REPORT N^{O} 70025363

8-10 SOUTHAMPTON ROW & 1 FISHER STREET, HOLBORN

PHASE 1 LAND CONTAMINATION ASSESSMENT

CONFIDENTIAL

WSP | PARSONS BRINCKERHOFF

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Idé Real Estate Ltd

Confidential

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EXECUTIVE SUMMARY

WSP | Parsons Brinckerhoff was instructed by Idé Real Estate Ltd (the Client), to undertake a Phase 1 Land Contamination Assessment of 8-10 Southampton Row & 1 Fisher Street, Holborn, London, WC1B 4AE (the Site).

WSP | Parsons Brinckerhoff understands that Idé Real Estate Ltd proposes to submit a planning application for refurbishment of the existing building and construction of a new 8-storey building to the rear, in order to create a 120 bedroom hotel. This report is required to support the proposed planning application by identifying potential contaminated land constraints at the Site and providing recommendations for further works.

The planning application boundary includes the roads adjacent to the Site, however, these have omitted for the purpose of this assessment as it is understood that no development will be undertaken on the roads.

The Site is currently occupied by a Grade II listed building, known as 'Carlisle House', in the west and a shaft for the Crossrail network in the east. The Site is bordered by an electrical substation to the east, Catton Street to the south, Fisher Street to the north and Southampton Row and Kingsway Tram Tunnel to the west of the Site. The listed building has been present since 1906. From the late 1800s, the Site was bisected by Kingsgate Street with a school in the east and commercial properties in the west. The east of the Site appears to have been hit by a high explosive bomb during World War II and this is evidenced by the 'Ruins' indicated on maps in the 1950s. Offices were constructed towards the end of the 1950s and remained present until demolition by Crossrail in 2009.

British Geological Survey (BGS) maps, historical logs and a ground investigation completed in 2010 indicate that the geological sequence beneath the Site and surrounding area comprises Made Ground, the Lynch Hill Gravel Member (River Terrace Deposits), London Clay Formation, Lambeth Group, Thanet Sand Formation and Chalk. Alluvium and Langley Silt have been identified in some locations overlying the River Terrace Deposits. The EA has classified the Lynch Hill Gravel Member and the Lambeth Group as Secondary (A) aquifers, the London Clay Formation as Unproductive Strata and the Thanet Sand Formation and Chalk as Principal aquifers. Perched and superficial aquifers at the Site are likely to be highly modified and groundwater flow interrupted by significant below-ground structures.

The majority of the eastern half of the Site has been excavated for construction of the Crossrail Fisher Street shaft. Therefore, it is considered that any Made Ground (and associated contamination) has been removed and will thereby not pose a risk to future site users or the underlying Secondary (A) aquifer. In addition, the entire Site will be occupied by the footprint of the building and hardstand cover, restricting infiltration rates and limiting exposure of site users to potentially contaminated soils.

WSP | Parsons Brinckerhoff makes the following recommendations:

- A full refurbishment asbestos survey of the entire building and asbestos removal prior to refurbishment works commencing;
- Limited gas monitoring comprising ambient air monitoring in the sub-basement and basement areas; and
- A piling risk assessment if additional piling works are proposed.

A full ground investigation and generic quantitative risk assessment for the Site is not considered necessary.

1 INTRODUCTION

1.1 AUTHORISATION AND PURPOSE OF ASSESSMENT

WSP | Parsons Brinckerhoff was instructed by Idé Real Estate Ltd (the Client), to undertake a Phase 1 Land Contamination Assessment of 8-10 Southampton Row & 1 Fisher Street, Holborn, London, WC1B 4AE (the Site).

WSP | Parsons Brinckerhoff understands that Idé Real Estate Ltd propose to submit a planning application comprising the refurbishment of the existing building and construction of a new 8-storey building to the rear of the Site to create a 120 bedroom hotel. The new building will be constructed over an existing Crossrail shaft and head house and the two buildings will be linked.

The site boundary plans provided by the Client for the Site (Drawing No. A000-001 and Drawing No. A100-002) include Fisher Street in the north and Catton Street in the south. The extent of the development is understood to only include the buildings on the Site. Therefore, even though the adjacent roads are included within the planning boundary, they have been omitted from this assessment as it is understood that no development will actually be undertaken on the roads. The area included within this assessment is shown on Figure 2.

This report is required to support the proposed planning application by identifying potential contaminated land constraints at the Site and providing recommendations for further works (if required).

1.2 AIMS

The key aims of this assessment are to:

- Develop a preliminary Conceptual Site Model (CSM) to identify potential ground contamination constraints associated with the proposed development of the Site for a commercial end use as a hotel;
- Evaluate the potential liabilities and constraints associated with any significant exposure of the identified receptors in the context of a future land use as a hotel; and
- Provide recommendations on the measures that could be adopted to address any potential liabilities or constraints.

This assessment does not consider the environmental risks associated with the current land use.

1.3 SCOPE OF WORKS

In order to meet the aims stated in Section 1.2, the following scope of works was undertaken:

- A site walkover survey of accessible areas to document the current land use and site setting.
- A review of relevant previous reports pertaining to the Site (references in Section 1.4).
- A review of publicly available historical maps to identify former land uses and potential contaminative activities on and surrounding the Site.

- A review of relevant regulatory databases and contact with relevant regulatory authorities including: Local Council planning website, the Contaminated Land Officer (CLO) and the Environment Agency (EA).
- A review of relevant publicly available information relating to hydrological features, hydrogeology, neighbouring land use, ecologically sensitive uses and geology in order to establish the environmental setting of the Site and the sensitivity of the location.
- The development of a preliminary CSM following the source-pathway-receptor contaminant linkage approach.
- Provision of an outline of the environmental risks with respect to ground, groundwater and ground gas conditions, which may potentially arise as liabilities or constraints associated with the development of the Site.

This report has been prepared in general accordance with:

- Part 2A of The Environmental Protection Act (1990).
- Environment Agency (EA) 'Model Procedures for the Management of Land Contamination', CLR11 (2004).
- The National Planning Policy Framework (2012).
- NHBC, EA and CIEH 'Guidance for the Safe Development of Housing on Land Affected by Contamination' R&D66 (2008).

1.4 SOURCES OF INFORMATION

The following sources of information have been used in the production of the report:

- Landmark Envirocheck report '8, Southampton Row' ref. 109627647_1_1, dated 6 January 2017.
- EA 'What's In Your Backyard?' website accessed on 6 January 2017.
- British Geological Society (BGS) 1:50,000 Series Geological Map Sheet 256 'North London' (Solid & Drift ed.).
- BGS 'Geology of Britain' online viewer accessed on 6 January 2017.
- Department of Environment (DoE) profiles.
- NHBC, EA and CIEH 'Guidance for the Safe Development of Housing on Land Affected by Contamination' R&D66. Appendix 3. 2008.
- Zetica Regional Unexploded Bomb Risk map: 'London – West Central', downloaded 9 January 2017.
- Bomb Sight website accessed on 9 January 2017.
- Camden Council Planning Portal, accessed 12 January 2017.

