PHASE I AND II GEO-ENVIRONMENTAL ASSESSMENT

PREMIER INN EXTENSION, 1 DUKES ROAD, EUSTON

REC REFERENCE: 1CO104376/P2/R1

PREPARED FOR: WHITBREAD GROUP PLC

DATE: NOVEMBER 2017

National Consultancy, Locally Delivered

A CONCEPT LIFE SCIENCES COMPANY

QUALITY ASSURANCE

Issue/revision	Issue 1	Revision 1	Revision 2
Remarks	Final	Revised following comments from structural engineer	
Date	November 2017	December 2017	
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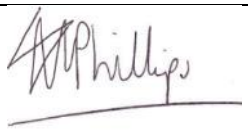
Signature			
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EXECUTIVE SUMMARY

Site Address	Premier Inn, Euston, 1 Dukes Road, London, WC1H 9PH	
Grid Reference	529895,182637	
Site Area	0.36ha	
Current Site Use	Existing Premier Inn Hotel and car park.	
Proposed use	Five storey extension with additional seven car parking spaces.	
Site History	The site originally comprised a group of structures which were relatively sparse and transected by a NW-SE running thoroughfare. From 1896 the structures became more densely orientated without any further notable changes to the site until 1970 when a single large structure 'Somerton House' was constructed taking up the majority of the site area.	
Site Investigation findings	**Geology**	Made Ground - Alluvium - London Clay Formation.
	Groundwater	Perched water encountered during the ground investigations (0.50m bgl) and during return monitoring visits (0.51m bgl).
Revised Conceptual Site Model (CSM)	**Human Health**	The asbestos encountered did not comprise loose fibres and is situated beneath the proposed building footprint. As such, it is not considered to pose a significant risk to future site users.
	Controlled Waters	No significant risk identified.
	Ground Gases	No significant risk following removal of majority of source.

Preliminary Geotechnical Assessment

Concrete Durability

Alluvium – **DS-1/AC-1s**

London Clay Formation – **DS-3/AC-2s**

Pavements and Construction

Based on a worst case Modified Plasticity Index of 20 an indicative design CBR value of 2 to 2.5% can be obtained based on assuming a low water table and average construction conditions.

Non-Standard Infiltration Test

Given the underlying fine-grained geology, it is unlikely that shallow soakaway drainage will could be implemented on site. As such it is recommended that contact is made with the receiving water board at the earliest convenience to agree discharge to a combined sewer.

Obstructions

Consideration should be given to the presence of obstructions encountered during the investigation, allowances should be made for pre probing of pile locations

Pile Capacities

Depth (mbgl)	Pile Carrying Capacity (kN)		
	300mm dia	450mm dia	600mm dia
10	145	245	350
20	420	670	940
30	810	1260	1750

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APPENDICES

1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants Ltd (REC) has been commissioned by Simpson Associates on behalf of Whitbread Group ('the Client') to undertake a Phase I and II Geo-Environmental Assessment at Premier Inn, Euston, 1 Dukes Road, London, WC1H 9PH. A site location plan (ref. 1CO104376-001) is presented within Appendix III.

The purpose of this report is to provide geo-environmental information with respect to the proposed extension of the existing hotel building and to provide an assessment of potential contamination and geotechnical aspects relating to the scheme.

1.2 Proposed Development

Based on the proposed extension site plan, provided by the Client (ref. CHQ.15.11690-04F), it is understood that it will comprise a five storey extension to the south of the existing hotel building providing an additional fifty nine (59no.) bedrooms and extra fourteen (14no.) car parking spaces. A proposed site development plan (ref. 1CO104376-003) has been drafted using this received plan and is presented within Appendix III.

1.3 Objectives

The objectives of the geo-environmental investigation are to:

- Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Phase 1 Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- Undertake a preliminary stage of intrusive works including sampling and analysis to provide an overview of environmental issues identified;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,
- Provide recommendations regarding future works, if required.

1.4 Scope of Works

The following scope of works was developed based on information contained in the invitation to tender brief referenced BB/13924 dated 10th September 2017. The details include:

- A single day of Window Sampling to depths circa 5.00mbgl, with in-situ testing (SPTs);

- A single foundation inspection pit adjacent to the existing hotel building;
- Installation of a single land gas and groundwater monitoring well;
- Two return land gas and groundwater monitoring visits;
- Non-standard permeability testing to be undertaken within the installed monitoring well to provide an indication of suitability of the spoils for use in shallow soakaways;
- Shallow soil sampling within the areas of proposed additional car parking; and,
- Collection of soil samples for subsequent chemical and geotechnical laboratory analysis.

1.5 Source of information

Background information was sought from the following:

- GroundSure data search: GS-4434300 & GS-4434301;
- Historical mapping dated 1871 to 2014;
- Online planning records held by Camden Council;
- Environment Agency Groundwater Vulnerability Map (http://maps.environment-agency.gov.uk/wiyby);
- HPA Indicative Atlas of Radon in England and Wales (HPA-RPD-033:2007);
- BRE Document BR211 Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007); and,
- British Geological Survey Online Mapping (http://www.bgs.ac.uk)

1.6 Risk Classification

REC Ltd has utilised the available data to classify the site on the basis of its likely contaminated land liability and potential for geotechnical constraints in relation to the property development. The risk classification definitions are summarised below:

Risk	Definition
Low	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
Low-Moderate	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of a future redevelopment of the site etc.
Moderate	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the site will likely require further site investigation.
Moderate-High	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment including intrusive ground investigations.
High	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine to level of risk and associated liability.

1.7 Limitations of the Study

The limitations of this report are presented in Appendix I.

1.8 Confidentiality

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC. A charge may be levied against such approval.

2.0 SITE SETTING

2.1 Site Details

Site Address	Premier Inn, Euston, 1 Dukes Road, London, WC1H 9PH
National Grid Reference	529895,182637
Site Area	0.36ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan (ref. 1CO104376-001) is presented within Appendix III.

2.2 Current Site Use

Site Description

At the time of the intrusive investigation, the wider site was noted to be an active hotel premises comprising a 9-storey building with an access road leading down to the car park and areas of hard standing. The site was bound to the north by Euston Road, to the west by Dukes Road and to the east and southeast by London Contemporary Dance School.

Access into the site was off Dukes Road via an asphalt driveway with entry controlled by a ticketed barrier. Both the driveway and the car park surface are laid in asphalt and appeared to be in good condition.

Hazardous Materials Storage

No Above Ground Storage Tanks (ASTs) and or evidence of Underground Storage Tanks (USTs) such as covers or historical bracing were observed to be on site.

Polychlorinated Biphenyls (PCBs)

No potential sources of PCBs were identified within the site boundary.

Waste Storage

No potentially hazardous waste streams were identified to be generated at the site. In addition, no waste storage facilities were observed within the site area.

Asbestos Containing Materials (ACMs)

No Asbestos Containing Materials (ACMs) were encountered on site during intrusive site investigation.

2.3 Surrounding Area

The surrounding land uses are summarised below:

Direction	Land Use
North	Euston Road
East	London Contemporary Dance School
South	London Contemporary Dance School
West	Dukes Road

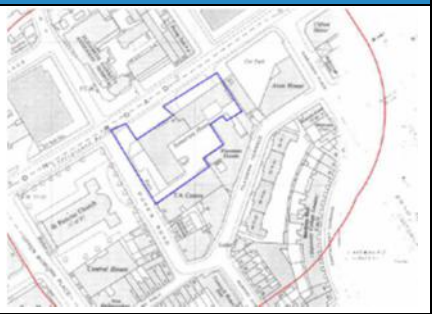
3.0 SITE HISTORY

3.1 Historical Mapping

A review of historical maps pertinent to the site are summarised in Table 3.1 below:

Table 3.1 Summary of Historical Land Uses

Map Edition	Historical Land Use	Map Excerpt
1871 – 1896 (1:1,056 & 1:10,560)	The site comprises multiple terraced structures which run parallel with Euston Road on the northern boundary. A road *'Stones's Row'* transects the site north west to south east from Euston Road, to the rear of a structure on the south-eastern boundary. The structures are not titled and as such are assumed residential. The surrounding area comprises residential dwellings with St Pancras Church circa 50m west of site.	
1896– 1952 (1:1,056, 1:1,250 & 1:10,560)	Stone's Row is no longer noted. However, an access route has proceeded it, which leads from *'Euston Road'* to *'South Place'* circa 10m south of the site. *'South Place'* leads onto a new Drill Hall. The site general layout have been altered slightly with additional structures constructed within the central portion of the site. In the surrounding area a hospital is located 40m north west and St Johns Works (confection) is 40m south east. A large goods shed is located circa 100m north west associated with *'St Pancras Station'*.	
1952 – 1965 (1:1,250, 1:2,500, 1:10,560 & 1:10,000)	The site comprises several residential properties labelled Endsleigh Terrace and Somerset Terrace. At the east of the site at the previous location of *'Stone's Row'* is now *'Inwood Place'* surrounded by properties structures on all sides. Within the surrounding area a confectionary works is located 70m west, an electricity substation 80m north, a leather works 110m north and a radiography unit 95m south. The surrounding area has undergone continued post war industrial expansion	

Map Edition	Historical Land Use	Map Excerpt
1965 – 2002 (1:1,250, 1:2,500 & 1:10,000)	By 1965, the site has been redeveloped into a large structure labelled *'Somerton House'.* In the surrounding area the majority of small residential buildings have been converted into large residential buildings. A electricity substation is located 50m north west of site. The surrounding area has continued its industrial expansion	
2002 - 2014 (1:10,000)	The site is in its current configuration.	

3.2 Historical Database

A review of potentially contaminative historic land uses identified in the Groundsure report, within 200m radius of the site are summarised below in Table 3.2:

Table 3.2 Summary of Potentially Contaminative Historical Land Uses

Surrounding Feature	Distance (m)	Dates	Direction
Identified by GroundSure Data Search			
Hospital	11 - 13	1894 – 1989	NW
Electricity Substation	48	1969-1970	W
Fire Station	54	1957 - 1989	W
Electricity Substation	59-126	1952-1997	N
Garages	88	1951	S
Garages	89	1952	SE
Goods Shed	95 - 129	1920 - 1973	NE
Railway Sidings	95 – 180	1920 - 1973	NE
Unspecified Tank	138 - 240	1876 - 1993	SE
Electricity Railway Station	190	1948	NW
Coal Depot	193	1948	NE

3.3 Planning History

Planning records held by the Local Planning Authority (Camden Council) did not yield any planning constraints environmentally pertinent to the site.

4.0 ENVIRONMENTAL SETTING

4.1 Geology & Hydrogeology

A review of the online British Geological Survey (BGS) mapping for the site indicates that the site is underlain by the following geological sequence:

Table 4.1 Summary of Geological Information

Geological Unit	Classification	Description	Aquifer Classification	Sensitivity
Superficial	Lynch Hill Gravel Member	Sand and Gravel	Secondary (A) Aquifer	Moderate
Bedrock	London Clay Formation	Clay	Unproductive	Low

Information obtained from the British Geological Survey (BGS) using a 50m buffer identifies the site is predominantly underlain by Lynch Hill Gravel Member over London Clay Formation. It is noted that Lynch Hill Gravel member is noted to only be present on the south and South west of the site only.

The nearest BGS historical borehole is located 60m east on Mabledon Place. TQ28SE2385 indicates the following geological sequence:

- Made Ground - 0.00 – 4.50mbgl
- London Clay Formation - 4.50 – 24.00mbgl
- Lambeth Group - 24.00 – 39.00mbgl
- Thanet Formation - 39.00 – 45.00mbgl
- Chalk (Undifferentiated) - 45.00 – 109.00mbgl

There are 9no. records of groundwater water abstraction licences within 1.0km. The closest active licence identified is located 136m north east at Bidborough House, Mabledon Place and comprised abstraction for use in a heat pump. The data search does not identify any potable water abstraction licences within 1.0km radius of the site.

The site is not within a Groundwater Source Protection Zone (SPZ).

The soil leaching potential of the site is categorised as Minor Aquifer/High Leaching Potential (H1) - Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

4.2 Geotechnical Data

Geotechnical data presented within the Groundsure Report identifies the following ground conditions:

Table 4.2 Summary of Geotechnical Information

Hazard	Designation	Details
Shrink-Swell Clay	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management.
Landslides	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides.
Soluble Rocks	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions.
Compressible Ground	Negligible	No indicators for compressible deposits identified.
Collapsible Rocks	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present.
Running Sand	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water.

4.3 Coal Mining & Ground Workings

The site does not lie within an area affected by coal mining and as such, no coal authority reports were required for this assessment.

4.4 Railways & Tunnels

The data search has identified 30no. active and/or historical railways within a 250m radius of the site, with 3no. underground railways (Circle, Hammersmith & City, and Metropolitan Lines) indicated to be present within the site boundary. However, the drawing provided indicates that these underground railways run below the A501 (Euston Road), located adjacent to the north of the site, and do not underlie the site itself. Furthermore, given that the proposed extension is located to the south of the existing hotel building, it is considered unlikely that the development proposals will impact upon these railways.

4.5 Hydrology

A review of available data has identified an unnamed culvert which lies approximately 45m north east of the site at its nearest point. There are 3no. records of surface water abstractions within 1.0km of the site with the closest located 928m north east at Maiden Lane Bridge for non-evaporative cooling.

The site does not lie in an area affected by Environmental Agency flooding. The data search indicates that the Risk of Flooding from Rivers and the Sea (RoFRaS) is considered to be very low. However the site is within a 50m radius of a groundwater flooding susceptibility area relating to superficial deposits flooding.

4.6 Radon Risk Potential

A review of available data has indicated that the site is not in a Radon Affected Area as less than 1% of the properties are above the Action Level. No radon protection measures are necessary.

