SMALL SITES × SMALL BUILDERS

COLLIERS WOOD

TECHNICAL INFORMATION

194-196 HIGH STREET, COLLIERS WOOD, SW19 2BN

Navigate this pack using the links below or the pdf bookmarks

Transport for London
TfL Operational Property
Commercial Development
Windsor House
42-50 Victoria Street
SW1H 0TL

Site Ref: 2546
Site Opposite
Colliers Wood Station

N

A3 Landscape

Date : Mar 2017

Initial : REM

File : PAR

Scale : 1/1250 at A3

Mayor of London

Transport for London
TfL Operational Property
Commercial Development
Windsor House
42-50 Victoria Street
SW1H 0TL

Site Ref: 2546
Site Opposite
Colliers Wood Station

N

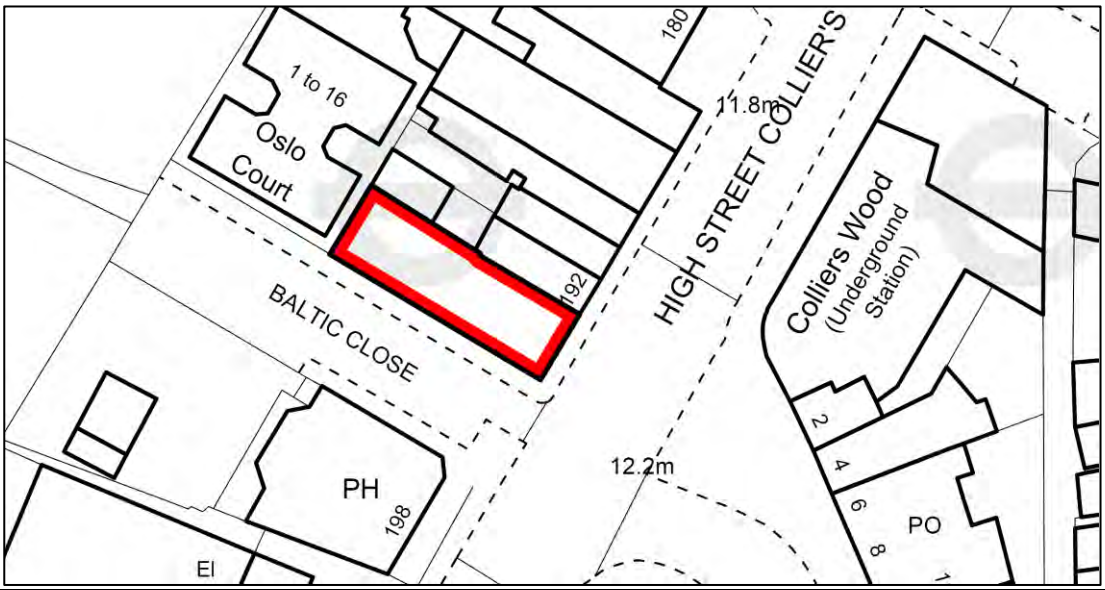
A3 Landscape

Date : Mar 2017

Initial : REM

File : PAR

Scale : 1/1250 at A3

1. PROPERTY DETAILS		
Site Name & Address	Site opposite Colliers Wood Station, SW19 2BN	
Unique Ref (PAR)	2546	
Borough	Merton	
Company	London Underground Ltd	
Zone (TfL)	3	
Site Area (acres)	Approx. 0.05 acres (208.67 sq. m)	
Location and Site Plan		
Existing Use	- Hard standing (car park)	

2. TOWN PLANNING	
Planning Policy Documents	- Adopted: London Plan (consolidated 2016), Core Planning Strategy (2011), Sites and Policies Plan and Policies Map (2014)
Site Allocations	- The site is allocated for development within the Local Plan (Site allocation 59 - Corner Baltic Close and High Street Colliers Wood)
Housing zone/OA	- The site is not within a Housing Zone or Opportunity Area, but is within Wimbledon and Colliers Wood Intensification Area, as designated under Policy 2.13 of the London Plan.
Heritage Designations	- The site is within Wandle Valley Conservation Area. It is also opposite the Grade II listed Colliers Wood Station.
Flood Zone	- Yes, the majority of the site is within Flood Zone 2, with a small area to the north falling within Flood Zone 3
Ecological Designations	- No
PTAL	- 5
Tall buildings permitted	- The Core Strategy identifies Town Centres and specifically Colliers Wood as an area appropriate for Tall Buildings. However, the context of the site, including the adjacent neighbouring properties and potential overlooking issues, as well as the setting of the Conservation Area, does not make this site appropriate for