The following third party reports have also been reviewed:

- Fugro Engineering Services Limited 'Crossrail Limited, Package 16A Royal Oak to Farringdon, Fisher Street Shaft – Factual Report on Ground Investigation', Contract No: WAL090063E, dated March 2011.
- Fugro Engineering Services Limited 'Crossrail Limited, Package 16A Royal Oak to Farringdon, Fisher Street Shaft – Factual Report on Ground Investigation Addendum B', Contract No: WAL090063E, dated May 2011.

- Crossrail Limited '*Fisher Street Shaft Contaminated Land Gas Analysis*' Document No: C123-JUL-T1-RAN-CR086_SH003_Z-5001, dated April 2011.
- Atkins *'Team BFK: Fisher Street Contaminated Land Verification Report'* Document Ref: C300-BFK-T1-RGN-CRT00_ST005-50863, dated April 2015.
- Crossrail Limited '*Fisher Street Environmental Management Plan*' Document No: CR-PN-CAM-CN-ST-00008.
- Dexter Moran Associates *'8-10 Southampton Row Pre-Application Document'*, dated October 2016.
- GL Hearn *'Environmental Scoping Report – 1 Fisher Street & 8-10 Southampton Row, London Borough of Camden'*, dated December 2016.

1.5 LIMITATIONS

This report is addressed to and may be relied upon by Idé Real Estate Ltd. It may not be relied upon or transferred to any other parties without the express written agreement of WSP | Parsons Brinckerhoff. The report should be read and used in full. No responsibly will be accepted where this report is used, ether in its entirety or in part, by any other party. WSP | Parsons Brinckerhoff cannot be held liable for third party information. Full details of the limitations are provided as **Appendix A**.

The planning application boundary includes the roads adjacent to the Site, however, these have omitted for the purpose of this assessment as it is understood that no development will be undertaken on the roads.

2 SUMMARY OF THE SITE AND SURROUNDING AREA

Site location and layout plans are provided as **Figure 1** and **Figure 2**.

A walkover of accessible areas of the Site was carried out by WSP | Parsons Brinckerhoff on 11 January 2017 and a photographic record is provided as **Appendix B. Table 2-1** provides details of the Site obtained from a review of Ordnance Survey (OS) mapping, online aerial photography, relevant regulatory information obtained from the Envirocheck report and key observations made during the walkover.

Table 2-1: Site Information and Observations

DETAILS	DESCRIPTION
Name and Address of Site	8-10 Southampton Row and 1 Fisher Street, London, WC1B 4AE
Location and National Grid Reference (NGR)	80 m to the north of Holborn Station at approximate NGR 530520, 181600
Site Ownership/ Occupation	The Site is currently occupied by Crossrail Limited.
Site Description and Current Use	The Site is occupied by Carlisle House (a Grade II listed building) in the west, which is currently used as construction site offices. An emergency access shaft has been excavated to the rear of the building for the Crossrail network and a head house building is currently being constructed over the top of the shaft.
Site Area and Topography	The Site is approximately 1,405 m^2 in area and is generally flat.
Ground Cover	Approximately half of Site is occupied by Carlisle House in the west with the Fisher Street Crossrail shaft occupying the majority of the eastern part of the site. Concrete hardstanding (in good condition) is present around the edge of the shaft. No areas of soft stand were observed on-site.
Surrounding Area	The Site is situated in Central London, within a predominately commercial area comprising offices, cafés and shops. It is bordered by Fisher Street to the north, an electricity substation and commercial building to the east, Catton Street to the south and Southampton Row and Kingsway Tram Tunnel to the west.

It is understood that the Crossrail shaft is 15 m in diameter and approximately 30 m deep. It is formed of 73 male and 73 female 620 diameter secant piles, a waterproof membrane and a 400 mm thick concrete lining. Individual external piles outside the shaft have also been built by Crossrail. Excavated material was sampled and classified, prior to removal off-site.

3 ENVIRONMENTAL SETTING

3.1 GEOLOGY

Reference to British Geological Survey (BGS) 1:50,000 (Sheet No. 256) map and borehole records for locations in the vicinity of the Site (ref. TQ38SW158, TQ38SE618, TQ38SW597, TQ38SW2897, TQ38SW2896) indicate that the underlying geology comprises River Terrace Deposits (the Lynch Hill Gravel Member) (up to approximately 6.5 m bgl) over the London Clay Formation (proven to be at least 29 m thick). The London Clay is underlain by the Lambeth Group, Thanet Sand Formation and Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) [hereafter referred to as Upper Chalk].

A BGS borehole record adjacent to the western boundary of the Site (TQ38SW618) indicates Made Ground up to 2.4 m bgl overlying clay and 'ballast'; a BGS borehole record located approximately 50 m south-east of the site (TQ38SW597) records 3.8 m of Made Ground overlying gravel.

As part of the Crossrail works in 2010, Fugro Engineering Services drilled a total of 15 boreholes within the vicinity of the Site. One borehole (WS280) was located within the footprint of the existing shaft and three boreholes (RT125R, WS279 and RT124P/RT124PA) were located adjacent to the Site boundary. The remaining boreholes were located within a 350 m radius of the Site. The locations of these historical boreholes are indicated on **Figure 3**. The encountered geology is summarised in **Table 3-1**:

Table 3-1: Summary of previously encountered geology

GEOLOGICAL UNIT	DEPTH TO BASE OF STRATUM (M BGL)	TYPICAL DESCRIPTION
Made Ground	0.30 to 3.80	Tarmacadam and concrete and light brown, brown, reddish brown, yellowish brown, dark brown, brown grey and black clay, sand and gravel in varying proportions with fragments of brick, concrete, pottery, ceramic, charcoal, ash, wood, glass, shells, slate and clinker.
Langley Silt	2.00 to 3.10	Light brown, reddish brown and yellowish brown slightly sandy slightly gravelly clay with flint gravel and rare partings of red brown silt, locally with occasional black mottling and rootlets. Encountered in RT124PA, WS282 and WS283 only.
Alluvium	1.60 to 2.35	Soft to firm light brown mottled reddish yellow slightly sandy clay with rare subangular to subrounded medium and coarse flint gravel. Encountered in WS279 and RT134R only.
River Terrace Deposits	2.65 to 7.90	Medium dense to very dense, reddish yellow, brown, reddish brown and yellowish brown gravel with varying proportions of clay and sand and sand with varying properties of clay and gravel. Locally, stiff slightly gravelly sandy clay.
London Clay Formation	21.15 to 26.40	Stiff to very stiff, becoming very stiff with depth locally firm at the top, fissured, dark greyish brown clay with slightly sandy to sandy clay. Locally containing dustings, partings and laminae of silt and fine sand. Lignite and pyrite nodules noted at some locations.
Harwich Formation Swanscombe Beds	23.75 to 24.35	Very stiff greyish brown sandy clay with occasional green glauconite lenses up to 3 mm. Encountered in RT123R, RT125R and RT128R only.
Lambeth Group	39.50 to 42.80	Upper Mottled Beds: stiff to very stiff and very stiff to hard, fissured, mottled slightly sandy to sandy clay. Laminated Beds: very stiff, laminated, dark and light grey, greenish