4.7 Industrial Land Uses

The data search has identified a single record of current significant industrial land uses within 250m of the site as detailed further below:

Table 4.3 Summary of Current Significant Industrial Land Uses

Feature	Category	Distance (m)	Direction
Obsolete Fuel Site	Fuel Site	38	E
Euston Fire Station	Fire Brigade Station	70	W
Electricity Sub Station*	Electrical Features	124	N
Unspecified Works	Unspecified Works or Factories	149	NW
Telephone Exchange	Telecommunication Features	152	E
Bombardier Transportation UK Ltd	Transport, Storage and Delivery	171	NW
Depot	Transport, Storage and Delivery	239	SE

* Nearest electrical substation only listed

4.8 Sensitive Land Uses

The data search has identified two records of Local Nature Reserves with the closest at 691m north at Camley Street Nature Park. No other environmentally sensitive areas were identified within a 2.0km radius of site.

4.9 Site Sensitivity Assessment

The site is considered to be located within a '**low to moderate**' sensitivity setting due to the following:

- Superficial Deposits (within the South and South West) are considered a Secondary 'A' Aquifer;
- Unnamed culvert is located approximately 45m north east of the site;
- Site is located within close proximity to Transport for London (London Underground) infrastructure
- The site is not located within an Environment Agency flood zone and has a very low risk from flooding; and
- The nearest sensitive area is located 691m north.

5.0 CONSULTATIONS

5.1 Contaminated Land Officer

A request for information was made to the Environmental Health Officer at Camden Council on 3rd November 2017. As of the submission of this report, no response has been received.

5.2 Landfill Sites and Waste Treatment Sites

A review of available information identified a number of landfills and other waste sites within a 1.0km radius of the site and these are summarised as follows:

Table 5.1 Summary of Landfill and Other Waste Sites

Location	Type of wastes	Distance (m)	Direction	Details
St Pancras Road	Metal Recycling Site	691	N	License issued 20/11/1992
Kings Cross Transfer Station	Household, Commercial & Industrial Waste Transfer Station	722	N	License Surrendered 06/03/2001
Unknown	Mobile plant for remediation of land.	754 - 761	NE	License issued 30/11/2015
Camley Street	Household, Commercial & Industrial Waste Transfer Station	770	N	License Surrendered 07/01/2000
Unknown	Metal Recycling Site	964	N	License issued 05/06/1997

5.3 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report.

Table 5.2 Summary of Historical Data

Activity	0-249m	250-500m	Details
Petrol and Fuel Sites	1	1	The nearest petrol site is located 38m east at St Pancras Service Station. Although this is now obsolete.
Records of Category 3 or 4 Radioactive Substances	0	54	All records relate to the medical disposal of wastes in association with University College London and its associated subsidiaries.
Part A(2) and Part B Activities and Enforcements	1	6	The nearest record is located 147m west at Cyna, Euston Road for petrol vapour recovery.

Licensed Discharge Consents	2	0	Both records relate to trade discharge – cooling water consents into groundwater via re-inject borehole at Bidborough House on Mabledone Place located 66m east. Both Bidborough House licences have been revoked (20/02/2009 & 08/03/2013).
Environmental Agency Pollution Incidents (NIRS List 2)	0	2	The nearest pollution incident occurred 282m west on 05/07/2001. The pollutant involved was diesel. No impact was recorded to air, land or water.

6.0 CONCEPTUAL SITE MODEL (CSM)

6.1 Initial CSM

In accordance with Environment Agency, CLR11 (2004) and BS10175 (Code of Practice for Investigation of Potentially Contaminated Land), REC have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area.

6.2 Contaminant Sources

On-site Potential Sources

- Made Ground associated with historical development.

Off-site Potential Sources

- Hospital (nearest located 11m north west);
- Obsolete fuel site (38m east);
- Electricity Substation (nearest located 48m west);
- Fire Station (nearest located 54m west);
- Garages (nearest 88m south);
- Goods Shed (nearest located 95m north east);
- Railway Sidings (nearest located 95m north east);
- Unspecified Tank (nearest located 138m south east);
- Unspecified Works (located 149m north west);
- Telephone Exchange (located 152m east);
- Bombardier Transportation UK Ltd and depot (nearest located 171m north west);
- Electricity Railway Station (located 190m north west); and,
- Coal Depot (located 193m north east).

6.3 Potential Pathways

Receptors may be potentially at risk from the identified potential sources of contamination via the following pathways:

- Ingestion of impacted soils;
- Inhalation of dust;
- Dermal contact with soils;
- Inhalation of fibres;
- Migration of hazardous gases into buildings;
- Migration of vapours into buildings; and,
- Vertical and lateral migration of mobile contaminants.

6.4 Potential Receptors

6.4.1 Human

The following potential human receptors have been identified:

- Future site users; and,
- Residents of adjacent properties.

Construction workers are not considered to be a plausible receptor as exposure will be managed through the use of appropriate PPE and hygienic working practices, as required under HSE/ CDM regulations. Furthermore potential exposure to possible contaminants is not expected to be over prolonged work duration thereby limiting any impact to ground workers.

6.4.1 Controlled Waters

The following potential controlled waters receptors have been identified:

- Lynch Hill Gravel Member – Secondary 'A' Aquifer.

6.5 Risk Assessment

CIRIA 552: Contaminated Land Risk Assessment 'A Guide to Good Practice' provides guidance on risk assessment taking into account factors such as severity of the potential harm that may arise from a successful pollutant linkage, potential magnitude of the hazard, and the sensitivity of the target receptor. Risk assessment is initially assessed by determining the severity of the potential hazard, which takes into account receptor sensitivity and the magnitude of the potential impact as detailed in Tables 6.1 & 6.2 below.

6.5.1 Severity

Table 6.1 Receptor sensitivity

Category	Human sensitivity	Environmental sensitivity
Very Low	Ground workers	Non-sensitive water course
Low	Commercial / Industrial	Secondary Aquifer
Moderate	Residential without plant uptake	Principal Aquifer / Sensitive Watercourse
High	Residential with plant uptake	Groundwater Source Protection Zone

Table 6.2 Magnitude of Impact

Category	Example
No Impact	No identified or potential pollutants present / Greenfield Site
Slight Impact	Minor leaks and spills from fuel infrastructure, inert landfills / Residential, Retail or Offices
Moderate Impact	Major leaks and spills from fuel infrastructure / Railways, Collieries or Scrapyards
Gross Impact	Heavily contaminated industrial sites, hazardous landfills / Gas Works, Chemical Works

Severity is subsequently assessed considering the potential receptor and magnitude of impact as outlined within Table 6.3.

Table 6.3 Determination of level of severity for potential hazards

	Receptor Sensitivity			
	Very Low	Low	Moderate	High
No Impact	Minor	Minor	Minor	Minor
Slight Impact	Minor	Minor	Minor	Mild
Moderate Impact	Minor	Minor	Mild	Medium
Gross Impact	Minor	Mild	Medium	Severe

6.5.2 Likelihood

The likelihood of an event is assessed while considering the potential for presence of a contaminant, presence of receptor, and the substantiality of the pollutant pathway. Likelihood is broken down into four separate categories within the CSM as shown in Table 6.4 overleaf:

Table 6.4 Definitions of likelihood categories

Category	Definition
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.
Low Likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.

6.5.3 Risk Rating

Table 6.5 demonstrates the methodology used to provide an overall risk rating within the preliminary CSM with respect to any potential sources of contamination that may affect the site. An overall risk rating is assigned to each potential contaminant considering the assessed likelihood and severity as determined using the methodologies within Tables 6.1 to 6.4.

Table 6.5 Level of risk rating for hazard definition

		Severity			
		Minor	Mild	Medium	Severe
Likelihood	Unlikely	Very Low	Very Low	Low	Low / Moderate
	Low Likelihood	Very Low	Low	Low / Moderate	Moderate
	Likely	Low	Low / Moderate	Moderate	High
	High Likelihood	Low / Moderate	Moderate	High	Very High

6.6 Conceptual Site Model

A site specific CSM has therefore been created using the above information and is provided on the following page.

Table 6.1 Conceptual Site Model

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
On-Site							
Made Ground associated with historical development	Heavy metals	Ingestion of soils Dermal contact with soils	Future Site Users	**Likely**	**Minor**	**Low**	**Potentially Active –** Due to the significant developments undertaken on site it is likely that significant thicknesses of Made Ground are present on site, and as such are likely to be impact by contaminants of concern. As such further assessment is required.
			Controlled waters		**Minor**	**Low**	
	Asbestos fibres	Inhalation of fibres	Future site users	**High Likelihood**	**Minor**	**Low/Moderate**	
	Total Petroleum Hydrocarbons (TPHs)	Ingestion of soils Dermal contact with soils Inhalation of ground gases	Future Site Users	**Likely**	**Minor**	**Low**	
			Controlled waters		**Minor**	**Low**	
	Polycyclic Aromatic Hydrocarbons (PAHs)	Ingestion of soils Dermal contact with soils	Future site users	**Likely**	**Minor**	**Low**	
			Controlled waters		**Minor**	**Low**	
	Ground gases (CH_4 and CO_2)	Inhalation of ground gases	Future Site Users	**Likely**	**Minor**	**Low**	
Off-Site							
Hospital (11m north west)	Heavy Metals, TPH and PAH	Lateral and vertical migration to site	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	**Inactive –** Although waste management practices at hospitals have been identifiably less stringent in the past (open material storage etc.) it is key to note these were often over a limited extent and of limit concern of migration. As such this risk is considered insignificant.
			Controlled waters		**Minor**	**Very Low**	
Obsolete Fuel Site (38m east)	TPH, PAH and (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Likely**	**Mild**	**Low / Moderate**	**Potentially Active –** Due to the close proximity and the age of the filling station there is a high possibility for migration of
			Controlled waters		**Mild**	**Low / Moderate**	

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
							contaminants over the long term via the permeable superficial despots to the east
Electricity Substations (48m west)	PCBs	Lateral and vertical migration to site	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	**Inactive –** Due to the limited mobility of PCB's these contaminants are unlikely to migrate to the site.
			Controlled waters		**Minor**	**Very Low**	
Fire Station (54m west)	TPH, PAH and (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Likely**	**Minor**	**Low**	**Potentially Active –** Due to the age of the Fire Station, there is potential for migration of potential contaminants over the long term via the permeable superficial deposits to the West.
			Controlled waters		**Minor**	**Low**	
Garages (88m south)	TPH, PAH and (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Likely**	**Mild**	**Low / Moderate**	**Potentially Active –** Due to the age of the Garages identified, there is potential for migration of potential contaminants over the long term via the permeable superficial deposits to the South.
			Controlled waters		**Mild**	**Low / Moderate**	
Goods Shed (95m north east)	Heavy Metals, TPH, PAH, and (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	**Inactive -** Considering the distance from the site, and the sites subsequent redevelopment it is not considered to pose a significant risk.
			Controlled waters		**Minor**	**Very Low**	
Railway Sidings (95m north east)	Heavy Metals, TPH and PAH, Ground Gasses	Lateral and vertical migration to site	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	**Inactive –** Considering the distance from the site, and the impermeable nature of the geology, it is considered of low likelihood that contaminants would migrate to site. As such the risk is deemed insignificant.
			Controlled waters		**Minor**	**Very Low**	

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
Unspecified Tank (138m south east)	TPH, PAH and (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Unlikely**	**Minor**	**Very Low**	**Inactive -** Considering the distance from the site, and the underlying geology to the north east comprising impermeable London Clay, it is considered of low likelihood that contaminants would migrate to site. As such the risk is deemed insignificant.
			Controlled waters		**Minor**	**Very Low**	
Unspecified Works (149m north west)	Heavy Metals, TPH, PAH, and (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Unlikely**	**Minor**	**Very Low**	**Inactive -** Considering the distance from the site, and the underlying geology to the north west comprising impermeable London Clay, it is considered of unlikely that contaminants would migrate to site. As such the risk is deemed insignificant.
			Controlled waters		**Minor**	**Very Low**	
Telephone Exchange (152m east)	PCBs	Lateral and vertical migration to site	Future Site Users	**Unlikely**	**Minor**	**Very Low**	**Inactive -** PCB's have a very low mobility and are unlikely to migrate far from the source. AS such this is risk is deemed insignificant
			Controlled waters		**Minor**	**Very Low**	
Bombardier Transportation UK Ltd and depot (171m north west)	Heavy Metals, TPH, PAH, Solvents, Asbestos, (S)VOCs	Lateral and vertical migration to site	Future Site Users	**Unlikely**	**Minor**	**Very Low**	**Inactive -** Considering the distance from the site, and the underlying geology to the north west comprising impermeable London Clay, it is considered of unlikely that contaminants would migrate to site. As such the risk is deemed insignificant.
			Controlled waters		**Minor**	**Very Low**	

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood of Occurrence	Severity	Overall Risk Rating	Active / Inactive
Electricity Railway Station (190m north west)	Heavy Metals, TPH and PAH	Lateral and vertical migration to site	Future Site Users	**Unlikely**	**Minor**	**Very Low**	**Inactive -** Considering the distance from the site, and the underlying geology to the north west comprising impermeable London Clay, it is considered of unlikely that contaminants would migrate to site. As such the risk is deemed insignificant.
			Controlled waters		**Minor**	**Very Low**	
Coal Depot (193m north east)	Heavy Metals, TPH and PAH	Lateral and vertical migration to site	Future Site Users	**Unlikely**	**Minor**	**Very Low**	Considering the distance from the site, and the underlying geology to the north west comprising impermeable London Clay, it is considered of unlikely that contaminants would migrate to site. As such the risk is deemed insignificant.
			Controlled waters		**Minor**	**Very Low**	

7.0 SITE INVESTIGATION

7.1 Desk Study Information

Potential contamination sources have been identified from the desk study and these are listed in Table 7.1 below:

Table 7.1 Summary of Potential Contaminant Sources

Potential Source	Potential Contaminants	Potential Impact
Made Ground associated with historical development	Heavy metals, PAHs, TPHs, Asbestos fibers & Ground gases	Future site users / Controlled Waters
Obsolete Fuel Station	TPH, PAH and (S)VOCs	
Fire Station		
Garages		

7.2 Site Investigation Rationale

A ground investigation has been designed based on the findings of the desk study with exploratory holes advanced to target specific potential contaminant sources summarised in Table 7.1 above. In addition, exploratory holes have also been advanced to provide information on baseline ground conditions within the proposed building extension footprint in accordance with the outline brief received from Simpson Associates. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed hotel extension.