<table>
<tr><td></td><td>a tall building in line with Policy CS 1.</td></tr>
<tr><td>Car parking standards</td><td>- The site would be an appropriate location for car free development in line with Policy CS 20. A car free development is expected to adhere to a legal agreement to ensure that future residents will not be able to obtain on street permits.</td></tr>
<tr><td>LPA affordable housing target</td><td>
<table>
<tr><th>Threshold</th><th>Affordable Housing target (unit)</th><th>Affordable Housing Tenure Split</th><th>Provision Requirement</th></tr>
<tr><td>10 units of more</td><td>40%</td><td>60% Social Rented and 40% Intermediate</td><td>On site</td></tr>
<tr><td>9 units or less</td><td>20%</td><td>60% Social Rented and 40% Intermediate</td><td>Financial Contribution</td></tr>
</table>
</td></tr>
<tr><td>Other</td><td>- Well located site, close to town centre amenities and immediately opposite Colliers Wood London Underground Station, which is served by the Northern Line.
- Adjacent buildings to the north and east have windows overlooking the site.
- Some landscaping work has recently been undertaken along the footway adjacent to the site
- The site is currently underutilised and results in an unattractive break in the streetscape. The site is identified as having a potential to improve the setting of the Conservation Area in the draft Wandle Valley Conservation Area Character Assessment.</td></tr>
<tr><td>Planning Policy Overview</td><td>- Any development will need to ensure the amenity, privacy and daylight and sunlight of the residential units to the north and North West are maintained (CS 14 and DM D2).
- Development will need to ensure that it is in keeping with the setting of the Conservation Area
- Site designation 59 notes that the following mix of uses would be considered appropriate on the site: retail (A1 Use Class), financial and professional services (A2 Use Class), restaurant or cafes (A3 uses), drinking establishments (A4 uses), hot food takeaway (A5 Use Class), offices (B1(a) use class) and residential (C3). Any residential development on the site should be on the upper floors.</td></tr>
<tr><td>Planning History</td><td>
<table>
<tr><th>Date</th><th>Reference</th><th>Description</th><th>Status</th></tr>
<tr><td>04/01/1995</td><td>94/ P0767</td><td>Consent granted for the use of the site as a car park for one year</td><td>Granted with conditions</td></tr>
<tr><td>Not available</td><td>94/P1096</td><td>Consent granted for the removal of the condition to limit the use of the site for car parking to one year</td><td>Granted with conditions</td></tr>
</table>
</td></tr>
<tr><td>Local Planning Authority Feedback
Meeting with Paul Garrett of London Borough of Merton on 27/04/2017</td><td>- Principle of development: Established through the site allocation

- Preferred uses: Retail use on ground floor, with residential or office development on upper floors. Active frontage is needed on both the site boundaries at ground floor level so residential or office on the ground floor is not supported.

- Transport: The site should be car-free, but existing vehicle access could be maintained for servicing and access. There is one spare disabled parking bay on Baltic Close which could potentially be utilised by a residential development.

- Other considerations: Any proposal should ideally seek to include the existing pergola, although removal of benches would be considered. It is expected that the building line fronting Baltic Close is set back to accommodate an accessible footway between the building and the pergola (minimum required footway width is 1.2m). The council would support a building taller than those immediately around, but not a tall building (subject to meeting planning policy and a high quality design).</td></tr>
</table>

ARCADIS Design & Consultancy for natural and built assets

TFL_PSF _9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVES
SITE OPPOSITE COLLIERS WOOD STATION, MERTON, SW19 2BN

Site Ref: 2546

Summary Report

JULY 2017

Incorporating
EC HARRIS BUILT ASSET CONSULTANCY
Hyder

Site Opposite Colliers Wood Station, Merton, SW19 2BN
Summary Report

Author	Various
Checker	Alison Pugh 
Approver	Angela Mulgrew
Report No	304-UA009686-UP32R-02
Date	JULY 2017

Version control

Version	Date	Author	Changes
01	17/07/2017	Various	First Draft
02	July 2017		Final Issue

CONTENTS

1 Introduction

Arcadis Consulting (UK) Limited (Arcadis) has been commissioned by Transport for London (TfL) 'the Client' to undertake a number of technical surveys for a site opposite Colliers Wood Station, Merton, London ('the Site').

TfL is aiming to divest a number of small sites to enable prospective regeneration. The objective of the Small Sites Initiative is to identify potential abnormal development costs associated with flood risk, archaeology and geotechnical and geo-environmental conditions. This report provides a summary of the technical surveys commissioned for the Site and reference should be made to the individual reports for further detailed information.

The Site is approximately 0.02 hectares in size and is centred at grid reference 526759, 170363. It is a vacant parcel of land fronting onto High Street, Collier's Wood (A24). It is covered in hardstanding of predominantly bituminous bound material and has been used as a car park. The Site is located in a suburban area characterised by residential, commercial and public buildings. The Site is bounded by High Street Collier's Wood (A24) to the east, Baltic Close to the south, Oslo Court (apartment block) to the west and residential properties to the north. Access to the Site is gained via Baltic Close where there are gates on the southern boundary.

The surveys undertaken during this study include the following;

- Topographical and buried services survey (Ref 1);
- Flood risk review (Ref 2);
- Archaeological desktop review (Ref 3); and
- Geotechnical and geo-environmental desk study and Preliminary Intrusive Ground Investigation (Ref 4).

A summary of the findings of these surveys are detailed in the following sections.

2 Topographical and Buried Services Survey

The topographical survey indicates that the Site is generally flat with levels varying between 12.10m and 12.19m OS.

The buried services survey indicated that there is a BT cable (north to south) in the western half of the Site. There is a gas pipeline indicated in the northern half of the site (east to west). The GPR scan also picked up some other cables / assets in the eastern end and southern half of the site but these were unidentified.

3 Flood Risk Review

Following the assessment of flooding to the Site from all likely sources, it is considered that there is a Medium risk of flooding to the Site from main rivers and a Low risk of flooding from surface water, groundwater and artificial sources, including sewers.

The EA *Flood Map for Planning* identifies the Site as within Flood Zone 2. Following the National Policy Planning Framework (NPPF) guidance, the Site would be suitable for all development types, but triggering the requirement for application of the Exception Test for '*Highly Vulnerable'* developments (which includes emergency services stations and command centres; basement dwellings; caravans, mobile homes and park homes intended for permanent use; and installations requiring hazardous substance consent). Use for '*More Vulnerable'* development, including residential land use, is appropriate in this Flood Zone in accordance with the NPPF, subject to satisfaction of the Sequential Test, which steers new development to Flood Zone 1. A Flood Risk Assessment (FRA) would need to be prepared in support of a planning application for any development on the Site.