GEOLOGICAL UNIT	DEPTH TO BASE OF STRATUM (M BGL)	TYPICAL DESCRIPTION
		grey and black carbonaceous slightly sandy clay with silt and sand laminae locally with lenses/pockets of silt and rare shells. Lower Shelly Beds: very stiff dark grey clay and light grey fine sand with shell fragments. Lower Mottled Beds: very stiff locally hard, mottled clay, locally with sand, gravel and calcrete and grading into mottled clay-bound gravel and gravelly clay towards its base. Upnor Formation: dark grey fine and medium sand with flint gravel.
Thanet Sand Formation	44.70 to 50.20	Grey, greyish brown and black silty or clayey fine and medium sand with black and dark brown flint gravel at the base.
Upper Chalk	Not proven	Very weak and weak, low to medium density chalk.

The Envirocheck® report indicates that the Site is located within a lower probability radon affected area where less than 1% of homes are above the Action Level for radon gas.

The BGS considers there to be potential for groundwater flooding of property situated below ground level to occur on the Site.

3.2 HYDROGEOLOGY AND HYDROLOGY

The Lynch Hill Gravel Member underlying the Site is designated by the EA as a Secondary (A) superficial aquifer and the London Clay Formation is designated as unproductive strata. The Lambeth Group is also designated as a Secondary (A) aquifer, whereas the Thanet Sand and Chalk are designated as Principal aquifers by the EA.

Fugro conducted long term groundwater monitoring at a number of locations, both on and surrounding the Site. WS280 (located within the footprint of the shaft) had a response zone from 0.6 to 1.4 m bgl. The well was dry during the majority of the monitoring rounds conducted between April 2010 and February 2011, with the exception of one occasion when groundwater was present at 1.23 m bgl (120.93 m ATD (Above Tunnel Datum)), indicative of perched water within the Made Ground. Location WS283, located 90 m to the south-west with a response zone of 2.0 to 3.65 m, was also dry between August 2010 and February 2011.

However, groundwater was recorded within the River Terrace Deposits at 5.80 to 6.31 m bgl (119.28 to 118.79 m ATD) at location RT125, located adjacent to the northern boundary. Groundwater was noted at 1.70 to 1.96 m bgl (119.32 to 119.06 m ATD) within the River Terrace Deposits at location WS281B, located approximately 40 m north-east of the Site. Groundwater was also recorded within the River Terrace Deposits at 4.98 to 5.61 m bgl (119.64 to 119.01 m ATD) in RT128R, located approximately 150 m north-east of the Site.

Groundwater has been recorded within the London Clay, the Lambeth Group and the Thanet Sand at various locations within 150 m of the Site.

The Site is not located within a groundwater Source Protection Zone (SPZ) for public water supply or within a Drinking Water Protected Area (DrWPA) as defined by the EA.

The Site is located within an area classified by the EA as being of High vulnerability with respect to potential groundwater pollution, having soils of high leaching potential.

The nearest named surface water feature to the Site is the River Thames, located approximately 920 m to the south.

An extended culvert passes along the north-east boundary of the Site, aligned in a north-west to south-east direction. There are no reported ‘lost’ rivers of London within the vicinity of the Site.

Currently licensed groundwater and surface water abstractions within a 1 km radius of the Site are summarised in **Table 3-2.**

Table 3-2: Currently Licensed Abstractions within 1 km

Abstracted Aquifer/Surface Water	Distance from Site	Direction from Site	Use of Water
Groundwater (unspecified)	693	West	Other industrial/commercial/public services : heat pump
Groundwater (unspecified)	794	South-east	Commercial/industrial/public services : drinking, cooking, sanitary, washing (small garden)
Groundwater (unspecified)	906	South-east	Commercial/industrial/public services : drinking, cooking, sanitary, washing (small garden)
Groundwater (unspecified)	919	South-east	Commercial/industrial/public services : drinking, cooking, sanitary, washing (small garden)

The Site is not located within an area at risk of extreme flooding from rivers or seas.

3.3 DESIGNATED ECOLOGICAL SITES AND OTHER SENSITIVE LAND USES

There are no ecological or other sensitive sites identified within 500 m of the Site.

3.4 PRELIMINARY HYDROGEOLOGICAL MODEL

We note that the extents of superficial deposits on Site are likely to be limited in extent due to the basement levels beneath the existing property and the Crossrail shaft.

It is considered likely that groundwater is present within the superficial Lynch Hill Gravel Member (River Terrace Deposits) where present and is not anticipated to be a continuous unit beneath the Site (due to the basement levels and Crossrail shaft). Where Made Ground is present, groundwater is likely to exist as a perched unit associated with isolated lenses of more permeable material and is not anticipated to be a continuous unit beneath the Site.

Groundwater present within the Lynch Hill Gravel is unlikely to be in hydraulic conductivity with groundwater bodies present at depth, due to limited permeability and significant thickness of the London Clay.

Regional topography infers that groundwater flows in a southerly direction towards the River Thames. However, based on the limited preliminary information reviewed, perched and superficial aquifers at the Site are likely to be highly modified and groundwater flow interrupted by significant below ground structures.

4 POTENTIALLY CONTAMINATIVE LAND USES

4.1 SITE USE

Table 4-1 provides information relevant to identifying current potential contaminative land uses, activities and incidents relating to the Site. The information was obtained from a review of OS mapping, online aerial photography, key regulatory information obtained from the Envirocheck report, the EA 'What's In Your Backyard?' website, correspondence with relevant consultees and planning records, and key observations made during the walkover. Access was made available to all interior and exterior areas of the Site.