Exploratory fieldwork was completed on 1st September 2017, a selection of site photographs are presented in Appendix VII and the works undertaken are summarised in Table 7.2 below.

Table 7.2 Summary of Fieldwork

Location Hole	Potential Source/Rationale	Type	Maximum Depth (m bgl)	Monitoring Wells Response Zone (m bgl)
WS101	To obtain information on baseline chemical and geotechnical conditions across the site.	Windowless Sample	6.00	N/A
WS102			0.60	N/A
WS103			4.00	1.00 – 3.00

Notes
m bgl – metres below ground level, N/A – Not applicable.

Soil samples obtained for chemical analysis were collected in appropriate sampling containers. All samples were subsequently stored in cooled boxes prior to submission to a UKAS accredited analytical laboratory. All samples were collected using appropriate PPE. A detailed copy of REC sampling methodology, QA procedures and laboratory chain of custody forms can be provided upon request.

7.3 In-Situ Testing

7.3.1 Standard Penetration Tests

Standard Penetration Tests (SPT) were carried out within the window sample locations, at 1.20mbgl and at 1.0m intervals thereafter or until met with refusal. The testing was carried out to provide validation of the underlying geologies relative density, consistency, and strength observations. The results of the in-situ SPT testing are presented on the exploratory hole logs, included within Appendix IV.

7.4 Laboratory Analysis

7.4.1 Soil Chemical Analysis

Selected soil samples were submitted to UKAS accredited Concept Life Sciences of Braintree for the following chemical analyses:

- Asbestos identification;
- Soil Organic Matter (SOM);
- Heavy metals;
- Total Cyanide;
- Total Phenols;
- Speciated Polycyclic Aromatic Hydrocarbons (PAH);
- Banded Total Petroleum Hydrocarbons (TPH);
- Waste Acceptance Criteria (WAC) Analysis; and,
- pH and Sulphate for subsurface concrete design.

The results of the chemical analyses are included in Appendix V and discussed in Section 9.

7.4.2 Geotechnical Laboratory Analysis

Selected soil samples were submitted to UKAS accredited Professional Soils Limited of Doncaster, where the following geotechnical tests were undertaken:

- Moisture Content; and,
- Atterberg Limits.

The results of the geotechnical testing are presented within Appendix VI and discussed in Section 10.

7.5 Hand Excavated Inspection Pit

A single hand excavated foundation inspection pit was initially planned to be undertaken adjacent to the structure. However, due to the presence of a basement structure beneath the hotel, a

foundation inspection pit could not feasibly be advanced.

7.6 Land Gas and Groundwater Monitoring

A single land gas and groundwater monitoring well was installed on site with two return monitoring visits scheduled for completion. During the initial visit, the response zone in the well was found to be flooded. Upon purging of the well, the recharge rates were found to be too high to clear the response zone. As such, no information pertaining to land gas or groundwater was obtained.

8.0 GROUND AND GROUNDWATER CONDITION

8.1 Ground Conditions

8.1.1 Summary of Ground Conditions

The ground investigation generally confirmed the published geology and identifies the strata set out in Table 8.1 below:

Table 8.1 Summary of Ground Conditions Encountered

Stratum	Min Depth to Top of Strata (m)	Max Depth to Top of Strata (m)	Max Thickness (m)
Made Ground	Ground Level	Ground Level	1.40 (WS103)
Alluvium	1.10 (WS101)	1.10 (WS101)	0.30 (WS101)
London Clay Formation	1.40 (WS101 & WS103)	1.40 (WS101 & WS103)	4.60 (WS101) (NP)

NP – Strata Thickness Not Proven

8.1.2 Made Ground

Made Ground was encountered within all exploratory hole locations and comprised a layer of asphalt overlying heterogeneous CLAY and GRAVEL of varying proportions. Gravel identified comprised brick, concrete, glass and metal. A geotextile membrane was also encountered in each of the exploratory holes at a depth of circa 0.40mbgl

No visual or olfactory evidence of gross contamination was identified within this stratum.

8.1.3 Superficial (Alluvium)

Alluvium was encountered within WS101 only. Deposits generally comprised of CLAY and GRAVEL of varying proportions, albeit becoming coarser grained with depth.

No visual or olfactory evidence of contamination was identified within this stratum.

8.1.4 Solid Geology (London Clay Formation)

The London Clay Formation was encountered within WS101 and WS103. This stratum was found to be generally homogeneous comprising stiff to very stiff greyish brown CLAY.

Deposits ranged from stiff to very stiff greyish brown clay occasional deposits of siltstone cobbles were found throughout the London Clay Formation.

No visual or olfactory evidence of gross contamination was identified within this stratum.

8.1.5 Standard Penetration Tests

The results of in-situ SPT testing were found to vary within the London Clay Formation. 'N' values were found to range from 9 to 27 within the window sample locations. The London Clay Formation was generally noted to comprise stiff to very stiff material

The summary of SPT test results are presented in Table 8.2 below and included within exploratory hole logs included within Appendix IV.

Table 8.2 Standard Penetration Test Results

Boreholes	Depth (m bgl)	Material Field Description	CPT/SPT "N" Value	Relative Density/Consistency
WS101	1.20	Slightly Sandy Gravelly CLAY	4	Soft
	2.00	Slightly Clayey Sandy GRAVEL	13	Medium Dense
	3.00	CLAY	12	Soft
	4.00		22	Very Stiff
	5.00		16	
	6.00		25	
WS103	2.00	CLAY	9	Stiff
	3.00		23	Very Stiff
	4.00		27	

8.1.6 Soil Plasticity

The results of the Atterberg Limit determinations, presented within Appendix VI and summarised below in Table 8.3 overleaf:

Table 8.3 Summary of Plasticity Index Test Results

Location	Depth (m)	Stratum	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Percentage passing 425µm sieve (%)	Modified Plasticity Index	Volume Change Potential
WS101	1.60	CLAY	30	75	29	46	98	45	High
WS101	2.50		36	78	30	48	100	48	High
WS101	3.30		35	82	32	50	98	49	High
WS101	4.90		34	88	33	55	100	55	High
WS101	5.90		33	92	31	51	98	50	High

Based on the results of Atterberg Limit determinations, the London Clay Formation is considered to

comprise high volume change potential.

8.1.6 pH and Sulphate

Chemical analyses for pH and water-soluble sulphate (2:1 aqueous extract) contained in Appendix V and summarised in Table 8.4 below indicates that the alluvium meets the classification of DS-1 / AC-1 in accordance with BRE Special Digest 1 (2005). The London Clay Formation has met a worst case of DS-3/AC-2s in accordance with BRE Special Digest 1 (2005).

Table 8.4 Summary of pH and Sulphate Data

Location	Depth (m)	Stratum	SO4 in 2:1 water / soil (mg/l)	pH	Acid soluble SO_4 (%)	Total Sulphur (%)	Total Potential Sulphate	Oxidisable Sulphates (%)	Concrete Design Class
WS101	1.20	ALL	80	8.0	-	-	-	-	DS1-AC-1s
WS103	1.70	LCF	90	7.8	0.05	0.01	0.03	-0.02	DS1-AC-1s
WS103	2.40		120	8.4	0.06	0.04	0.12	0.06	DS1-AC-1s
WS103	3.90		130	8.2	0.18	0.35	1.05	0.87	DS-3/AC-2s

Note: All – Alluvium, LCF – London Clay Formation

8.2 Groundwater Conditions

Perched groundwater was encountered at 0.50mbgl within WS102 and WS103 during excavation of the service inspection pits. During the return monitoring visit the water level within WS103 was recorded at 0.51mbgl. The water level remained static following the purging of 25 litres from the monitoring well, indicating continual ingress of perched water from within the Made Ground.

8.2.1 Soil Infiltration

Due to the presence of perched groundwater within the installed well, it was not possible to undertake infiltration testing.

8.3 Ground Gas

A single gas monitoring installation was installed within WS103 to a depth of 3.00mbgl. It was not possible for gas readings to be taken as the monitoring well response zone was saturated by perched groundwater.

9.0 TIER II GENERIC QUANTITATIVE CONTAMINATED LAND RISK ASSESSMENT

REC has undertaken a Tier II qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

9.1 Human Health

At a Tier II stage, the long term (chronic) toxicity risk to human health is assessed by utilising appropriate and conservative generic assessment criteria (GAC) to determine whether there are actual or potential unacceptable risks at the site and if any viable pollutant linkages are present.

To undertake the Tier II assessment within the context of the proposed extension, REC has determined that the most appropriate GAC values available will be those based upon a commercial end use with Soil Organic Matter (SOM) at 2.5%.

The following assessment, summarised below and overleaf, has primarily adopted the S4UL (Suitable for Use Levels reference values published by LQM/CIEH in 2015, the S4ULs). Currently, no published GAC value is available for cyanide and therefore REC has utilised the Environmental Agency Contaminated Land Exposure Assessment Tool (CLEA v1.06) to derive the relevant GAC for this proposed land use. Due to the absence of a published lead GAC for direct use within the planning regime, the 2014 Defra C4SL (Category 4 Screening Level) has been used as this value is considered to incorporate the latest toxicological, bio-accessibility and exposure modelling research to date.

Table 9.1: Summary of Generic Human Health Toxicity Assessment for a Commercial End Use

Determinand	Units	GAC	GAC Source	n	[mc]	Location / Strata	Primary Pathways	Assessment
Inorganics								
Arsenic	mg/kg	640	(i)	4	25	N/A	1	No Further Action
Barium	mg/kg	22,000	(i)	4	260		1	
Beryllium	mg/kg	12	(i)	4	1.1		1,3	
Boron	mg/kg	240,000	(i)	4	<1		1,2	
Cadmium	mg/kg	190	(i)	4	0.7		1	
Chromium	mg/kg	8,600	(i)	4	32			
Chromium (VI)	mg/kg	33	(i)	4	<1		1	
Lead	mg/kg	2,330	(iv)	4	900		1	
Mercury [Inorganic]	mg/kg	1,100	(i)	4	10		1	
Nickel	mg/kg	980	(i)	4	28		1	
Selenium	mg/kg	12,000	(i)	4	<3		1	
Copper	mg/kg	68,000	(i)	4	160		1	
Zinc	mg/kg	730,000	(i)	4	290		1	
Cyanide [Total]	mg/kg	1,200	(v)	4	<1		1	
Asbestos	**-**	**D.**	**-**	**4**	**D.**	**WS103 0.50 – 0.70**	**3**	**See Discussion**

Determinand	Units	GAC	GAC Source	n	[mc]	Location / Strata	Primary Pathways	Assessment
Organics – PAHs and Phenol								
Phenols	mg/kg	1,500	(ii)	4	<1	N/A	5	No Further Action
Naphthalene	mg/kg	460	(ii)	4	<0.1		4	
Acenaphthylene	mg/kg	97,000	(ii)	4	<0.1		1	
Acenaphthene	mg/kg	97,000	(ii)	4	<0.2		1	
Fluorene	mg/kg	68,000	(ii)	4	<0.2		1	
Phenanthrene	mg/kg	22,000	(ii)	4	<1.2		1	
Anthracene	mg/kg	540,000	(ii)	4	<0.2		1	
Fluoranthene	mg/kg	23,000	(ii)	4	<0.2		1	
Pyrene	mg/kg	54,000	(ii)	4	<0.9		1	
Benzo(a) Anthracene	mg/kg	170	(ii)	4	<0.1		1	
Chrysene	mg/kg	350	(ii)	4	<0.1		1	
Benzo(b) Fluoranthene	mg/kg	44	(ii)	4	<0.1		1	
Benzo(k) Fluoranthene	mg/kg	1,200	(ii)	4	<0.4		1	
Benzo(a)Pyrene	mg/kg	35	(ii)	4	<0.1		1	
Indeno (123-cd)Pyrene	mg/kg	510	(ii)	4	<0.2		1	
Dibenzo(a,h) Anthracene	mg/kg	3.6	(ii)	4	<0.1		1	
Benzo(ghi) Perylene	mg/kg	4,000	(ii)	4	<0.2		1	
Organics – TPH								
TPH C_5-C_6	mg/kg	5,900	(iii)	4	<0.10	N/A	4	No Further Action
TPH C_6-C_8	mg/kg	17,000	(iii)	4	<0.10		4	
TPH C_8-C_{10}	mg/kg	4,800	(iii)	4	<0.10		4	
TPH C_{10}-C_{12}	mg/kg	28,000	(iii)	4	<2		4	
TPH C_{12}-C_{16}	mg/kg	37,000	(iii)	4	3		1, 4	
TPH C_{16}-C_{21}	mg/kg	28,000	(iii)	4	8		1	
TPH C_{21}-C_{35}	mg/kg	28,000	(iii)	4	35		1	

Key

[mc] Maximum Concentration Recorded

D. Detected

N.D. None Detected (Limit of Detection = <0.0001%)

Primary Pathways

1 Ingestion of soil and indoor dust and / or oral background exposure;

2 Consumption of home-grown produce and attached soil;

3 Inhalation of dust (background and indoor);

4 Inhalation of vapour (background and indoor);

5 Direct dermal / skin contact.

Determinand	Units	GAC	GAC Source	n	[mc]	Location / Strata	Primary Pathways	Assessment
Generic Assessment Criteria (GAC) Source (i) LQM/CIEH Suitable For Use Level (S4UL) (2015); (ii) S4UL – Conservative Assessment Approach of 2.5% SOM; (iii) S4UL – 2.5% SOM and assumed worst case aliphatic / aromatic compound; (iv) Defra Category 4 Screening Level (2014); (v) CLEA 1.06 Derived Value.								