The FRA would be a more detailed assessment than is presented in the Flood Risk Review and would need to be specific to the type and layout/configuration of development that is proposed. The FRA should demonstrate that the proposed development would not be subject to an unreasonable risk of flooding and that developing the Site would not subsequently increase flood risk to third parties. EA modelled flood data indicates maximum flood depths on Site of up to 0.66m during the extreme flood event. Further investigation, via the FRA, would therefore be required to demonstrate how the Site can be developed safely, identifying necessary design measures to provide adequate protection in these flood scenarios, without increasing flood risk to third parties.

It is considered that there is a low risk of surface water flooding, however there is a known history of surface water flooding in areas local to the Site. Surface water drainage and runoff from the Site should be further investigated and it should be ensured that drainage is managed to a high standard. Current rainfall-runoff rates and volumes, as well as greenfield runoff rates for the Site should be calculated. A Drainage Strategy should then be developed as part of a planning application, in consultation with the Lead Local Flood Authority and Thames Water, which should detail methods, including the use of Sustainable Drainage Systems to manage site runoff, which would ideally be controlled to match greenfield rates.

Subject to production of an FRA and Drainage Strategy for any future planning application and the implementation of the flood resilience recommendations from these studies, it is considered that flood risk would not limit any form of development on the Site.

4 Archaeological Desktop Review

The archaeology desktop review involved a rapid information-gathering and review exercise on the Site and a 500m study area using information from publicly held sources. A brief assessment of potential heritage/archaeological constraints and opportunities at the Site has been made. Although the Site has potential for buried archaeological remains to exist, these heritage assets are not considered likely to prevent development on the Site.

The review assessed that the key heritage constraints to development are that the Site lies within the Wandle Valley/Colliers Wood Archaeology Priority Area. There is a medium potential for Roman remains including possible survival of the road surface of the adjacent Stane Street and roadside activity such as drainage ditches. The location of the Site has attracted settlement and industry in the past, being located between a Roman thoroughfare and the River Wandle. There is a medium potential for medieval and post-medieval industrial activity to survive on the Site. The Site may contain deposits from previous courses of the River and past flooding events. Waterlogged remains could be present which may offer good potential for survival of organic remains.

There are no Scheduled Monuments within the Site. There are eight Listed Buildings within the Study Area, all Grade II, but none within the Site boundary. One Listed Building - Colliers Wood Train Station - is located opposite the Site. There are no Registered Parks and Gardens within the Study Area. The Site lies within The Wandle Valley Conservation Area.

For any future planning application, the potential for below ground remains need to be fully evaluated. The Greater London Archaeological Advisory Service (GLAAS) who advise the local planning authority are likely to recommend a full archaeological desk-based assessment and an evaluation to be undertaken prior to planning permission being determined. This would include a specific archaeology Site walkover, a visit to the record office to gather historic maps and relevant documentary evidence, a map regression exercise as well as preparation of distribution maps showing designated and un- designated heritage assets. The evaluation would likely consist of a programme of trial trenching and subsequent reporting. If heritage assets of significance are encountered during the evaluation stage, there may be a requirement for further recording in the form of an excavation or watching brief. This may be delivered through a post-determination condition.

5 Geotechnical and Geo-Environmental Desk Study and Preliminary Intrusive Ground Investigation

The geo-environmental and geotechnical desk study comprised a review of existing historical and current information on the Site.

The historic review of the Site indicated terraced properties have been recorded within the Site and a second feature possibly a building (unknown use) was noted after the properties were demolished. Potential off-site sources of contamination including a nearby dry cleaners and petrol filling station are recorded.

A preliminary site investigation has been undertaken comprising two boreholes to consider the ground conditions and give an indication of the levels of contaminants on the Site.

Potential risks to human health, controlled waters and the built environment have been identified from on-site Made Ground and ground gas / vapours are possible risks to human health from the off-site sources. Gross contamination was not encountered during the preliminary ground investigation, however, concentrations of contaminants (lead, arsenic, PAHs and asbestos) within the Made Ground were recorded in excess of applicable guideline values for a sensitive residential land use. However if apartments or retail with first floor flats are proposed, hardstanding is likely to cover the majority of the Site. This would reduce the risk to future end-users as potential pathways to the contaminants would be broken. Where soft landscaping is proposed (e.g. for gardens), a clean cover system is likely to be required to remove the risk.

Further development specific ground investigation will be required to confirm the requirements for development. These include (but not limited to):

- Confirm concrete design for foundations and services including the London Clay;
- Investigation of the eastern part of the Site which was not possible during preliminary investigation due to London Underground restrictions;
- Further gas monitoring and assessment of the potential risk of ground gases to receptors, and to determine whether gas protection measures would be required for future development. Appropriate consideration of BS8485 may enable a reduction in abnormal costs when applied to the proposed design for the Site and should be consulted early within the detailed design stage; and
- Consideration of shrinkage and swelling, trees, potential for relict shear slip surfaces, buried services and the nearby London Underground assets may need to be taken into account during the design.

Based on the findings of the desk study report and assuming that the Site will be developed for residential use with gardens, it is anticipated that some remediation (off-site disposal, clean cover, gas membrane, basic asbestos monitoring and pipe upgrade but excluding foundation) may be required. Indicative costs are provided in the desk study report (Ref. 4) which are based on the information known to date.

