in areas of proposed landscaping projects at the estate (such as the Peace Garden and Nourish Food Growing site) is assessed to confirm suitability for use prior to redevelopment and that raised planters with suitable topsoil be used where it is intended to grow produce for consumption.



**FIGURES**



© 2019 RPS Group  
 Notes  
 1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.  
 2. If received electronically it is the recipient's responsibility to print to correct scale. Only written dimensions should be used.

- Legend**
- Site Location
  - Grenfell Tower Location

Rev	Description	By	CB	Date



20 Farringdon Street, London EC4A 4AB  
 T: +44 020 3691 0500 E: rpslon@rpsgroup.com

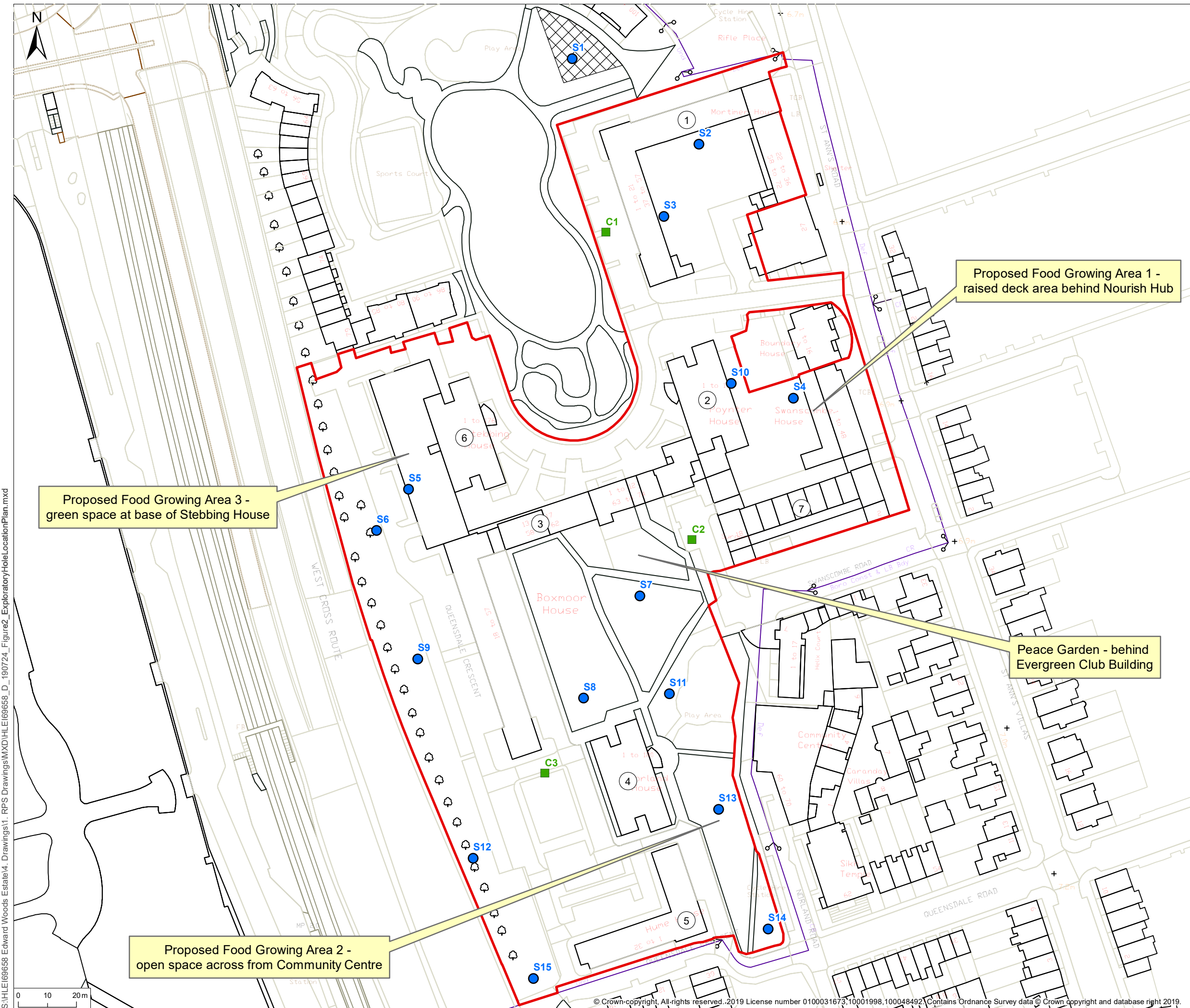
Client **LBHF**  
 Project **Edward Woods Estate**  
 Title **Site Location Plan**

Status	Drawn By	PM/Checked By
FINAL	KAG	LH
Project Number	Scale @ A3	Date Created
HLEI69658	1:10,000	JUL 2019
Drawing Number		Rev

**Figure 1**  
 -  
 rpsgroup.com

S:\HLEI69658 Edward Woods Estate\4. Drawings\1. RPS Drawings\MXD\HLEI69658\_D\_190725\_Figure1\_SiteLocationPlan.mxd





© 2019 RPS Group  
 Notes  
 1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.  
 2. If received electronically it is the recipient's responsibility to print to correct scale. Only written dimensions should be used.

- Legend**
- Site Boundary
  - Soil Samples (15)
  - Control Samples (3)
  - Area previously sampled as part of validation of remediation work undertaken in 2003 by Casella Stanger

- Building Numbers:**
1. Mortimer House
  2. Poynter House
  3. Boxmoor House
  4. Norland House
  5. Hume House
  6. Stebbing House
  7. Swanscombe House

Proposed Food Growing Area 3 - green space at base of Stebbing House

Proposed Food Growing Area 1 - raised deck area behind Nourish Hub

Peace Garden - behind Evergreen Club Building

Proposed Food Growing Area 2 - open space across from Community Centre

Rev	Description	By	CB	Date



20 Farringdon Street, London EC4A 4AB  
 T: +44 020 3691 0500 E: rpslon@rpsgroup.com

Client **LBHF**  
 Project **Edward Woods Estate**  
 Title **Exploratory Hole Location Plan**

Status **FINAL** Drawn By **KAG** PM/Checked By **LH**  
 Project Number **HLEI69658** Scale @ A3 **1:1,250** Date Created **JUL 2019**  
 Drawing Number  Rev

**Figure 2**  
 rpsgroup.com

S:\HLEI69658 Edward Woods Estate\4. Drawings\1. RPS Drawings\MXD\HLEI69658\_D\_190724\_Figure2\_ExploratoryHoleLocationPlan.mxd