Referring to Table 9.1, the results of this direct comparison indicates that the screening values have been exceeded for the following determinants:

- **Asbestos –** WS103 @ 0.50 – 0.70mbgl

9.1.1 Asbestos

Asbestos was identified within WS103 at a depth of 0.50 – 0.70mbgl. The asbestos encountered comprised ACM and did not comprise loose fibres. As such, it is not considered to pose a significant risk to future site users. However, consideration should be given to the presence of ACM during construction, with all site personnel and contractors being made aware of the presence of ACM.

9.2 Controlled waters

Given that no exceedances were encountered within the soil analysed, and that the site area is found to lie directly upon the London Clay Formation (unproductive aquifer) it is considered that the risk posed to controlled waters is insignificant.

9.3 WAC Analysis

The results of WAC analysis, detailed in Table 9.2 below, indicated that the Made Ground analysed within the proposed hotel extension area is considered to be Stable non-reactive. The results of the WAC analyses are presented within Appendix V.

Table 9.2 WAC Analysis

Sample location	Stratum	Area of the site	Waste Classification
WS101 (0.50mbgl)	Made Ground	Building Extension Area	Stable non-reactive
WS103 (0.90-1.00mbgl)	Made Ground	Building Extension Area	

9.4 Ground Gas

Whilst it was not possible to undertake ground gas monitoring of the installed well due to the presence of perched groundwater it is considered that the potential source of ground gas, Made Ground associated with the historic development of the site, will be largely removed during the

development process and as such it is considered that no significant risk to future site users will remain.

9.5 Revised Conceptual Site Model

The Phase II Site Investigation identified the presence of Chrysotile and Amosite ACMs in a single location (WS103) at a depth of 0.50 – 0.70mbgl. Whilst this is not thought to pose a risk to the end users of the site it may pose a risk to construction workers. No other exceedances of contaminants were found. The potential source of land gas will be largely removed during the development process and such it is considered that no significant risk to future site users will remain.

10.0 GEOTECHNICAL ASSESSMENT

10.1 Proposed Development

It is understood that the proposed development comprises a five storey extension to the south of the existing hotel building providing an additional 59no. bedrooms and extra 14no. car park spaces to the existing car park.

10.2 Summary of Ground and Groundwater Conditions

Ground conditions encountered, summarised in Table 8.1, Section 8.1.1, generally comprised Made Ground overlying Alluvium (WS101) in turn overlying London Clay Formation. Gravel pockets in the London Clay Formation comprised siltstone.

Perched water strikes were identified during the intrusive investigation. However, it is considered that these do not represent the true groundwater characteristics on site.

10.3 Site Preparation

Site preparation should include (where relevant):

- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- During the site investigation concrete obstructions were identified beneath the proposed structure and as such these should be excavated from below the proposed development footprint and the resulting voids infilled with suitable compacted engineered fill; and
- If the concrete obstructions are left in situ prior to construction, pre-probing of pile locations should be considered.

10.4 Foundation Conditions and Bearing Capacity

Given the proposed development is to comprise a five-storey extension it is likely that any resulting structural design will comprise piled foundations.

Using SPT ‘N’ Values obtained during the intrusive investigation, the underlying CLAY was identified as comprising generally stiff to very stiff which indicates favourable conditions for piling. As such, preliminary pile capacities have been calculated using a nearby exploratory borehole undertaken during previous phases of investigation work at the site. The borehole record in question can be found detailed within Appendix IX. When undertaking these preliminary calculations, the following parameters and generalisations have been used:

- Adhesion Factor of 0.45 based on CFA piles;
- Beta values limited to 0.80;
- A seepage identified at 5.20mbgl within the historical borehole record;

- No positive or negative skin friction before 3.00mbgl to account for sleeving of pile within the Made Ground;
- Factors of safety of 1.5 on side resistance and 3 on base resistance; and,
- Global Factor of safety of 2.5.

Table10.1 Summary of Pile Carrying Capacities

Depth (mbgl)	Pile Carrying Capacity (kN)		
	300mm dia	450mm dia	600mm dia
10	145	245	350
20	420	670	940
30	810	1260	1750

Atterberg Limit Determinations carried out on a selection of soil samples retrieved from the underlying London Clay Formation has indicated that the CLAY is of high volume change potential. As such, it is recommended that any piles are designed with an adequate factor of safety to resist against uplift forces on the shaft due to heave. Consideration should also be given to ensuring effects of heave are not subjected upon the ground beams via the employment of clay boarding or void formers.

It is recommended that all foundations are designed by a competent structural engineer.

10.5 Concrete Durability

Chemical analyses for pH and water-soluble sulphate (2:1 aqueous extract) indicates that the alluvium meets the classification of DS-1 / AC-1 in accordance with BRE Special Digest 1 (2005). The London Clay Formation has met a worst case of DS-3/AC-2s in accordance with BRE Special Digest 1 (2005).

10.6 Excavations

It is recommended that where man entry into excavations deeper than 1.20m is required that either excavations are shored or that the sides of excavations are battered to a safe angle of repose.

Excavations should be protected during construction in order to avoid potentially excessive shrink or swell caused by periods of hot or wet weather.

10.7 Floor Slabs

Given that the structure is likely to be piled it is assumed that any proposed floor slabs will be suspended. It is recommended that any suspended floor slabs incorporate a sub floor void in order to address issues in relation of subfloor condensation.

10.8 Construction Activity and Inspection

The following activities and inspections should be incorporated in to the site works:

- It is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and floor slabs;
- Excavations should be protected during construction in order to avoid potentially excessive loosening of any encountered superficial or Made Ground deposits caused by wet weather;
- It is recommended that onsite mitigation is undertaken during piling in an attempt to reduce the risk posed by potentially present UXO; and
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as bench marking the sides or use of support systems in accordance with CIRIA R97 utilised.

10.9 Underground Services

The presence of significant depths of Made Ground across the site (1.40m within WS103) may result in settlement should it remain in-situ. Should this material be removed and services laid upon the London Clay Formation consideration should be given to the potential ground heave experienced by release of overburden. This is generally assumed to be within 100 – 150mm for high volume change CLAY in accordance with NHBC Guidance. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

10.10 Pavements and Construction

Based on a worst case Modified Plasticity Index of 55 an indicative design CBR value of 2 to 2.5% can be obtained based on assuming a low water table and average construction conditions. However, it is recommended that in-situ plate bearing tests are undertaken to confirm these values prior to design.

As with good construction practice, it is recommended that the formation level be inspected and any areas of soft/loose deleterious strata are replaced with an appropriately compacted coarse-grained medium. Likewise, any hard spots should also be removed to guard against reflective cracking in the pavement. Proof rolling/compaction of the formation level should be carried out prior to laying the new pavement.

10.11 Soakaways

Given the underlying fine-grained geology, it is unlikely that shallow soakaway drainage could be implemented on site. As such it is recommended that contact is made with the receiving water board at the earliest convenience to agree discharge to a combined sewer.

11 CONCLUSIONS & RECOMMENDATIONS

Based on the findings of this report, the following conclusions can be made:

11.1 Contamination

- Based on the Tier II Generic Quantitative Risk Assessment, exceedances for Asbestos were identified. The asbestos encountered comprised ACM and did not comprise loose fibres. As such, it is not considered to pose a significant risk to future site users considering the exceedance was identified beneath the proposed structure;

- Given that no exceedances were encountered within the soil analysed, and that the site area is found to lie directly upon the London Clay Formation (unproductive aquifer) it is considered that the risk posed to controlled waters is insignificant.

- Results of Waste Acceptance Criteria tests undertaken on a selection of Made Ground samples indicate the materials have been classified as an stable non-reactive; and,

- Whilst it was not possible to undertake ground gas monitoring due to the presence of perched groundwater within the installed well, it is considered that the potential source of ground gas will be largely removed during the development process and as such no significant risk to future site users will remain.

11.2 Geotechnical

- Groundwater strikes were recorded within the Made Ground although this is not believed to be representative of the underlying groundwater conditions;

- Chemical analyses for pH and water-soluble sulphate (2:1 aqueous extract) indicates that the alluvium meets the classification of DS-1 / AC-1 in accordance with BRE Special Digest 1 (2005). The London Clay Formation has met a worst case of DS-3/AC-2s in accordance with BRE Special Digest 1 (2005);

- Consideration should be given to shallow obstructions encountered during the site investigation with allowances made for pre-probing of piled foundation prior to advancement or mobilisation of foundation construction apparatus; and

- It is recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

END OF REPORT

APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. In addition to the above REC Ltd note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.
7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
10. This report presents an interpretation of the geotechnical information established by excavation, observation and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation.
11. REC can not be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.
12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II

GLOSSARY

TERMS

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
Sp.TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

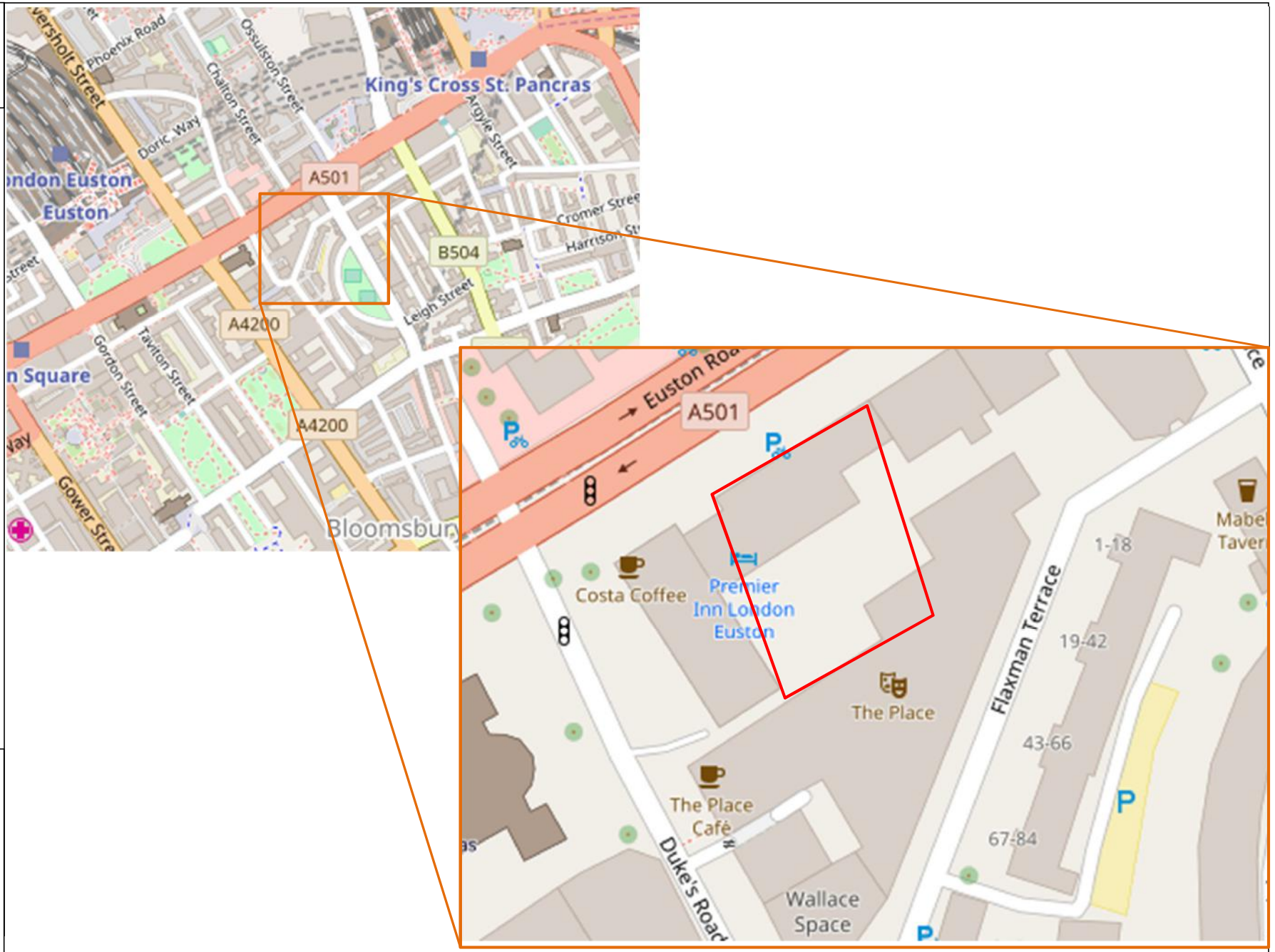
APPENDIX III

DRAWINGS

KEY:

N

Site location



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Job Title:	Premier Inn Euston – 1 Dukes Road
Client:	Whitbread UK PLC
Job No:	1CO104376
Drawn By:	JS
Approved by:	RL
Notes:	NOT TO SCALE
Drawing Title:	1CO104376-001 – Site Location Plan

KEY:

N

Window Sample Location

REC

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Premier Inn Euston – 1 Dukes Road