The Site is in an area where ‘low’ risk of encountering unexploded ordnance is present and further assessment is not considered necessary.

6 References

1. 40Seven (May 2017) Topographical and Utility Mapping Survey - Site Opposite Colliers Wood Station, Merton, SW19 2BN. (Site Ref: 2546) (Drawing Number 2546- Colliers Wood Rev A)
2. Arcadis Consulting (UK) Limited (July 2017) - Site Opposite Colliers Wood Station, Merton SW19 2BN Flood Risk Review (Report 302-UA009686-UU41R-04)
3. Arcadis Consulting (UK) Limited (June 2017) - Site Opposite Colliers Wood Station, Merton SW19 2BN Archaeological Desktop Review (Report Number 303-UA009686-UU41R-03)
4. Arcadis Consulting (UK) Limited (July 2017) - Site Opposite Colliers Wood Station, Merton SW19 2BN Preliminary Geotechnical and Geo Environmental Report (Report Number 301-UA009686-UP32R-03)

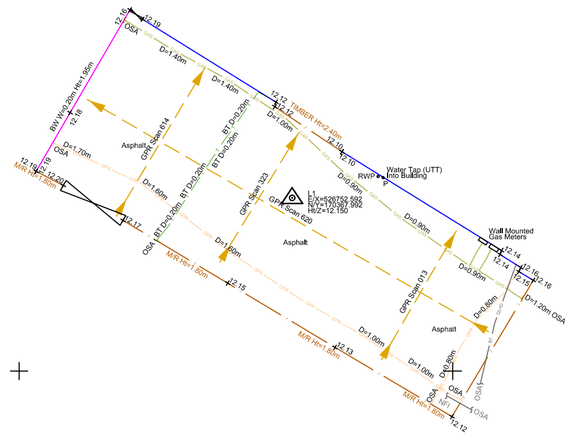
Arcadis Consulting (UK) Limited

Arcadis House
34 York Way
London N1 9AB
United Kingdom

T: +44 (0)20 7812 2000

arcadis.com

526720E
526740E
526760E
526780E
170400N
170380N
170360N
170340N



TOPOGRAPHICAL LEGEND

Building		Structure Underground	
Building Canopy		Vegetation Extents	
Building Overhead		Drainage Channel	
Surface Edge		Scar	
Road Edge		Above Ground Pipe	
Road Kerb Channel		Overhead Pipe	OHP
Banking		Overhead Electricity	OHE
Fence		Overhead Telecom	OHT
Wall		Railway Track	
Structure		Contour Line	220
Structure Overhead			

ABBREVIATIONS

AC	Asbestos Cement	FS	Flag Staff	SI	Spun Iron
ACU	Air Conditioning Unit	G	Gully	SL	Soffit Level
AD	Assumed Direction	GPRI	Ground Penetrating Radar Inconclusive	SP	Sign Post
AR	Assumed Route	GV	Gas Valve	Spr	Spring
AV	Air Valve	H/R	Hand Rail	S/R	Steel Railings
BB	Belisha Beacon	IC	Inspection Cover	SS	Structure Support
BD	Back Drop	IL	Invert Level	ST	Stop Tap
BdL	Bed Level	I/R	Iron Rail Fence	Stn	Survey Station
BH	Borehole	KO	Kerb Outlet	SV	Sluice Valve
Bk	Brick	LB	Letter Box	SVP	Soil Vent Pipe
BL	Basement Light	LC	Lighting Column	SW	Stone Wall
BO	Bollard	LH	Lamp Hole	Tac	Tactile Paving
BR	Brick	LOR	Loss Of Reflection	TBM	Temporary Bench Mark
BS	Bus Stop	LOS	Loss Of Signal	TC	Telecom Cover
BT	British Telecom Cover	MB	Mooring Bollard	TCB	Telephone Call Box
BTB	British Telecom Box	M/C	Multiple Cables	TCP	Telephone Call Post
BW	Brick Wall	MH	Manhole Cover	TFR	Taken From Records
B/W	Barbed Wire Fence	Mkr	Marker Post	TH	Trial Hole / Pit
Cam	Camera	MP	Mile Post/Stone	ThL	Threshold Level
CAT	Catenary Level	NFI	No Further Information	Tk	Tank
C/B	Close Borded Fence	NM	Node Marker	TOW	Top Of Wall
CC	Control Cabinet	NP	Name Plate	TP	Telegraph Pole
CH	Chainage	NPV	No Pipes Visible	TS	Traffic Signals
ChL	Channel Level	OSA	Off Survey Area	U/S	Upstream
CI	Cast Iron	P	Post	UTGA	Unable to Gain Access
C/I	Corrugated Iron Fence	PBM	Permanent Bench Mark	UTL	Unable to Locate
CL	Cover Level	PE	Polyethylene	UTR	Unable to Raise
C/L	Chain Link Fence	PGM	Permanent Ground Marker	UTS	Unable to Survey
Co	Concrete	PL	Plastic	UTT	Unable to Trace
CP	Catch Pit	P/L	Palisade Fence	VC	Vitrified Clay
CpL	Coping Level	PM	Parking Meter	VDP	Vehicle Detector Pads
C/B	Crash Barrier	P/R	Post and Rail Fence	VP	Vent Pipe
CTV	Cable TV	PU	Pump	VR	Vapour Recovery
CUL	Culvert	PVC	Polyvinylchloride	VTP	Vertical Pipe
CW	Concrete Wall	P/W	Post and Wire Fence	W	Water Cover
DI	Ductile Iron	PZ	Piezometer	WL	Water Level
dil	Dilapidated	RE	Rodding Eye	WM	Water Meter
dis	Disused	Ri	Riser	W/M	Wire Mesh Fence
D/S	Downstream	RL	Rail Level	WO	Water Wash Out
DSW	Dry Stone Wall	RP	Reflector Post	WS	Window Sample
EB	Electricity Box	RS	Road Sign	WV	Wheel Valve
EC	Electricity Cover	RWP	Rain Water Pipe		
E/F	Electric Fence	R/W	Retaining Wall		
EOT	End of Trace	S	Stump		
EP	Electricity Pole	SA	Survey Abandoned		
ER	Earth Rod	S/A	Soakaway		
FC	Fuel Cover	SC	Speed Camera		
FFL	Finished Floor Level	S/F	Safety Fence		
FH	Fire Hydrant				
FO	Fibre Optic Cover				