Table 4-1: Current Potential On-Site Contaminative Land Uses, Activities and Incidents

ACTIVITY / INCIDENT	DESCRIPTION	SOURCE OF INFORMATION
Operations and Processes	The western half of the Site is occupied by an eight-storey Grade II listed building. The lower five floors are currently used as Crossrail construction site offices, with the basement utilised as locker rooms and changing rooms. The sub-basement and top three levels are unoccupied. The sub-basement was noted to be flooded in some areas. On the eastern half of the Site, the Crossrail head house is being constructed over the shaft. The Site has not been determined as contaminated land under Part IIA of the Environmental Protection Act 1990.	Site walkover Camden Council Planning Portal Contaminated Land Officer
Bulk Storage of Chemicals/ Fuels	Fuel for plant was stored in bunded containers within areas of hardstanding on the Site.	Site walkover
Waste Storage	A skip was present in the south-east of the Site for inert waste disposal.	Site walkover
Drainage / Services	No drainage survey or drainage plans were reviewed during the Site visit and no inspection covers were lifted.	Site walkover
Observations of Impact	During the site walkover, no external staining of the ground was observed No pollution incidents have been reported for the Site.	Site walkover Environment Agency Contaminated Land Officer

During the walkover, a GA5000 gas analyser was used to provide a preliminary check for ground gases within the sub-basement of existing building. No concentrations of methane or carbon dioxide were recorded at concentrations above 0.1% v/v.

4.2 LAND USES IN THE SURROUNDING AREA

Following a review of relevant information obtained from the Envirocheck® Report and from the relevant regulators, as well as from observations made during the site visit, a summary of sites determined by WSP | Parsons Brinckerhoff to be of note within 250 m of the Site are provided in **Table 4-2**.

Table 4-2: Summary of Potential Land Uses, Activities and Incidents in the Immediate Surrounding Area

LAND USE	DISTANCE / DIRECTION	SOURCE(S) OF INFORMATION
Electrical sub-station	Adjacent east	Envirocheck report – historical maps Contaminated Land Officer
Electronic component manufacturers & distributors	68 m north-west	Envirocheck report – contemporary trade directory entries
Dry Cleaners	245 m north-east	Envirocheck report – contemporary trade directory entries

Portugal Street landfill is located approximately 400 m to the south-east of the Site at Lincoln's Inn Fields, according to historical landfill records from the Environment Agency (ref. EAHLD12040). No details regarding licensing, operating dates or the type of waste landfill are known for this record.

According to the Contaminated Land Officer, land to the rear of 2 Fisher Street (assumed to be the electrical substation) has been identified by Camden Council has medium priority for inspection under their Part IIA strategy. The council considers this site to be suitable for its current use, but cannot guarantee that it will not be investigated in the future.

In the response for information from the Contaminated Land Officer for Camden Council (refer to **Appendix D**) it is stated that:

'*If the land was to be redeveloped in the future and the works would involve excavations, a planning condition may be imposed with a requirement to carry out a detailed site investigation (desk top, walkover and intrusive investigation) and if necessary remediation works. However, if the site remains in the current state (established development/hard-standing) and there are no extensive soft landscaped areas or gardens the site would not be considered for investigation under the contaminated land regime.*'

We understand that the current proposals do not include for further excavations (other than that for additional piled foundations) and that there are no proposed soft landscaped areas or gardens at ground level.

POLLUTION INCIDENTS

The Environment Agency provided information regarding several pollution incidents within the vicinity of the Site. These incidents have been summarised in **Table 4-3** with full correspondence and incident reports provided in **Appendix D.**

Table 4-3: Summary of Pollution Incidents in the Immediate Surrounding Area

POLLUTION INCIDENT NUMBER	DISTANCE / DIRECTION	DATE	DETAILS
01087165	55 m north-east	16 February 2017	60 litres of fire fighting foam entered drains following London Fire Brigade attendance at a bus fire
00285597	115 m south-east	5 January 2005	Unknown quantity of diesel spilt to roadside drains
00531737	230 m north-west	15 September 2007	Up to 100 litres of diesel spilt into drains

4.3 SITE HISTORY

Historical maps were obtained as part of the Envirocheck ® report **(Appendix B)** and were reviewed to identify any potentially contaminative former land uses on the Site and within a 500 m radius of the Site boundary. A search was also made on the Camden Council planning portal for any historical information relating to the Site and surrounding area.

A historical map dated 1851 shows the Site to be bisected by Kingsgate Street, aligned in a north to south direction. Maps from 1875 show the Site to the occupied by a number of buildings, including a school over the north-east of the current shaft site. Fisher Street and Eagle Street were present to the north and south of the Site, respectively. A 1888 historical building plan identifies the buildings on the west of the Site as tenements over shops. A printer was present adjacent to the north-west of the Site, a soap factory adjacent to the south-west of the Site and a builder & carpenters adjacent to the east of the Site. The majority of the surrounding area was shown to comprise shops and residential dwellings. Of note, an electrical engineers was shown to be present approximately 60 m to the south-west of the site.

Historical maps dated 1916 show Kingsgate Street to no longer be present and the school expanded to the west. A 'tram subway' is shown to be present 15 m to the north-west of the Site, along with associated tram lines. An electrical sub-station is present immediately adjacent to the eastern boundary on a 1944 Goad insurance plan. The tram lines were absent on historical maps dated from 1958, although the subway was retained (now a Grade II listed tunnel known as the Kingsway Tram Tunnel).

Historical maps dated 1952 show 10 Southampton Row depicted as a bank, with the rest of the Site comprising 'ruins', assumed as a result of World War II bomb damage. Offices are shown to occupy this area of the Site on the 1958 Goad insurance plans. It is noted that the electrical sub-station adjacent to the east of the Site is not indicated on maps between 1958 and 1973; it is understood to have been damaged during World War II and then rebuilt in its original location. Eagle Street (to the south of the Site) is shown renamed as 'Catton Street' on historical maps from 1974.

Based on information obtained from the London Borough of Camden Planning Portal, the historical property occupying 8-10 Southampton Row comprised an eight storey building (Carlisle House) and was constructed in 1905-06. It was originally used as a hotel and 'Friendly Society Offices'. By the mid-20th century, the building included a bank and then a pub/restaurant on the ground and first floors with nine residential buildings above. The building was recorded as vacant since 2009. It is understood from documents provided by Crossrail that the buildings at 1 Fisher Street and the rear extension of 8-10 Southampton Row were demolished between 2009 and 2010.

Planning permission was granted in January 2015 for the development of a residential end-use above and around the Crossrail head house to provide 22 residential units (application no: 2013/1477/P).

4.4 PREVIOUS REPORTS

CROSSRAIL – ENVIRONMENTAL MANAGEMENT PLAN

Crossrail produced an Environmental Management Plan for the construction of the Fisher Street shaft, setting out how the project would deliver environmental requirements and how environmental issues would be handled if they arose. This included a water management plan to protect surface and groundwater from pollution and other adverse effects.

FUGRO ENGINEERING SERVICES LTD – FACTUAL REPORT ON GROUND INVESTIGATION

Fugro completed a ground investigation along the proposed Crossrail alignment from Lord Hill's Bridge to Farringdon Station. This included drilling one window sample borehole (WS280) in the location of the Fisher Street shaft. The locations of the exploratory holes are shown on **Figure 3**.