Client:
Whitbread PLC

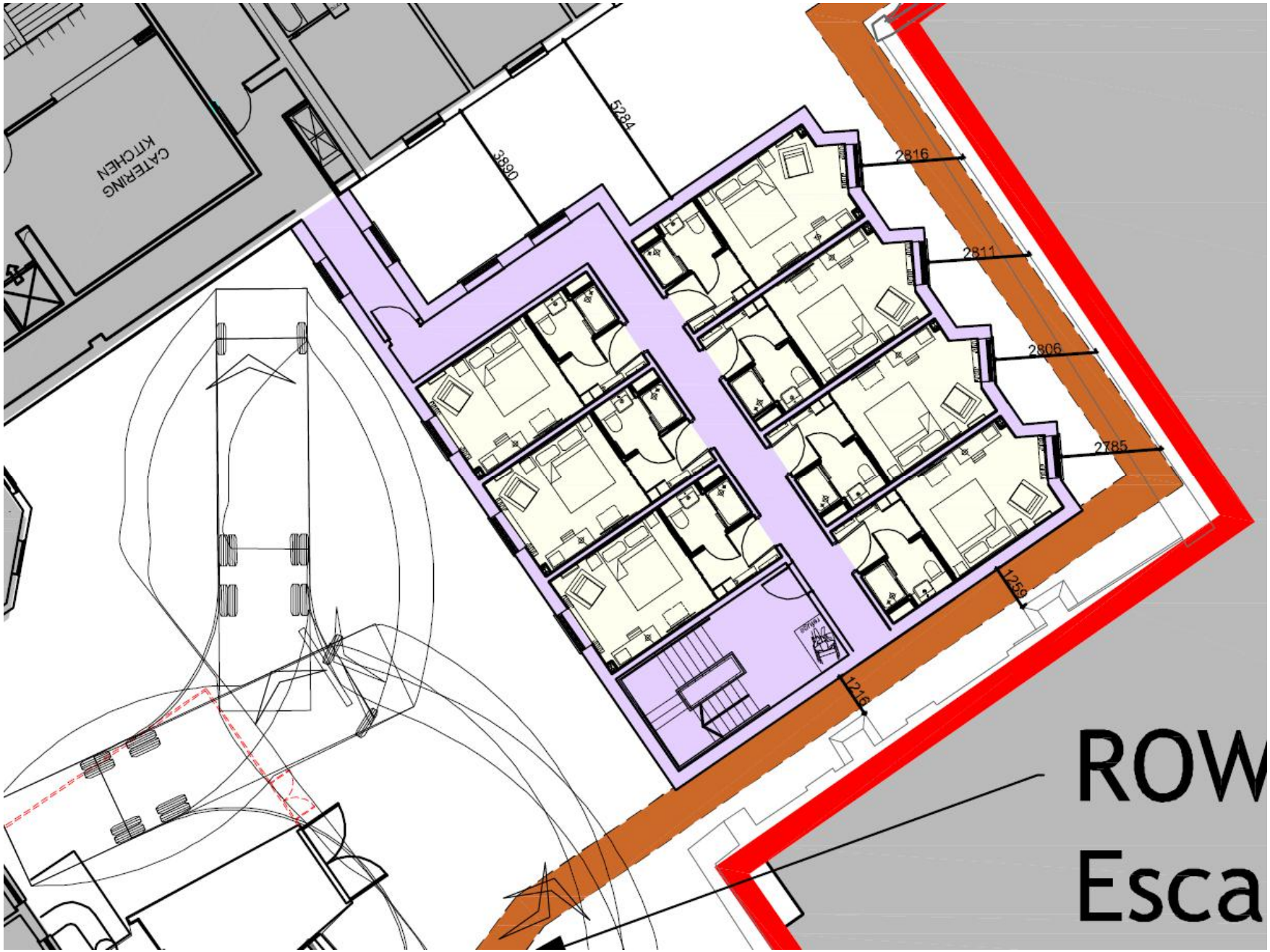
Job No:	1CO104376
Drawn By:	JS
Approved by:	RL

Notes:
NOT TO SCALE

Drawing Title:
1CO104376-002 - Exploratory Hole Location Plan

KEY:

N



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Premier Inn Euston – 1 Dukes Road

Client:
Whitbread PLC

Job No:	1CO104376
Drawn By:	JS
Approved by:	RL

Notes:
NOT TO SCALE

Drawing Title:
1CO104376-003 – Site Development Plan

APPENDIX IV EXPLORATORY HOLE LOGS

APPENDIX IV

EXPLORATORY HOLE LOGS

Borehole Log

Borehole No. **WS101** Sheet 1 of 1

Project Name:	Premier Inn Extension, 1 Dukes Road, London	Proj. ID: 1CO104376		Easting: / Northing:	Hole Type: WS
Location:	Euston, London	Plant: Dando Terrier 2002		Level (m AOD): / Final Depth (m): 6.00	Scale: 1:30
Client:	Whitbread PLC Ltd	Crew: Endeavour Drilling		Start Date: 04/10/2017 / End Date: 04/10/2017	REC Engineer: TC

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			Asphalt [MADE GROUND]
								Concrete [MADE GROUND]
		0.40 - 0.70	B1		0.40			Dark grey clayey sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse brick, flint, wood and concrete. Cobbles are subangular brick. [MADE GROUND]
		0.50	ES1					*... at 0.40mbgl: geotextile membrane.*
		0.70 - 0.90	D2		0.70			Soft grey slightly sandy slightly gravelly CLAY with occasional organic matter and organic odour. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse brick flint and concrete. [MADE GROUND]
		0.90	ES2					*... at 0.70mbgl: timber encountered within east of pit.*
					1.10			Soft grey gravelly CLAY with occasional organic matter and organic odour. Gravel is angular to subrounded fine to medium flint. [ALLUVIUM]
		1.20	D3					Wet grey slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint. [ALLUVIUM]
		1.20	SPT	4 (,/3,1,,)	1.30			Firm to stiff brown mottled grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium siltstone. Occasional relic rootlets. [LONDON CLAY FORMATION]
					1.40			*... below 1.60mbgl: stiff.*
		1.60	D4					
		1.60		HVP=64				
		2.00	SPT	N=13 (2,3/3,3,3,4)				*... at 2.75mbgl: cobble-size pocket of orange SILT.*
		2.50	D5					Stiff to very stiff greyish brown CLAY with occasional rootlets and traces of silty fine sand. [LONDON CLAY FORMATION]
		2.60		HVP=78				*... below 3.00mbgl: no relic rootlets or sand.*
		2.80		HVP=72	2.80			
		2.90	D6					
		3.00	SPT	N=12 (1,1/1,2,4,5)				
		3.30	D7					
		3.30		HVP=82				
		3.50		HVP=76				
		4.00	SPT	N=22 (1,5/4,5,6,7)				*... at 3.90mbgl: rare subangular siltstone cobble.*
								... at 4.60mbgl: band of angular fine to medium siltstone gravel.
		4.90	D8					*... at 4.70mbgl: rare subangular siltstone cobble.*
		5.00	SPT	N=16 (2,3/4,4,4,4)				
		5.90	D9					*... between 5.75 and 5.95mbgl: subangular to rounded siltstone gravel.*
		6.00	SPT	N=25 (5,5/5,6,6,8)	6.00			End of Borehole at 6.00m

Remarks:

Location cleared for buried services using a Cable Avoidance Tool [CAT]. Hand excavated inspection pit extended to 1.20 mbgl. No groundwater encountered. Location was backfilled with arisings and made safe with cold lay asphalt upon completion.

Borehole Log

Borehole No. **WS102**

Sheet 1 of 1

Project Name:	Premier Inn Extension, 1 Dukes Road, London	Proj. ID:	1CO104376	Easting: Northing:	Hole Type WS
Location:	Euston, London	Plant:	Dando Terrier 2001	Level (m AOD): Final Depth (m): 0.60	Scale: 1:30
Client:	Whitbread PLC Ltd	Crew:	Endeavour Drilling	Start Date: 04/10/2017 End Date: 04/10/2017	REC Engineer: JS

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Asphalt [MADE GROUND]
								Concrete [MADE GROUND]
	▼	0.50	ES1		0.45 0.60			Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded brick, flint, metal and concrete. [MADE GROUND] *... at 0.45mbgl: geotextile membrane.*
								End of Borehole at 0.60m

Remarks:

Location cleared for buried services using a Cable Avoidance Tool [CAT]. Pooled water encountered at 0.50mbgl. Location was terminated at 0.60mbgl upon encountering suspected concrete slab. Location was backfilled with arisings and made safe with a layer of concrete beneath cold lay asphalt upon completion.

Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project Name:	Premier Inn Extension, 1 Dukes Road, London	Proj. ID: 1CO104376		Easting: Northing:	Hole Type: WS
Location:	Euston, London	Plant: Dando Terrier 2002		Level (m AOD): Final Depth (m): 4.00	Scale: 1:30
Client:	Whitbread PLC Ltd	Crew: Endeavour Drilling		Start Date: 04/10/2017 End Date: 04/10/2017	REC Engineer: JS

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			Asphalt [MADE GROUND]
								Concrete [MADE GROUND]
	▼	0.50 - 0.70	ES1		0.45			Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded brick and flint. [MADE GROUND]
								... at 0.45mbgl: geotextile membrane.
		0.90 - 1.00	ES2		0.90			Soft dark grey slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is angular fine to coarse flint and brick. [MADE GROUND]
					1.40			Firm to stiff greyish brown CLAY. [LONDON CLAY FORMATION]
		1.50	ES3					
		1.60		HVP=74				
		1.70	D1					
								... between 1.80 and 1.85mbgl: band of orange siltstone.
		1.95		HVP=78				
		2.00	SPT	N=9 (1,1/1,2,3,3)				
		2.40	D2					
		2.95		HVP=78				
		3.00	SPT	N=23 (1,2/6,5,5,7)				
		3.60		HVP=68				*... below 3.60mbgl: becomes wet.*
		3.90	D3					
		4.00	SPT	N=27 (4 for 0mm/27 for 0mm)	4.00			End of Borehole at 4.00m

Remarks:

Location cleared for buried services using a Cable Avoidance Tool [CAT]. Hand excavated inspection pit extended to 1.20 mbgl. Pooled water encountered at 0.50mbgl. 50mm internal diameter standpipe installed from 3.00mbgl, fitted with flush cover and set in concrete.

APPENDIX V CHEMICAL TESTING RESULTS

APPENDIX V

CHEMICAL TESTING RESULTS

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
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Braintree
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CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 687997-1

Date of Report: 13-Oct-2017

Customer: Resource Environmental Consultants Ltd
Capital Business Centre
Unit 19a Carlton Road
South Croydon
CR2 0BS

Customer Contact: Mr Tim Conibear

Customer Job Reference: 1CO104376
Customer Purchase Order: 003627
Customer Site Reference: PI Euston
Date Job Received at Concept: 09-Oct-2017
Date Analysis Started: 10-Oct-2017
Date Analysis Completed: 13-Oct-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Claire Brown Crociquia
Customer Service Manager

Concept Reference: 687997
Project Site: PI Euston
Customer Reference: 1CO104376

Soil Analysed as Soil
REC002S (SE)

				Concept Reference	**687997 001**	**687997 003**	**687997 004**	**687997 005**
				Customer Sample Reference	**WS101 ES1 @ 0.50m**	**WS102 ES1 @ 0.50m**	**WS103 ES1 @ 0.50-0.70m**	**WS103 ES2 @ 0.90-1.00m**
				Date Sampled	**04-OCT-2017**	**04-OCT-2017**	**04-OCT-2017**	**04-OCT-2017**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Arsenic	T257	A40	2	mg/kg	**25**	**16**	**13**	**21**
Barium	T257	A40	2	mg/kg	**260**	**250**	**110**	**240**
Beryllium	T245	A40	0.5	mg/kg	**1.0**	**0.9**	**0.8**	**1.1**
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**0.7**	**0.5**	**0.1**	**0.3**
Chromium	T257	A40	0.5	mg/kg	**18**	**32**	**20**	**22**
Copper	T257	A40	2	mg/kg	**160**	**83**	**29**	**77**
Lead	T257	A40	2	mg/kg	**900**	**320**	**160**	**220**
Mercury	T245	A40	1.0	mg/kg	**1.6**	**10**	**2.8**	<1.0
Nickel	T257	A40	0.5	mg/kg	**19**	**19**	**18**	**28**
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	**49**	**39**	**36**	**59**
Zinc	T257	A40	2	mg/kg	**290**	**260**	**100**	**86**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Chrysotile ACM Detected Amosite ACM Detected	Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1
pH	T7	A40			**8.8**	**11.3**	**10.7**	**8.3**
Soil Organic Matter	T287	A40	0.1	%	**4.1**	**0.7**	**0.7**	**6.6**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.32**	**0.12**	**0.26**	**0.25**
SO4(Total)	T102	A40	0.02	%	**0.22**	**0.35**	**0.26**	**0.14**
Cyanide(Total)	T921	AR	1	mg/kg	<1	<1	<1	<1
Phenols(Mono)	T921	AR	1	mg/kg	<1	<1	<1	<1
Moisture @105C	T162	AR	0.1	%	**23**	**22**	**16**	**19**
Retained on 2mm	T2	A40	0.1	%	**21.9**	**32.2**	**47.6**	**10.8**