NOTES

Read in conjunction with existing records.
Utility routes and text shown in dark grey are from existing records.
Drainage routes with a pipe diameter of 300mm or greater are shown as the pipe width along with continuous line style.
Services plotted outside survey extents should not be considered to be exhaustive.

REV.	DETAILS	BY	DATE

GRID
ORDNANCE SURVEY RELATED TO THE OS ACTIVE STATIONS BY GPS OBSERVATIONS

DATUM
ORDNANCE SURVEY RELATED TO THE OS ACTIVE STATIONS BY GPS OBSERVATIONS

Achilles
THE SURVEY ASSOCIATION
Certificate Number: FS 11217
40SEVEN
LEEDS 08450 179300
LONDON 08450 179305
E-Mail: 40Seven-info@40Seven.com Web site: www.40seven.com

CLIENT:
ARCADIS CONSULTING (UK) LTD
ARCADIS HOUSE
34 YORK WAY
LONDON N1 9AB

PROJECT TITLE:
SITE OPPOSITE
COLLIERS WOOD STATION
MERTON SW19 2BN

DRAWING TITLE:
TOPOGRAPHICA & UTILITY MAPPING SURVEY
SITE REF: 2546

SURVEYED BY:	DRAWN BY:	APPROVED BY:
LB / LR	NC	JB

SCALE:	SURVEY DATE:
1:200 @ A2	MAY 2017

DRAWING NUMBER: 2546 - Colliers Wood Rev A

SHEET NUMBER: 2546 - Colliers Wood - 01 REV:

DISCLAIMER

Unless otherwise stated, all services shown on this plan have been surveyed using approved detectors and the connections between manholes, if not traced, are assumed to be direct. No guarantee can be given that all services have been shown. In ideal conditions the depth accuracies for the underground utilities located is +/- 10% of depth. Where services are shown as 'Taken From Records' on the drawing we are not liable for any loss that may arise due to a lack of accuracy in that guided information. Due to BT's policy we are not permitted to lift their inspection chamber covers. Reference should be made to the methodology used on site as detailed within the latest version of 40SEVEN's Site Procedures for Utility Location Surveys. Excavations in the vicinity of services shown are to be carried out with due diligence (Ref: HS(G)47.) The following text* is an extract from Surveys of Land, Buildings and Utility Surveys at scales of 1:500 and Larger issued by the Royal Institute of Chartered Surveyors February 1996. *Electronic tracing is a reliable method of locating buried services. On heavy, built up sites 85% completeness is probably all that can be expected. *Plan accuracies of the order of + or - 150mm may be achieved but this figure will depend on the depth of the service below ground level. Where similar services run in close proximity, separation may be impossible. Successful tracing of non-metallic pipes may be limited. *Existing record information showing underground services is often incomplete and of doubtful accuracy. It should be regarded only as an indication and cannot be guaranteed.

ARCADIS Design & Consultancy for natural and built assets

TFL_PSF_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE
SITE OPPOSITE COLLIERS WOOD STATION, MERTON, SW19 2BN

Site Ref. 2546

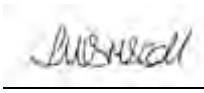
Flood Risk Review

NOVEMBER 2017

Incorporating
EC HARRIS BUILT ASSET CONSULTANCY
Hyder

Site opposite Colliers Wood Station, Merton, SW19 2BN

Flood Risk Review

Author	Joshua Moore	
Checker	Lisa Driscoll	
Approver	Angela Mulgrew	
Report No	302-UA009686-UU41R-05	
Date	NOVEMBER 2017	

Version Control

Issue	Revision No.	Date Issued	Description of Revision: Page No.	Description of Revision: Comment	Reviewed by:
01	0	16/05/2017	-	Initial Draft	JM
02	1	05/06/2017		Technical Review	LD
03	2	06/06/2017		Issue following Tech. Review	JM
04	3	22/06/2017		Updates to address client comments	LD
05	4	02/11/17		Final Issue	AP

CONTENTS

1 INTRODUCTION

1.1 Background

Arcadis Consulting (UK) Limited ('Arcadis') has been commissioned by Transport for London (TfL) 'the Client' to a number of technical surveys for a site on opposite Colliers Wood Station, Merton ('the Site').

TfL is aiming to divest a number of small sites to enable positive regeneration. The objective of the Small Sites Initiative is to provide robust and pragmatic advice that sensibly de-risks each of the sites such that unreasonable 'abnormal' development costs are nor included by developers.