Six rounds of ground gas monitoring were undertaken at location WS280 between 27 April and 1 July 2010 by Fugro Engineering Services. Generally gas flow rates were negative, methane and carbon dioxide concentrations were recorded at less than 0.1% v/v and oxygen concentrations ranged between 20 and 21% v/v. Carbon monoxide was initially recorded at 4 ppm, then 5 ppm and then <1 ppm for the subsequent four monitoring rounds. The well was also monitored for groundwater on a number of occasions; it was dry during all but one round when a water level of 1.23 m bgl (120.93 m ATD) was recorded.

No asbestos was detected in any of the soil samples submitted for laboratory chemical analysis. The majority of determinands were recorded at low concentrations or below the limit of detection (LOD). Lead was detected above typical background levels in six samples, ranging from 130 mg/kg to 590 mg/kg. However, low concentrations of lead were recorded on the Site itself at WS280, with a maximum of 89 mg/kg.

CROSSRAIL – CONTAMINATED LAND GAP ASSESSMENT

This document provided a summary of Site and ground investigation data and identified gaps and potential areas for further assessment. Several other reports are referenced to provide a summary of the Site history, geology, hydrogeology and hydrology. It is reported that the water level of the shallow aquifer (River Terrace Deposits) recorded in July 1998 was 120.44 m ATD, whilst the construction phase groundwater level within the deep aquifer within the Lambeth Group is 69.8 m ATD. The shallow aquifer is generally non-potable and non-utilised. The report noted that the use of secant piling in the construction of the Fisher Street shaft would seal off the excavation and therefore the risk to the shallow aquifer was considered to be low. The risk to the deep aquifer was also considered to be low as the works were carried out within the cohesive upper layers of the Lambeth Group, 20 m above the construction phase groundwater level.

A quantitative UXO risk assessment was undertaken for the construction phase of the Crossrail project. It was considered that encountering UXO at Fisher Street was possible, but remote. An Explosive Ordnance Disposal (EOD) Engineer was on-call during the deep excavation works.

Overall, the potential risk to end users at the Site was considered to be low to negligible since the shaft structure was considered to break any potential pollutant pathways.

ATKINS – CONTAMINATED LAND VERIFICATION REPORT

Atkins produced a verification report for enabling works undertaken at the Site between February 2012 and January 2013. The report stated that the buildings occupying the footprint of the Fisher Street shaft were demolished and the underlying basement structure removed. Details of the

shaft construction were provided. During the excavation works, monitoring was in progress to check for unexpected or unusual ground conditions. Based on the lack of groundwater encountered within borehole WS280 during the Fugro monitoring visits, Atkins did not consider the superficial RTD aquifer to be a potential receptor of contamination.

The report stated that:

'Crossrail have not characterised the Fisher Street site as either a 'Category 1' or a 'Category 2' site, which they define as having a medium or high potential for land contamination respectively'.

And: *'The design of the enabling works required the removal of soils within the site footprint. Evidence of the excavation of this material constitutes the removal from site of any contaminants present within the soils excavated, particularly within the Made Ground.…The process of removing the Made Ground acts as "source removal" which eliminates the 'source' element of the source-pathway-receptor linkage'.*

Removal of the excavated material from the Site was evidenced by photographs and Waste Transfer notes appended to the report. The natural ground was sampled at a rate of one sample per 100,000 m^3 and one sample was taken from the Made Ground. The materials were then classified prior to removal off-site.

An email from the EA dated 15 March 2013, appended to the report, states that:

'*the risk of contamination at the site is low hence there is a very low risk of contamination to the lower aquifers. However, the maximum depth of the shaft will be close to the base of the Lambeth Group, therefore care must be taken to prevent a pathway for the mixing of water from the RTD aquifer with the underlying aquifers in the Lambeth Group/Thanet Sand*'.

An email from Camden Council dated 17 October 2012 stated that:

'the Council is satisfied that sufficient site investigation and risk assessment has been carried out. There are no further comments from the contaminated land officer at this stage'.

DEXTER MOREN ASSOCIATES – PRE-APPLICATION DOCUMENT

A pre-application document has been produced for the Site summarising the historical context, heritage, site constraints and opportunities and existing and proposed site layout plans.

GL HEARN – ENVIRONMENTAL SCOPING REPORT

An environment scoping report has been produced for an Environmental Impact Assessment (EIA) to be undertaken at the Site. Section 4.2 of the report states that ground conditions will be scoped out of the EIA since the chance of the Site being contaminated is considered to be low. It is stated that a separate geo-environmental report should be produced to support the planning application.

In a letter response (dated 11 January 2017, ref: NE/2016/126280/01/L-01), the EA considers the construction of the shaft to potentially be a highly contaminative land use, since there is potential for pathways to be created for the transfer of pollutants to groundwater. The EA recommended that ground conditions should be scoped into the EIA.

4.5 UNEXPLODED ORDNANCE

The Zetica Regional Unexploded Bomb Risk map for London (West Central) indicates that the Site is located in a high risk area. The Bomb Sight website was referenced and shows a high explosive bomb fell at Fisher Street during the London Blitz (7 October 1940 to 6 June 1941). The location of this bomb strike appears to correlate with the 'ruins' marked on the historical maps dated 1952-53.

However, following the bulk excavations to construct the Crossrail shaft and piling works have already been undertaken, the risk posed to ground workers and future site users from UXO is not considered to be significant.

5 PRELIMINARY CONCEPTUAL MODEL

5.1 INTRODUCTION

This section of the report presents the characteristics of the Site and provides a systematic evaluation of the risks to enable uncertainties and further assessment needs or other actions to be identified. It draws on the information presented in earlier sections of the report to identify plausible contaminant-pathway-receptor contaminant linkages in the context of a commercial land use scenario(s).

5.2 POTENTIAL CONTAMINANT SOURCES

Table 5-1 provides a summary of the potential sources of contamination and the likely nature of such sources both on-site and in the immediate surrounds.

Table 5-1: Potential Sources of Contamination

POTENTIAL SOURCE	POTENTIAL CONTAMINANTS OF CONCERN	LIKELY/ANTICIPATED DISTRIBUTION
On-site		
Residual Made Ground of unknown provenance	Metals, inorganics (e.g. cyanide), hydrocarbons, asbestos	Within areas which have not been excavated for construction of the shaft or existing basement levels
Organic matter in Made Ground and Alluvium	Ground gas (carbon dioxide and methane)	Within areas which have not been excavated for construction of the shaft or existing basement levels
Asbestos within Grade II listed building	Asbestos	Localised to building interior
Off-site		
Organic matter in Made Ground and Alluvium	Ground gas (carbon dioxide and methane)	Within shallow soils in the vicinity of the Site
Contaminated groundwater (from historical pollution incidents)	Hydrocarbons, solvents, surfactants	Present within shallow groundwater beneath the Site

On-site Made Ground has been discounted across the majority of the Site (circa 70%), where basement levels and the Crossrail shaft are present, as excavation works would have removed potentially impacted materials in these locations.