Concept Reference: 687997
Project Site: PI Euston
Customer Reference: 1CO104376

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

				Concept Reference	**687997 001**	**687997 003**	**687997 004**	**687997 005**
				Customer Sample Reference	**WS101 ES1 @ 0.50m**	**WS102 ES1 @ 0.50m**	**WS103 ES1 @ 0.50-0.70m**	**WS103 ES2 @ 0.90-1.00m**
				Date Sampled	**04-OCT-2017**	**04-OCT-2017**	**04-OCT-2017**	**04-OCT-2017**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Naphthalene	T16	AR	0.1	mg/kg	<0.1	**0.1**	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	**0.2**	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	**0.2**	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1	**1.2**	<0.1	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1	**0.2**	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	**0.2**	**1.1**	**0.1**	<0.1
Pyrene	T16	AR	0.1	mg/kg	**0.2**	**0.9**	**0.1**	<0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1	**0.5**	<0.1	<0.1
Chrysene	T16	AR	0.1	mg/kg	**0.1**	**0.5**	<0.1	<0.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1	**0.3**	<0.1	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	<0.1	**0.4**	<0.1	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	<0.1	**0.4**	<0.1	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1	**0.2**	<0.1	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1	**0.2**	<0.1	<0.1
PAH(total)	T16	AR	0.1	mg/kg	**0.6**	**6.3**	**0.3**	<0.1

Concept Reference: 687997
Project Site: PI Euston
Customer Reference: 1CO104376

Soil Analysed as Soil
Suite C

				Concept Reference	**687997 001**	**687997 003**	**687997 004**	**687997 005**
				Customer Sample Reference	**WS101 ES1 @ 0.50m**	**WS102 ES1 @ 0.50m**	**WS103 ES1 @ 0.50-0.70m**	**WS103 ES2 @ 0.90-1.00m**
				Date Sampled	**04-OCT-2017**	**04-OCT-2017**	**04-OCT-2017**	**04-OCT-2017**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
TPH (C5-C6)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10
TPH (C6-C8)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12)	T219	AR	2	mg/kg	(13) <2	(13) <2	(13) <2	(13) <2
TPH (C12-C16)	T219	AR	2	mg/kg	(13) <2	(13) <2	(13) <2	(13) <2
TPH (C16-C21)	T219	AR	2	mg/kg	**(13) 4**	**(13) 8**	(13) <2	(13) <2
TPH (C21-C35)	T219	AR	2	mg/kg	**(13) 10**	**(13) 35**	**(13) 15**	(13) <2

Index to symbols used in 687997-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
13	Results have been blank corrected.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis
Retained on 2mm is removed before analysis
Asbestos subcontracted to REC Limited

Method Index

Value	Description
T6	ICP/OES
T27	PLM
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T7	Probe
T82	ICP/OES (Sim)
T287	Calc TOC/0.58
T162	Grav (1 Dec) (105 C)
T219	GC/FID (SE)
T245	ICP/OES (Aqua Regia Extraction)
T2	Grav
T921	Colorimetry (CF) (MCERT)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T16	GC/MS
T54	GC/MS (Headspace)
T102	ICP/OES (HCl extract)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C5-C6)	T54	AR	0.10	mg/kg	N	001,003-005
TPH (C6-C8)	T54	AR	0.10	mg/kg	N	001,003-005
TPH (C8-C10)	T54	AR	0.10	mg/kg	N	001,003-005
TPH (C10-C12)	T219	AR	2	mg/kg	U	001,003-005
TPH (C12-C16)	T219	AR	2	mg/kg	U	001,003-005
TPH (C16-C21)	T219	AR	2	mg/kg	U	001,003-005
TPH (C21-C35)	T219	AR	2	mg/kg	U	001,003-005
Naphthalene	T16	AR	0.1	mg/kg	U	001,003-005
Acenaphthylene	T16	AR	0.1	mg/kg	U	001,003-005
Acenaphthene	T16	AR	0.1	mg/kg	M	001,003-005
Fluorene	T16	AR	0.1	mg/kg	M	001,003-005
Phenanthrene	T16	AR	0.1	mg/kg	U	001,003-005
Anthracene	T16	AR	0.1	mg/kg	M	001,003-005
Fluoranthene	T16	AR	0.1	mg/kg	N	001,003-005
Pyrene	T16	AR	0.1	mg/kg	N	001,003-005
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	M	001,003-005
Chrysene	T16	AR	0.1	mg/kg	M	001,003-005
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001,003-005
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001,003-005
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	M	001,003-005
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	M	001,003-005
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	M	001,003-005
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	M	001,003-005
PAH(total)	T16	AR	0.1	mg/kg	U	001,003-005
Arsenic	T257	A40	2	mg/kg	M	001,003-005
Barium	T257	A40	2	mg/kg	U	001,003-005
Beryllium	T245	A40	0.5	mg/kg	U	001,003-005
Boron (water-soluble)	T82	A40	1	mg/kg	N	001,003-005
Cadmium	T257	A40	0.1	mg/kg	M	001,003-005
Chromium	T257	A40	0.5	mg/kg	M	001,003-005
Copper	T257	A40	2	mg/kg	M	001,003-005
Lead	T257	A40	2	mg/kg	M	001,003-005
Mercury	T245	A40	1.0	mg/kg	U	001,003-005
Nickel	T257	A40	0.5	mg/kg	M	001,003-005
Selenium	T257	A40	3	mg/kg	U	001,003-005
Vanadium	T257	A40	0.1	mg/kg	U	001,003-005
Zinc	T257	A40	2	mg/kg	M	001,003-005
Asbestos ID	T27	A40			SU	001,003-005
Chromium VI	T6	A40	1	mg/kg	N	001,003-005
pH	T7	A40			M	001,003-005
Soil Organic Matter	T287	A40	0.1	%	N	001,003-005
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	001,003-005
SO4(Total)	T102	A40	0.02	%	M	001,003-005
Cyanide(Total)	T921	AR	1	mg/kg	M	001,003-005
Phenols(Mono)	T921	AR	1	mg/kg	M	001,003-005
Moisture @105C	T162	AR	0.1	%	N	001,003-005
Retained on 2mm	T2	A40	0.1	%	N	001,003-005

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 687997-1 A

Date of Report: 13-Oct-2017

Customer: Resource Environmental Consultants Ltd
Capital Business Centre
Unit 19a Carlton Road
South Croydon
CR2 0BS

Customer Contact: Mr Tim Conibear

Customer Job Reference: 1CO104376
Customer Purchase Order: 003627
Customer Site Reference: PI Euston
Date Job Received at Concept: 09-Oct-2017
Date Analysis Started: 10-Oct-2017
Date Analysis Completed: 13-Oct-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Claire Brown Crociquia
Customer Service Manager

Waste Acceptance Criteria

Customer Sample Reference : WS101 ES1 @ 0.50m
SAL Sample Reference : 687997 001
Project Site : PI Euston
Customer Reference : 1CO104376
Date Sampled : 04-OCT-2017
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
pH	Probe			M	**8.8**		> 6.0	
Loss on Ignition	Ign @450C/Grav	0.1	%	M	**5.1**			10.0
Total Organic Carbon	OX/IR	0.1	%	N	**2.4**	3.0	5.0	6.0
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Coronene	GC/MS (MCERTS)	0.1	mg/kg	N	<0.1			
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Total Petroleum Hydrocarbons (C10 - C40)	GC/FID (SE)	10	mg/kg	M	(13) **14**	500.0		
PCB EC7 (Sum)	Calc	0.020	mg/kg	N	<0.020	1.0		
Moisture	Grav (1 Dec) (105 C)	0.1	%	N	**23**			
Retained on 2mm Sieve	Grav	0.1	%	N	**21.9**			

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Total Dissolved Solids	Calc	100	mg/kg	N	**1200**	4000.0	60000.0	100000.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**170**	500.0	800.0	1000.0
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.22**	**0.06**	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.51**	**0.5**	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.19**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.00066**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**140**	800.0	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.17**	2.0	50.0	100.0
Fluoride	Calc (W)	0.50	mg/kg	N	**4.5**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	**0.62**	**0.5**	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	**0.0035**	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.27**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.021**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc (W)	0.20	mg/kg	N	<0.20	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.033**	0.1	0.5	7.0
Sulphate ion	Calc (W)	5	mg/kg	N	**260**	1000.0	20000.0	50000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**0.12**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : WS103 ES2 @ 0.90-1.00m
SAL Sample Reference : 687997 005
Project Site : PI Euston
Customer Reference : 1CO104376
Date Sampled : 04-OCT-2017
Matrix Class : Clay

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
pH	Probe			M	**8.3**		> 6.0	
Loss on Ignition	Ign @450C/Grav	0.1	%	M	**6.0**			10.0
Total Organic Carbon	OX/IR	0.1	%	N	**3.8**	**3.0**	5.0	6.0
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Coronene	GC/MS (MCERTS)	0.1	mg/kg	N	<0.1			
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
Total Petroleum Hydrocarbons (C10 - C40)	GC/FID (SE)	10	mg/kg	M	(13) <10	500.0		
PCB EC7 (Sum)	Calc	0.020	mg/kg	N	<0.020	1.0		
Moisture	Grav (1 Dec) (105 C)	0.1	%	N	**19**			
Retained on 2mm Sieve	Grav	0.1	%	N	**10.8**			

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Total Dissolved Solids	Calc	100	mg/kg	N	**1300**	4000.0	60000.0	100000.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**250**	500.0	800.0	1000.0
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.039**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.025**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.21**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.00021**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**52**	800.0	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.038**	2.0	50.0	100.0
Fluoride	Calc (W)	0.50	mg/kg	N	**7.2**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	**0.028**	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.19**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.014**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc (W)	0.20	mg/kg	N	<0.20	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.0078**	0.1	0.5	7.0
Sulphate ion	Calc (W)	5	mg/kg	N	**210**	1000.0	20000.0	50000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**0.086**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 687997
Project Site: PI Euston
Customer Reference: 1CO104376

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

				Concept Reference	**687997 001**	**687997 005**
				Customer Sample Reference	**WS101 ES1 @ 0.50m**	**WS103 ES2 @ 0.90-1.00m**
				Test Sample	**AR**	**AR**
				Date Sampled	**04-OCT-2017**	**04-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Fluorene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Anthracene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Fluoranthene	GC/MS	0.1	mg/kg	N	**0.2**	<0.1
Pyrene	GC/MS	0.1	mg/kg	N	**0.2**	<0.1
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Chrysene	GC/MS	0.1	mg/kg	M	**0.1**	<0.1
Benzo(b)fluoranthene	GC/MS	0.1	mg/kg	U	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	M	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS	0.1	mg/kg	U	**0.6**	<0.1

Concept Reference: 687997
Project Site: PI Euston
Customer Reference: 1CO104376

Soil Analysed as Soil
BTEX

				Concept Reference	**687997 001**	**687997 005**
				Customer Sample Reference	**WS101 ES1 @ 0.50m**	**WS103 ES2 @ 0.90-1.00m**
				Test Sample	**AR**	**AR**
				Date Sampled	**04-OCT-2017**	**04-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10

Concept Reference: 687997
Project Site: PI Euston
Customer Reference: 1CO104376

Soil Analysed as Soil
PCBs EC7 (SE)

				Concept Reference	**687997 001**	**687997 005**
				Customer Sample Reference	**WS101 ES1 @ 0.50m**	**WS103 ES2 @ 0.90-1.00m**
				Test Sample	**AR**	**AR**
				Date Sampled	**04-OCT-2017**	**04-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Polychlorinated biphenyl BZ#28	GC/MS	20	µg/kg	M	<20	<20
Polychlorinated biphenyl BZ#52	GC/MS	20	µg/kg	M	<20	<20
Polychlorinated biphenyl BZ#101	GC/MS	20	µg/kg	M	<20	<20
Polychlorinated biphenyl BZ#118	GC/MS	20	µg/kg	M	<20	<20
Polychlorinated biphenyl BZ#153	GC/MS	20	µg/kg	M	<20	<20
Polychlorinated biphenyl BZ#138	GC/MS	20	µg/kg	M	<20	<20
Polychlorinated biphenyl BZ#180	GC/MS	20	µg/kg	M	<20	<20

Index to symbols used in 687997-1 A

Value	Description
A40	Assisted dried < 40C
AR	As Received
10:1 S	Data for BS EN 12457-2 (10:1)
13	Results have been blank corrected.
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis
Retained on 2mm is removed before analysis
pH, LOI & TOC were performed on assisted dried samples (<40 degree centigrade). All other results relate to samples as received.