The aim of this flood risk review is to assess the flood risk status of the Site and confirm the suitability of the Site for various forms of development based on the findings of a desk study.

1.2 Scope of Works

Specific objectives of the flood risk review are to:

- Collect and review Environment Agency (EA) and Lead Local Flood Authority (Merton London Borough Council (MLBC)) flood maps and published datasets (Strategic Flood Risk Assessments, Preliminary Flood Risk Assessment and Local Flood Risk Management Strategy);
- Assess flood risk from all relevant sources (rivers, groundwater, surface water, sewers and artificial sources) and assign a risk value for each form of flooding (high, medium or low);
- Confirm the EA Flood Zone and confirm the acceptability of accommodating residential or other forms of development in accordance with the National Planning Policy Framework (NPPF) requirements;
- Confirm the need for application of the NPPF Sequential and Exception Tests; and
- Provide recommendations for further study or necessary flood risk mitigation measures to facilitate development.

1.3 Limitations

This report has been prepared for the Client in accordance with the terms and conditions of appointment. Arcadis cannot accept any responsibility for any use of or reliance on the contents of this report by any third party. The copyright of this document, including the electronic format shall remain the property of Arcadis.

This report has been compiled from a number of sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time. Consequently, there is a potential for further information to become available, which may change this report's conclusion and for which Arcadis cannot be responsible.

2 SITE OVERVIEW

The Site covers 0.02ha and is located opposite Colliers Wood Station, Merton, SW19 2BN, centred at national grid reference 526759 170363.

The Site is located at the end of a terrace plot and consists of vacant, paved land, currently used as a car park. The Site is located within a generally suburban setting and is surrounded by residential, commercial and public buildings as well as some green open spaces. The Site is bounded by High Street Collier's Wood (A24) to the east, Baltic Close to the south, Oslo Court (apartment block) to the west and residential properties to the north, as shown in Figure 1.

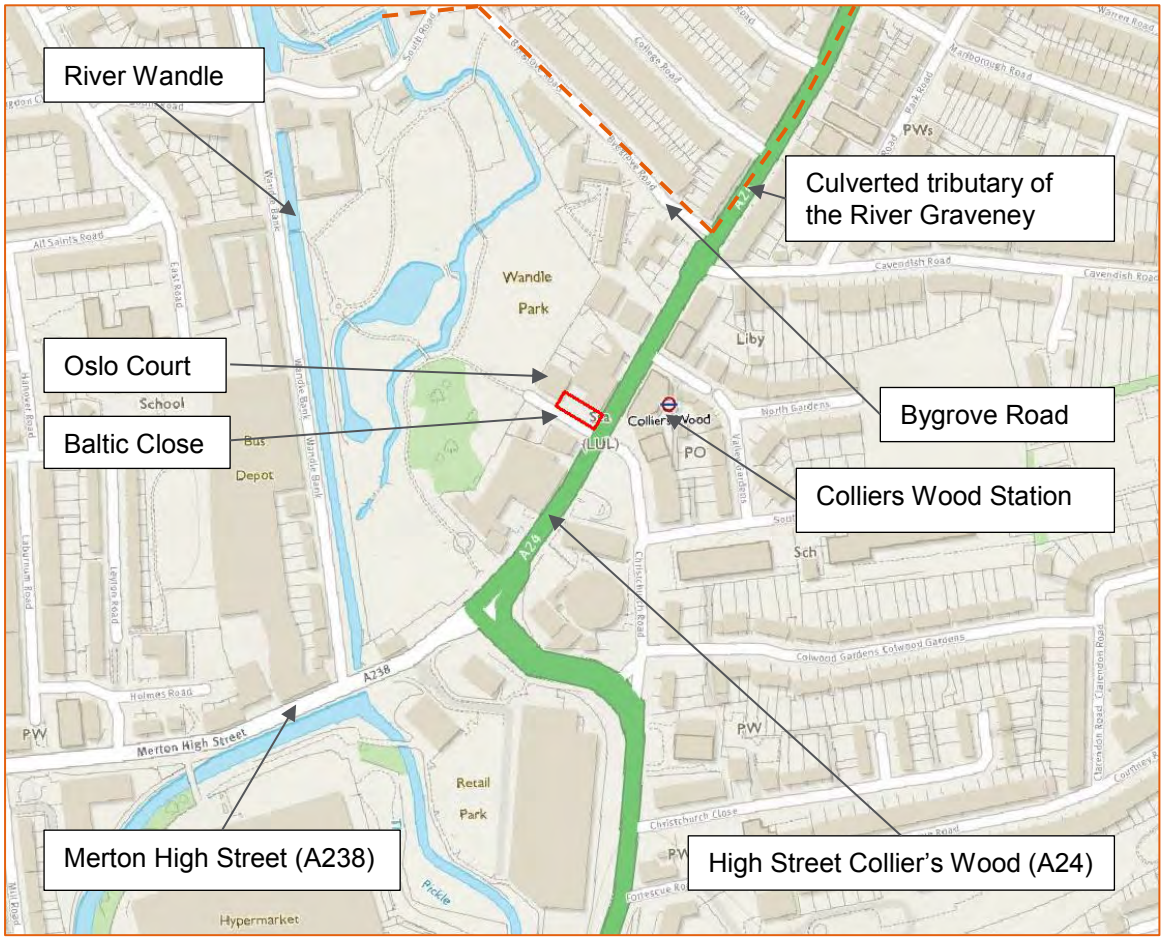


Figure 1: Site Location. Site Boundary Outlined in Red.
Contains Ordnance Survey data © Crown copyright and database right 2016. All rights reserved.