The off-site historical electrical engineering works (located 60 m to the south-west) has been discounted as it has since been redeveloped as offices and is located down-hydraulic gradient of the Site. The active dry cleaners and historical landfill have been discounted as potential off-site source due to distance from the Site, 245 m to north-east and 400 south-east, respectively.

The electrical sub-station to the east of the Site has been discounted as PCBs were not detected within soil samples obtained during the 2010 ground investigation.

Chemical testing results from Made Ground soils within the vicinity of the Site did not record significant levels of contamination in any of the exploratory hole locations. During subsequent ground gas monitoring, no elevated concentrations of ground gas were recorded. Therefore, off-site Made Ground has also been discounted as a potential source.

5.3 POTENTIAL RECEPTORS

In the context of the proposed future land use for a hotel, the following potential receptors of soil and/or groundwater impact were identified:

Water Environment

- Lynch Hill Gravel Member (Secondary (A) aquifer)

Human Health

- Future site users (hotel staff and guests)
- Adjacent site users (office workers)

Ground workers, both during redevelopment and future below ground maintenance, were discounted from the assessment because there is a legal requirement to ensure that suitable health and safety controls should be in place during works.

The River Thames was discounted as a receptor due to distance from the Site (approximately 920 m). Groundwater flow is also likely to be interrupted by significant below-ground structures. The Thanet Sand and Chalk Principal aquifers have been discounted from the assessment since a significant thickness of impermeable London Clay is considered to impede contaminant migration.

5.4 PLAUSIBLE CONTAMINANT LINKAGES

Table 5-2 provides an evaluation of the potential contaminant linkages that were considered to be plausible on the basis of the information currently available for the Site.

Table 5-2: Plausible Contaminant Linkages

POTENTIAL CONTAMINANTS	POTENTIAL PATHWAYS	POTENTIAL RECEPTORS	COMMENTS
Ground gas generation from Made Ground and alluvium at the peripheries of the Site and off-site	Migration and inhalation of gases derived from degradation of organic materials. Ingress into buildings via service penetrations, floor construction and cracks, wall cavities.	Future site users Adjacent site users	The risk of harm to future end users from ground gases is considered to be **Low**. This is based on: → Lack of significant onsite sources → Low ground gases recorded on site in previous ground investigations → Ground gases not recorded in sub-basement area during walkover.

Exposure of future and adjacent site users to direct contact with contaminated soils and vertical leaching from impacted soils to the underlying Secondary (A) aquifer have been discounted as plausible contaminant linkages. This is on the basis of:

- The majority of Made Ground across the Site has been removed during construction of the shaft.
- Based on the previous 2010 ground investigation findings, there is unlikely to be a significant thickness of Made Ground in the small area surrounding the shaft and concentrations of contaminants are not likely to be elevated above typical background levels.

- The entire Site will be occupied by the footprint of the building, and hardstand cover restricting infiltration rates and limiting exposure of Site users to potentially contaminated soils.
- The superficial deposits are likely to have been removed from the majority of the Site; as such, the groundwater regime and flow (to off-site receptors) is likely to be highly modified.

The inhalation of vapours derived from volatile compounds in soils has also been discounted as a contaminant linkage as the Site history and previous ground investigation data indicates a **low** likelihood for hydrocarbons to be present in the ground at the Site that could cause risk to future land users.

6 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the Site walkover and the desk based assessment, WSP | Parsons Brinckerhoff make the following conclusions and recommendations in the context of the proposed development of the Site.

6.1 CONCLUSIONS

The Site is located within central London, 80 m to the north of Holborn Station, within a predominately commercial area. A Grade II listed building (Carlisle House) is present in the west of the Site, which is currently used as construction site offices. An emergency access shaft has been constructed to the rear of the building for the Crossrail network and construction works for the head house are ongoing.

Historical OS maps and building plans from the late 1800s indicate that the Site was bisected by Kingsgate Street with a school in the north-east and shops in the west. Kingsgate Street was no longer present in 1916 and Carlisle House is understood to have been constructed in the west of the Site in 1905-06. The east of the Site was reportedly hit by a high explosive bomb during World War II and this is evidenced by the 'Ruins' indicated on maps in the 1950s. Offices were constructed towards the end of the 1950s and remained present until demolition by Crossrail in 2009.

BGS maps and historical borehole logs indicate that the Site is underlain by the Lynch Hill Gravel Member and the London Clay Formation. The Lambeth Group, Thanet Sand Formation and Chalk are present at depth. The EA has classified the Lynch Hill Gravel Member and the Lambeth Group as Secondary (A) aquifers, the London Clay Formation as Unproductive Strata and the Thanet Sand Formation and Chalk as Principal aquifers. Perched and superficial aquifers at the Site are likely to be highly modified and groundwater flow interrupted by significant below ground structures.

A ground investigation conducted in 2010 confirmed the published geology in the area surrounding the Site. On the Site itself, 1.40 m of Made Ground was encountered overlying Lynch Hill Gravel. Laboratory analysis of soils indicated contaminant concentrations below the limit of detection or at low concentrations. Subsequent groundwater level monitoring indicated the presence of perched groundwater within the Made Ground. No elevated ground gases were encountered.

The majority of the eastern half of the Site has been excavated for construction of the Crossrail shaft. Therefore, it is considered that any Made Ground (and associated contamination) has been removed and will thereby not pose a risk to future site users or the underlying Secondary (A) aquifer. Since the entire Site will also be occupied by the footprint of a building and hardstand cover, it is therefore considered that no pollutant pathways between potentially contaminated soils and future site users will remain. In addition, planning permission was previously granted for a residential development, which is considered to be a more sensitive land use than the proposed use as a hotel.

6.2 RECOMMENDATIONS

Based on the proposed development, comments made by the Camden Council Contaminated Land Officer and the preliminary conceptual site model, a full ground investigation and generic quantitative risk assessment for the Site is not considered necessary.

A full refurbishment asbestos survey of the entire building should be undertaken and any asbestos removed by a licensed asbestos removal contractor prior to refurbishment works commencing.

Previous shallow ground gas monitoring conducted in the east of the Site indicated a very low risk from ground gas, but a single monitoring well at the Site may not be considered sufficient to accurately characterise the ground gas regime. It is therefore prudent to conduct limited gas monitoring on the Site comprising ambient air monitoring in the sub-basement, and basement areas, which is considered to be an enclosed space where ground gas accumulation could occur.

If additional piling works are undertaken, it is recommended that a piling risk assessment is completed in order to ensure that preferential pathways between potentially contaminated soils (residual Made Ground soils) and the underlying groundwater are minimised.