APPENDIX VI GEOTECHNICAL TESTING RESULTS

APPENDIX VI

GEOTECHNICAL TESTING RESULTS

LABORATORY REPORT

REPORT

4043

Contract Number: PSL17/5372

Report Date: 07 November 2017

Client's Reference:

Client Name: REC Croydon
Osprey House
Pacific Quay
Broadway
Manchester
M50 2UE

For the attention of: Jason Seaton

Contract Title: Premier Inn, Euston, 1 Dukes Road

Date Received: 3/11/2017
Date Commenced: 3/11/2017
Date Completed: 7/11/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	C Marshall (Laboratory Manager)	A Fry (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS101	4	D	1.60		Brown slightly gravelly CLAY.
WS101	5	D	2.50		Brown CLAY.
WS101	7	D	3.30		Brown slightly gravelly CLAY.
WS101	8	D	4.90		Brown CLAY.
WS101	9	D	5.90		Brown slightly gravelly CLAY.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Premier Inn, Euston, 1 Dukes Road

Contract No:
PSL17/5372
Client Ref:
1C0104376

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS101	4	D	1.60		30			75	29	46	98	Very high plasticity CV.
WS101	5	D	2.50		36			78	30	48	100	Very high plasticity CV.
WS101	7	D	3.30		35			82	32	50	98	Very high plasticity CV.
WS101	8	D	4.90		34			88	33	55	100	Very high plasticity CV.
WS101	9	D	5.90		33			82	31	51	98	Very high plasticity CV.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

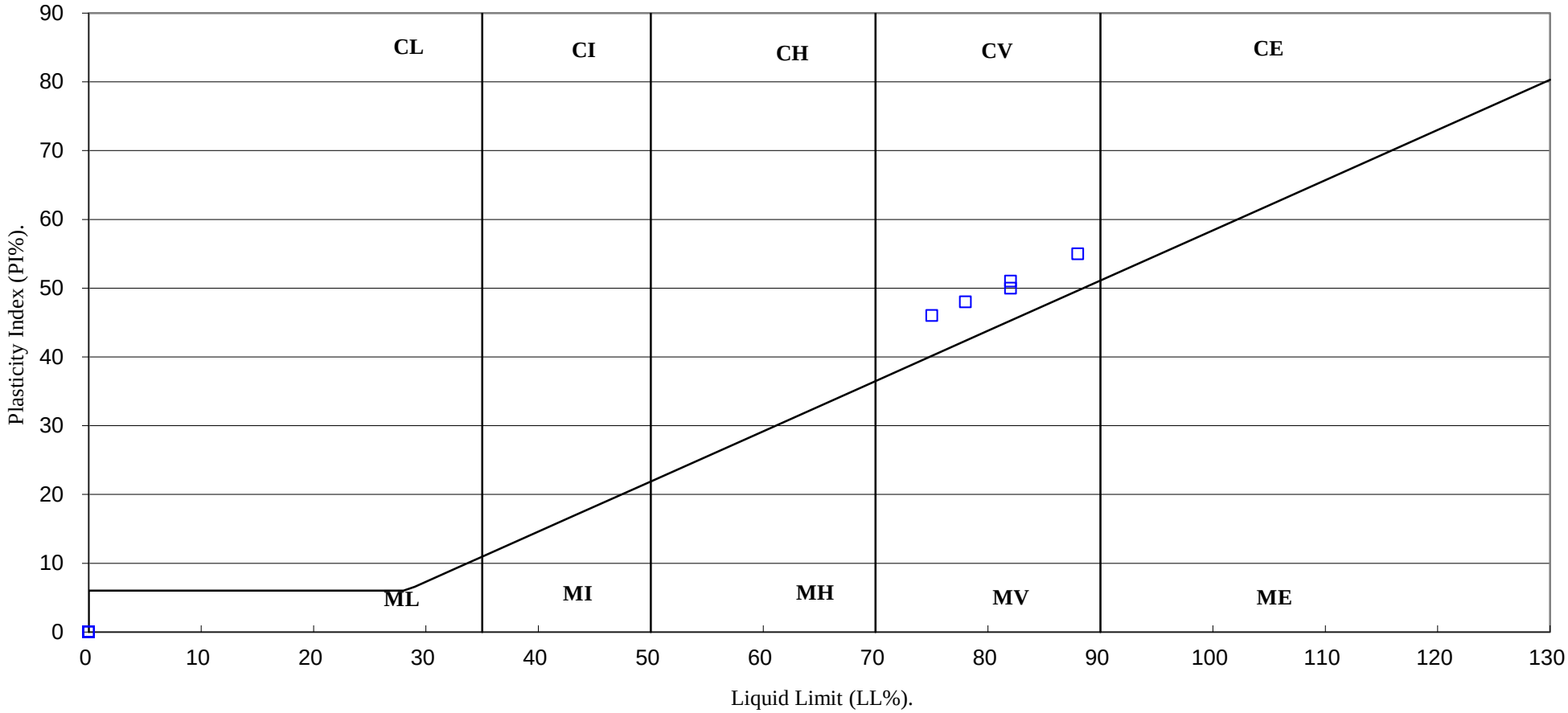
PSL Professional Soils Laboratory

Premier Inn, Euston, 1 Dukes Road

Contract No:
PSL17/5372
Client Ref:
1C0104376

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Premier Inn, Euston, 1 Dukes Road**	**Contract No:**
			PSL17/5372
			Client Ref:
			1C0104376

APPENDIX VII PHOTOGRAPHS

APPENDIX VII

PHOTOGRAPHS

Plate 1 - Entrance to site from Dukes Road

Plate 2 - Overview of site showing exploratory hole locations

Plate 3 - Location of WS101

APPENDIX VIII

HISTORICAL MAPS

Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: 1056 Scale Town Plan

Map date: **1871**

Scale: 1:1,056

Printed at: 1:1,056

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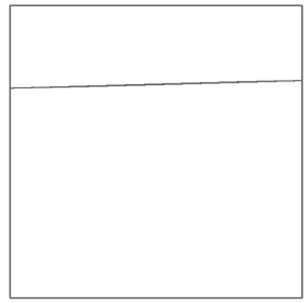
Surveyed 1871
Revised N/A
Edition 1874
Copyright N/A
Levelled N/A



Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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W: www.groundsure.com

Production date: 01 November 2017

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Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: 1056 Scale Town Plan

Map date: **1874**

Scale: 1:1,056

Printed at: 1:1,056

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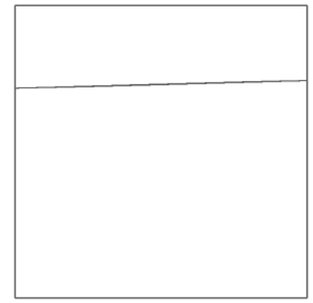
Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1871
Revised 1873
Edition 1874
Copyright N/A
Levelled N/A

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Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: County Series

Map date: **1876-1877**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1870
Revised N/A
Edition 1876
Copyright N/A
Levelled N/A

Surveyed 1877
Revised 1877
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 01 November 2017

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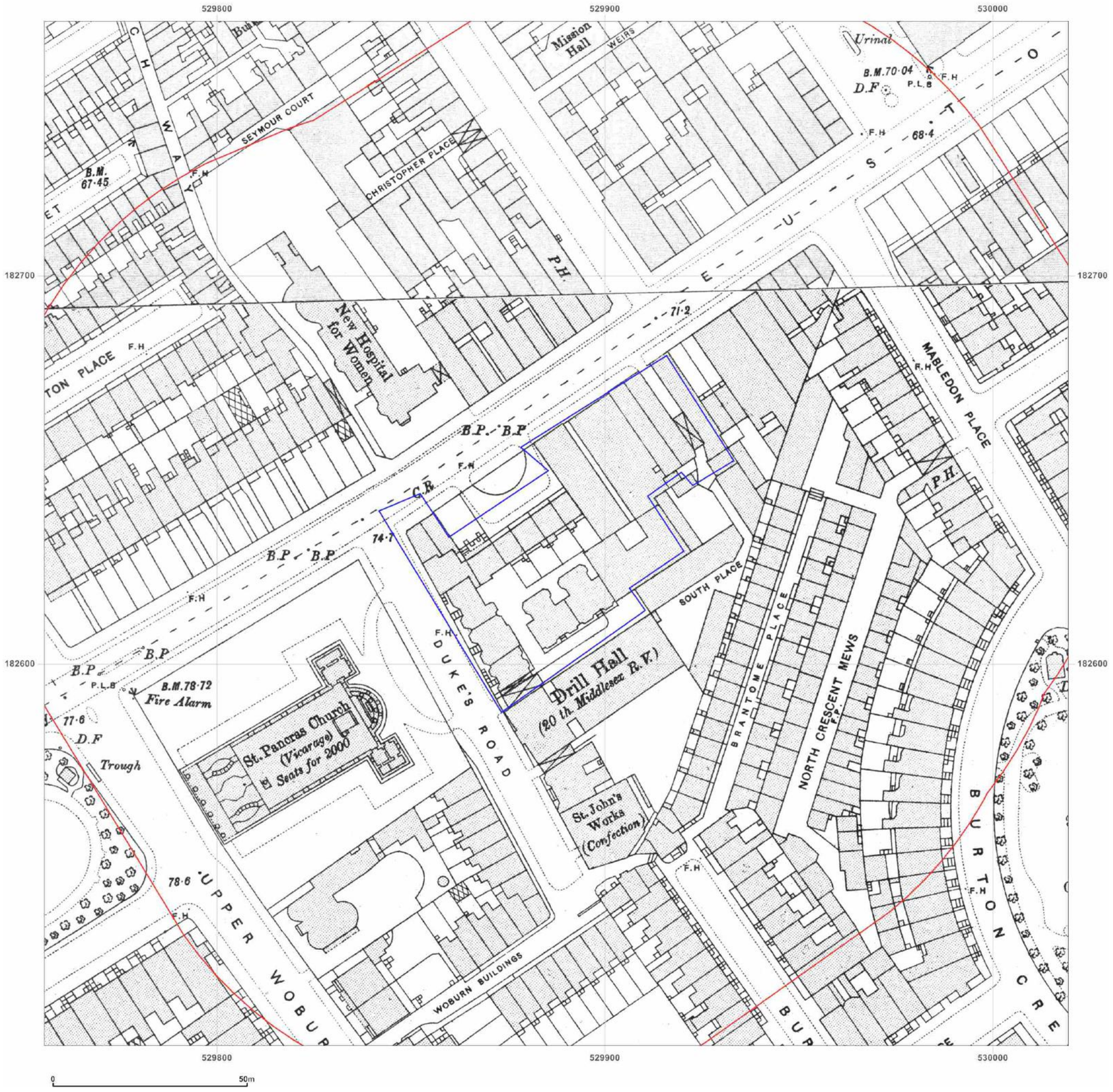

Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: 1056 Scale Town Plan

Map date: **1896**

Scale: 1:1,056

Printed at: 1:1,056

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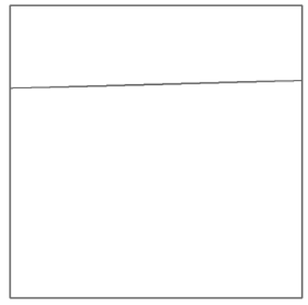
Surveyed 1894
Revised N/A
Edition 1896
Copyright N/A
Levelled N/A



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Revised N/A
Edition 1896
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Levelled N/A

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Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: County Series

Map date: **1896**

Scale: 1:2,500

Printed at: 1:2,500

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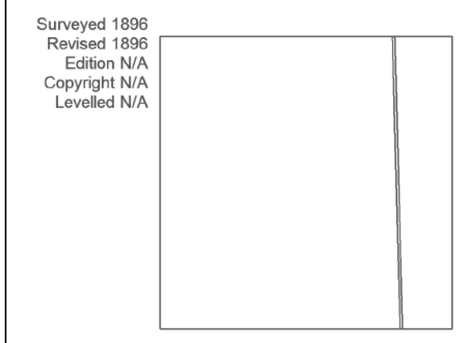

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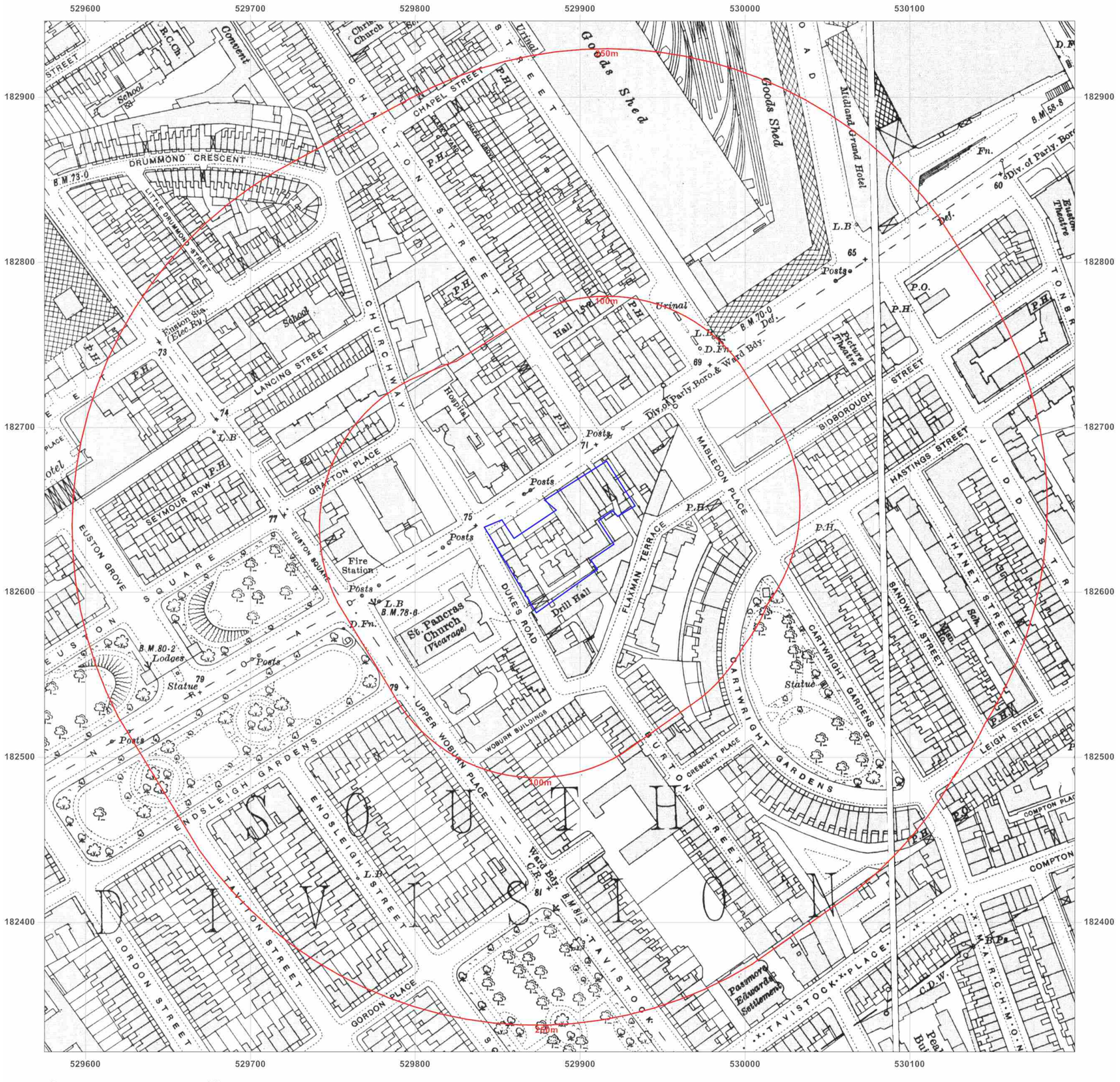

Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: County Series

Map date: **1916**

Scale: 1:2,500

Printed at: 1:2,500

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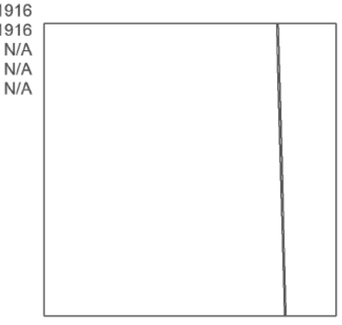
Surveyed 1916
Revised 1916
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1916
Revised 1916
Edition N/A
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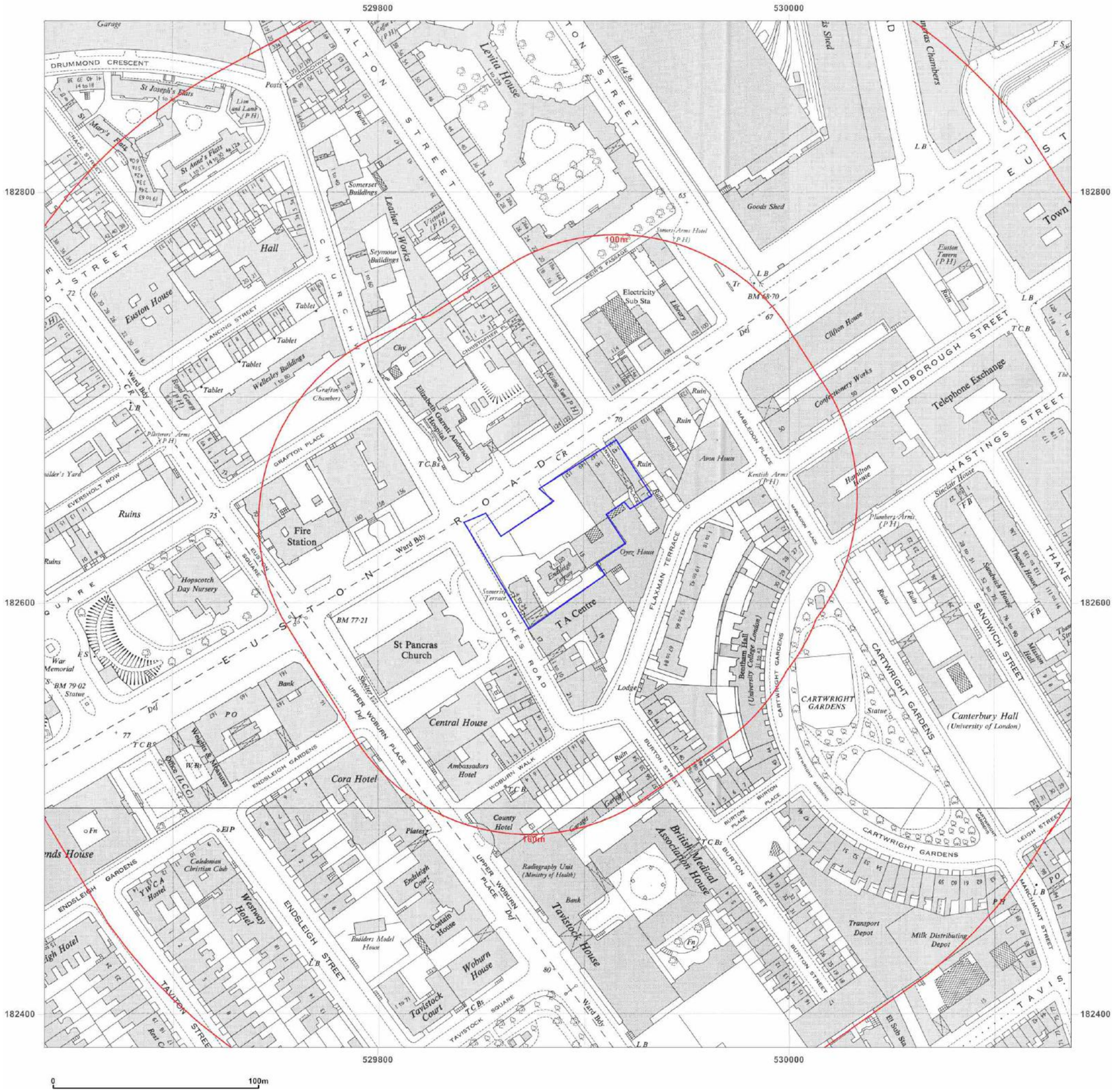

Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: National Grid

Map date: **1951-1952**

Scale: 1:1,250

Printed at: 1:2,000

N W E S

Surveyed 1952 Revised 1952 Edition N/A Copyright N/A Levelled 1932		Surveyed 1951 Revised 1951 Edition N/A Copyright N/A Levelled 1934
Surveyed 1951 Revised 1951 Edition N/A Copyright N/A Levelled 1932		Surveyed 1951 Revised 1951 Edition N/A Copyright N/A Levelled 1934

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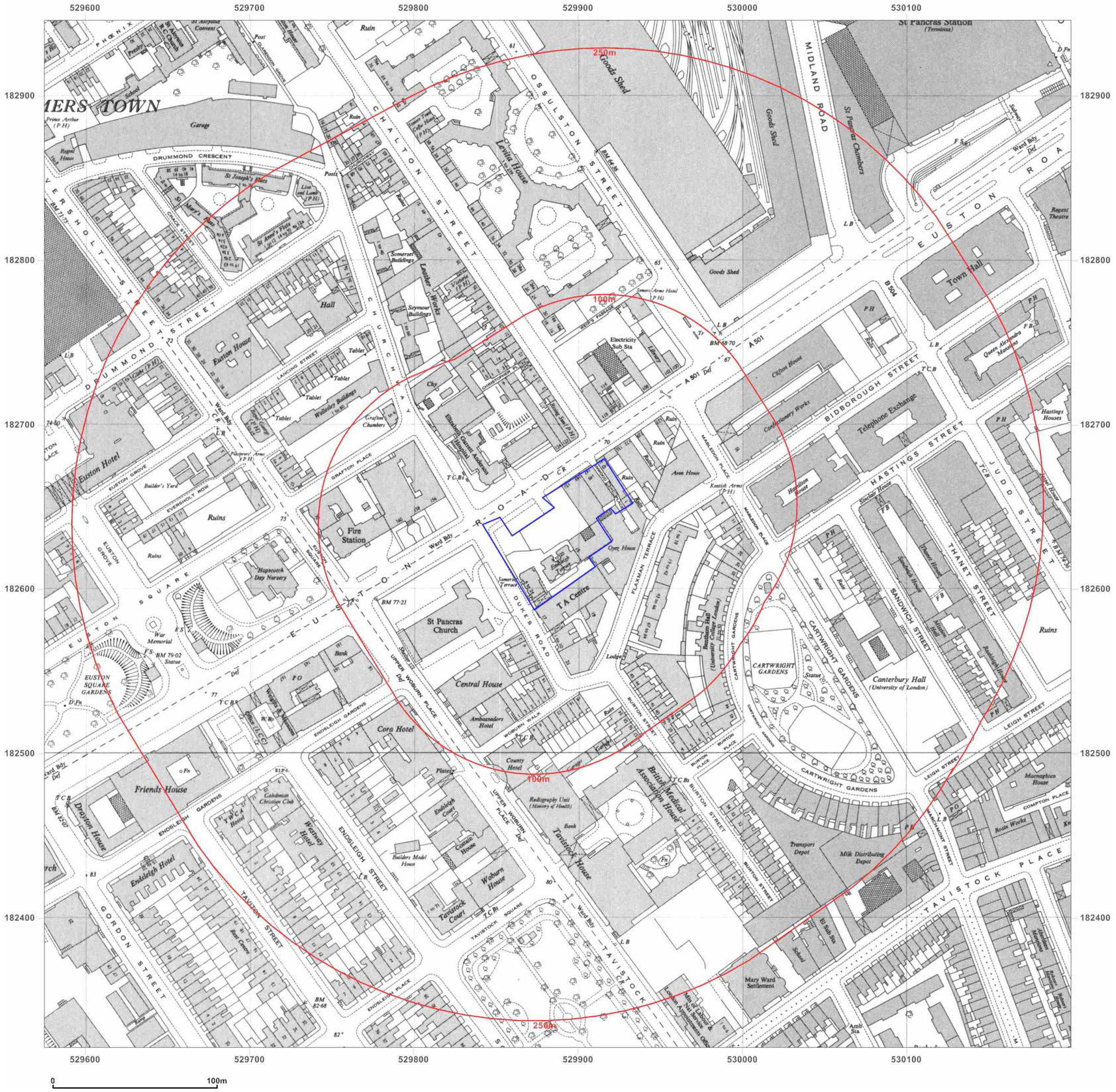

Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: National Grid

Map date: **1952-1954**

Scale: 1:2,500

Printed at: 1:2,500

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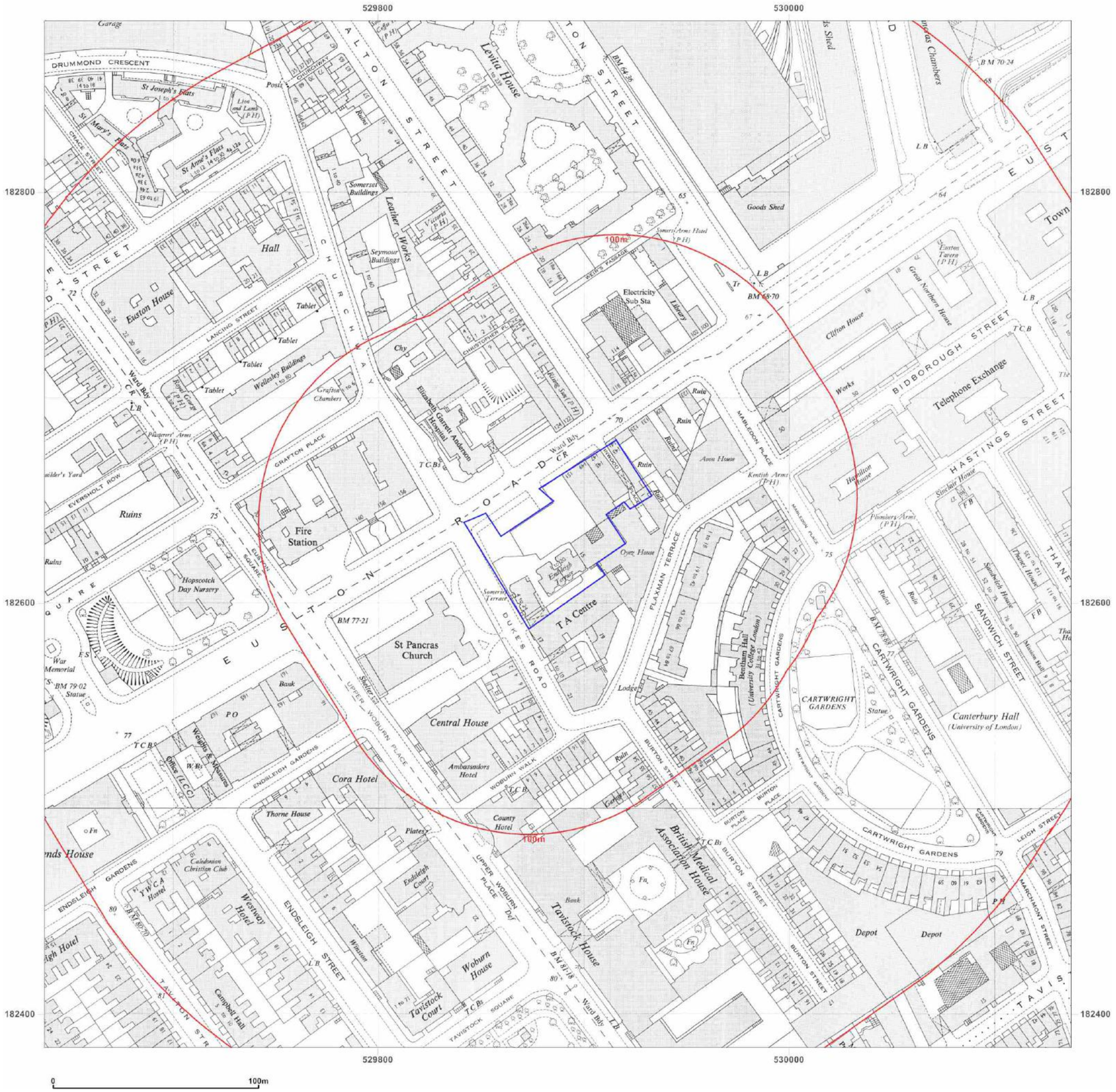

Groundsure INSIGHTS

Site Details:

PREMIER INN, 1, DUKE'S ROAD, LONDON, WC1H 9PJ

Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: National Grid

Map date: **1960-1965**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1951 Revised 1960 Edition N/A Copyright 1961 Levelled 1953		Surveyed 1962 Revised 1962 Edition N/A Copyright 1962 Levelled 1953

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Site Details:

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Client Ref: 1CO104376_003741
Report Ref: GS-4434302
Grid Ref: 529887, 182633

Map Name: National Grid

Map date: **1965-1970**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1968
Revised 1968
Edition N/A
Copyright 1970
Levelled 1954

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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