Topographical information for the Site has been identified from data collected from a survey commissioned by TfL and completed by 40Seven in May 2017, verified against EA Opensource Government License 2m LiDAR digital terrain mapping (DTM) datasets (Ref. 1). The Site is flat, with levels between 12.10m above ordnance datum (mAOD) and 12.20 mAOD. The landform in the wider area generally slopes down towards the River Wandle in the west (Figure 2).

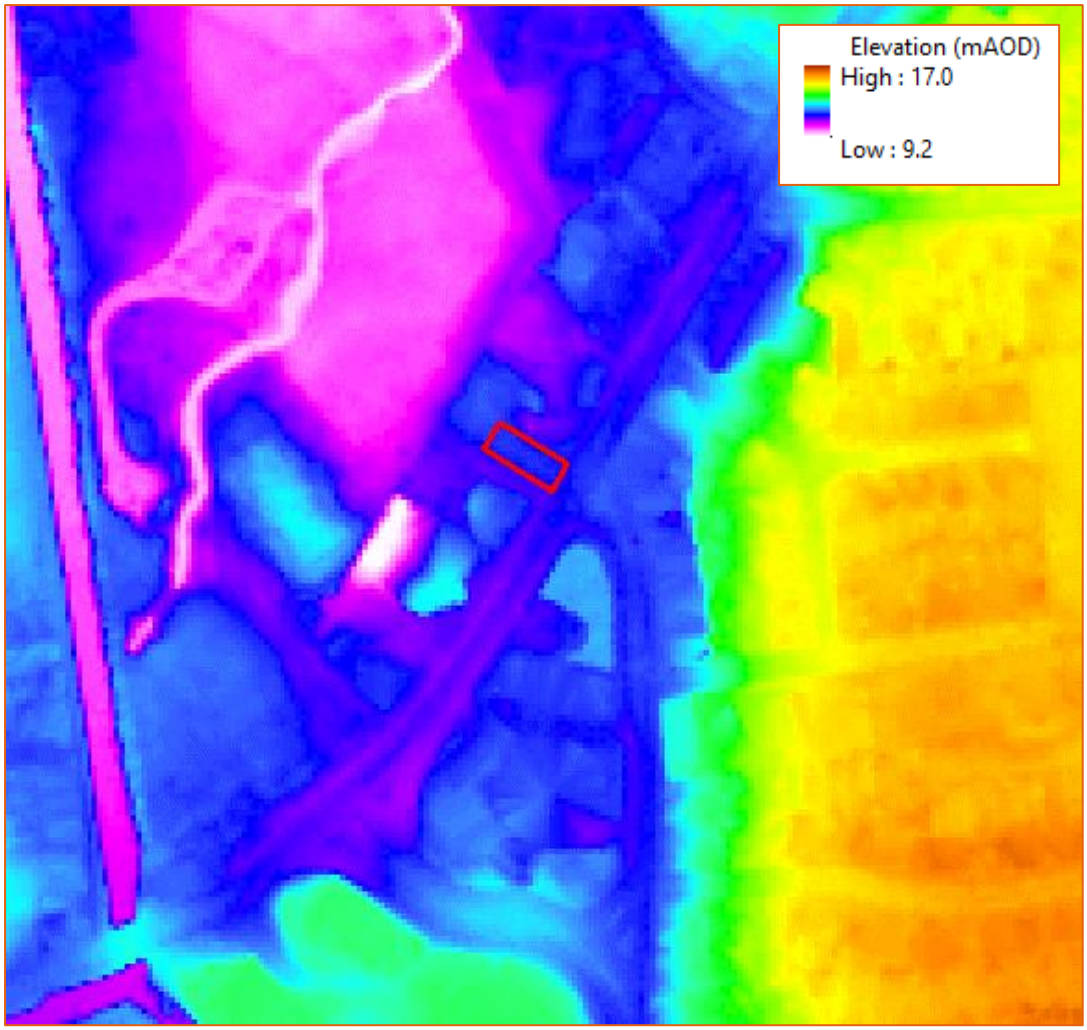


Figure 2: Site Topography. Site boundary Outlined in Red

2.1 Catchment Description

The Site is located within the catchment of the River Wandle, an EA designated Main River and tributary of the River Thames. The River Wandle flows in a northerly direction approximately 160m west of the Site and to this point drains a catchment of approximately 154km^2. The River Wandle catchment receives an average annual rainfall of 725mm (Ref. 2).

A side channel of the River Wandle splits off the right bank of the watercourse and flows through Wandle Park approximately 100m to the west of the Site. The side channel connects to a small pond, and then re-joins the main channel (see Figure 1).

The River Graveney, an EA designated Main River, flows westwards approximately 500m north of the Site and confluences with the River Wandle approximately 900m northwest of the Site. The River Graveney is a heavily modified watercourse and a culverted tributary of the river flows southwards along High Street Collier's Wood and then turns westwards along Bygrove Road towards the River Wandle. At its closest, this culverted watercourse is located less than 100m north of the Site (see Figure 1).

2.2 Ground Conditions and Aquifers

Soils underlying the Site are described as naturally wet, loamy and clayey floodplain soils with naturally high groundwater (Ref. 3). The superficial geology consists of Alluvium – clay, silt, sand and gravel (Ref. 4), supporting a Secondary A aquifer (Ref. 5). Such aquifers are defined by rock layers or drift deposits with a wide range of permeability and storage that are capable of supporting water supplies at a local scale and the Site is located within an inner (Zone 1) groundwater source protection zone attributed to a potable water supply abstraction from the superficial aquifer. The bedrock geology underlying the Site consists of the London Clay Formation – clay and silt, which has no aquifer designation.