Date Modified: 07/02/2017 13:42

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File: Created using iGIS, WSP's Online Mapping System

Key

Site Location

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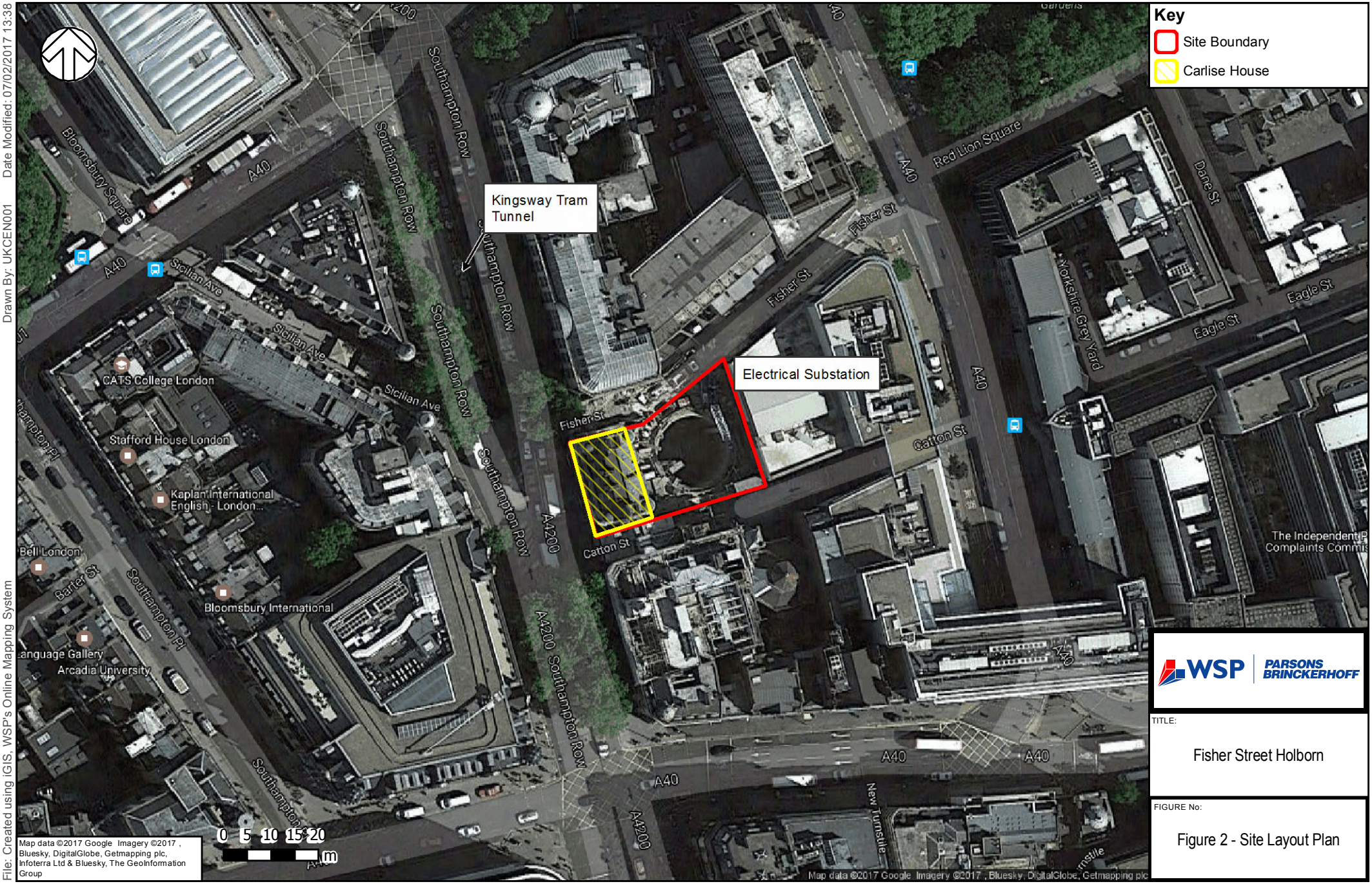
TITLE:

Fisher Street Holborn

FIGURE No:

Figure 1 - Site Location Plan



File: Created using iGIS, WSP's Online Mapping System Drawn By: UKCEN001 Date Modified: 07/02/2017 13:38

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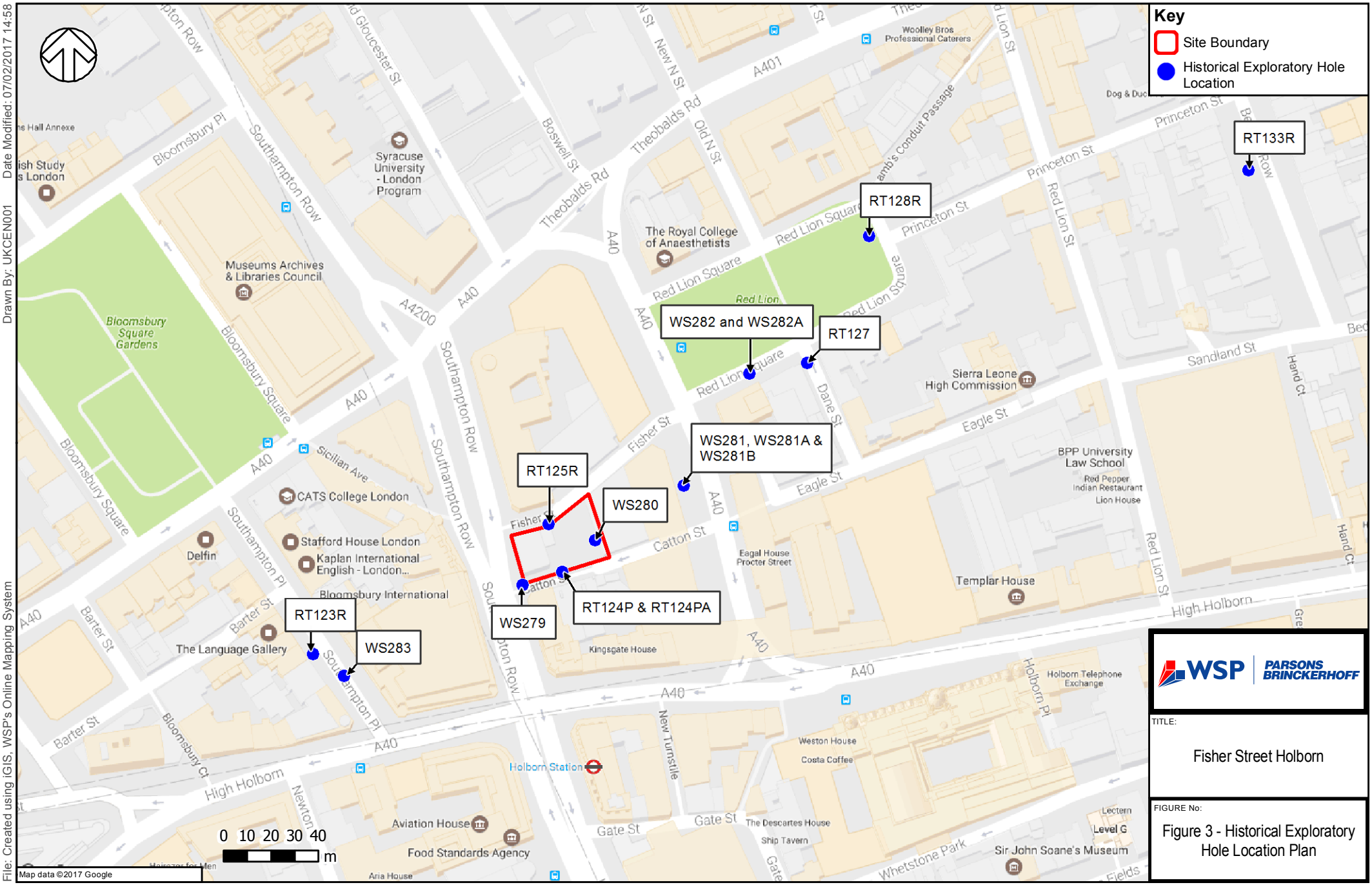
TITLE:

Fisher Street Holborn

FIGURE No:

Figure 2 - Site Layout Plan


Key
Site Boundary
Historical Exploratory Hole Location
RT133R
RT128R
WS282 and WS282A
RT127
WS281, WS281A & WS281B
RT125R
WS280
WS279
RT124P & RT124PA
RT123R
WS283
Fisher Street Holborn
Figure 3 - Historical Exploratory Hole Location Plan
Map data ©2017 Google
0 10 20 30 40 m
Date Modified: 07/02/2017 14:58
Drawn By: UKCEN001
File: Created using iGIS, WSP's Online Mapping System

NOTES

Location Plan
Scale 1:1250

0 20 50 120

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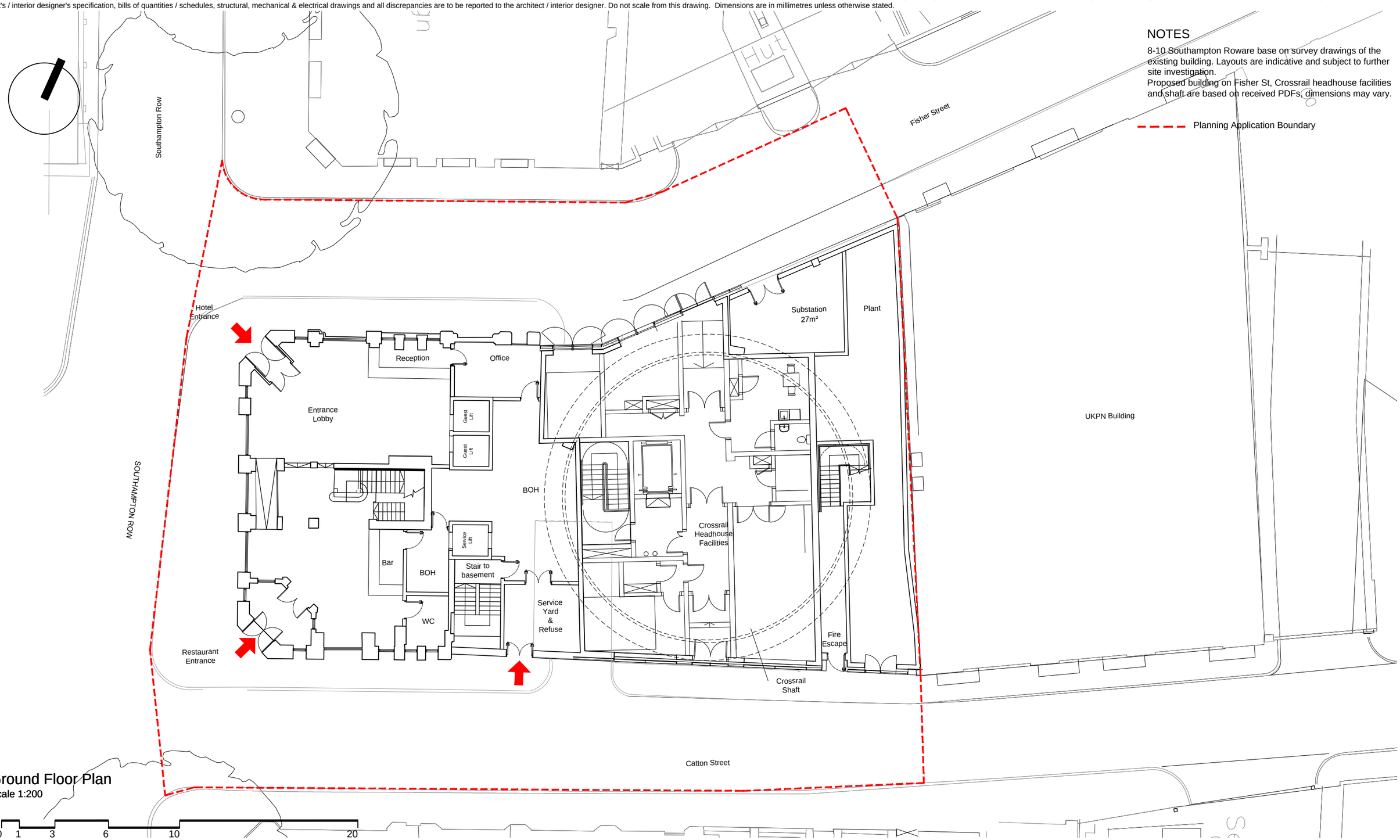
rev	amendments	date	by
P0	ISSUED FOR PRE APPLICATION	31.10.16	RA

project	drawing title	scale	date	drawn by	checked by
Holborn Fisher Street	Location Plan	1:1250 @ A3 NTS @ A4	31.10.16	RA	WY

client	drawing status	job no.	drawing no.	revision
	PRE APPLICATION	1365	A-000-001	P0



NOTES

8-10 Southampton Roware base on survey drawings of the existing building. Layouts are indicative and subject to further site investigation.
Proposed building on Fisher St, Crossrail headhouse facilities and shaft are based on received PDFs, dimensions may vary.

Planning Application Boundary

Ground Floor Plan

Scale 1:200

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rev	amendments	date	by
P0	ISSUED FOR PRE APPLICATION	31.10.16	RA

project	drawing title	scale	date	drawn by	checked by
PRE APPLICATION	Ground Floor Plan	1:200 @ A3 NTS @ A4	31.10.16	RA	WY

client	drawing status	job no.	drawing no.	revision
Idé Real Estate	PRE APPLICATION	1365	A-100-002	P0