3 DATA SOURCES

Information has been drawn from web-based and published sources, outlined below, as well as having been collected through consultation with the EA who provided a Flood Product 4 data pack.

Web-bases sources:

- Flood Estimation Handbook (FEH) Web-Service;
- EA What's in Your Backyard? Interactive Maps;
- EA Long Term Flood Risk Interactive Maps (Ref. 6);
- EA Flood Map for Planning (Ref. 7);
- Cranfield University Soilscapes Soil Interactive Map;
- British Geological Survey Geology Viewer.

Published documents:

- MLBC Level 1 Strategic Flood Risk Assessment (SFRA) (Ref. 8);
- MLBC Level 2 SFRA (Ref. 9);
- MLBC Local Flood Risk Management Strategy (LFRMS) (Ref. 10);
- MLBC Preliminary Flood Risk Assessment (PFRA) (Ref. 11);
- Surface Water Management Plan for the LMBC (SWMP) (Ref. 12).

4 RELEVANT PLANNING POLICES & DESIGNATIONS

4.1 NPPF and Flood Risk

The National Planning Policy Framework (NPPF) (Ref. 13) and accompanying flood risk and coastal change planning practice guidance (PPG) (Ref. 14) set out the Government's planning policy for England and advises on '*how to take account of and address the risks associated with flooding and coastal change in the planning process*'. The principal aim of the NPPF is to achieve sustainable development by accounting for flooding at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from areas where risks are highest. Where development is necessary in areas at risk of flooding, the NPPF aims to ensure it is safe, without increasing flood risk to third parties.

Early adoption of, and adherence to, the principles set out in the NPPF and its PPG, with respect to flood risk, ensures that detailed designs and plans for development take due account of flood risk and the need for appropriate mitigation, if required.

4.2 The Sequential and Exception Tests

The NPPF identifies four Flood Zone classifications, detailed in Table 1 below.

Table 1: Flood Zones (Source: PPG, Table 1)

Flood Zone	Definition
Zone 1 – Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Zone 2 – Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a – High Probability	Land having a greater than 1 in 100 annual probability of river flooding; or land having a greater than 1 in 200 annual probability of sea flooding.
Zone 3b – The Functional Floodplain	Land where water flows or is stored in times of flood.

The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The NPPF provides guidance on the compatibility of each land use classification in relation to each of the Flood Zones, as summarised in Table 2.

Table 2: Flood Risk Vulnerability and Flood Zone Compatibility (Source: PPG Table 3)

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
Zone 3b	Exception Test required	✓	✗	✗	✗
Key:	✓ Development is appropriate		✗ Development should not be permitted		

When the Exception Test is triggered, this requires the development proposals to demonstrate wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

The Site has been assessed against the NPPF planning tests in Section 6 of this report.

5 FLOOD RISK SOURCES AND FLOODING HISTORY

5.1 Overview

In line with best practice, flood risk from the range of possible sources listed in Table 3 has been considered.

Table 3: Potential Sources of Flooding

Source of Flooding	Description
1. Flooding from rivers (Fluvial)	Floodwater originating from a nearby watercourse when the amount of water exceeds the channel capacity of that watercourse
2. Flooding from land (Surface Water)	Flooding caused by intense rainfall exceeding the available infiltration and/or drainage capacity of the ground
3. Flooding from groundwater	Flooding caused when groundwater levels rise above ground level following prolonged rainfall
4. Flooding from reservoirs, canals and other artificial sources	Failure of infrastructure that retains or transmits water or controls its flow

5.2 Historical Flooding

Consultation with the EA identified no records of historic flooding affecting the Site.

The MLBC PFRA *Surface Water Flooding Incidents and Fluvial Flooding Incidents* map identifies one surface water flooding incident at the Site and two flood outlines within the local area (located on High Street Collier's Wood, approximately 130m north of the Site, and on South Gardens and Colwood Gardens, approximately 150m south of the Site). The MLBC Level 1 SFRA dates these events to 20th July 2007, where intense periods of rainfall (with 50.8mm of rainfall record in 24 hours) caused flash flooding and the capacity of drainage systems was exceeded across the Borough.

Consultation with the MLBC and review of published documentation identified no historical incidences of fluvial or sewer flooding affecting the Site.

The Site does not benefit from any installed flood defences.

5.3 Flooding from Rivers

The EA *Flood Map for Planning* (Figure 3), confirmed via consultation with the EA, identifies the Site within Flood Zone 2, medium flood risk (land having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of flooding) from rivers. This risk is associated with the River Wandle and the culverted tributary of the River Graveney.

EA modelled flood water data predicts fluvial flood levels around the Site of up to 12.26 mAOD during the 1 in 100 (1%) storm, 12.57 mAOD for a 1 in 100 plus climate change (1%+CC) storm and 12.76 mAOD for a 1 in 1,000 (0.1%) storm. Comparison of modelled flood levels and topography indicates that the Site would be subject to inundation during all three of these events, with flood levels of up to 0.66m in the extreme (0.1%) event.

The EA *Flood Map for Planning*, does not illustrate flood risk from non-Main River sources (ordinary watercourses). However, there are no ordinary watercourses in proximity to the Site, therefore flood risk from this source is considered Negligible.

Overall, it is considered the Site is at medium risk of fluvial flooding.

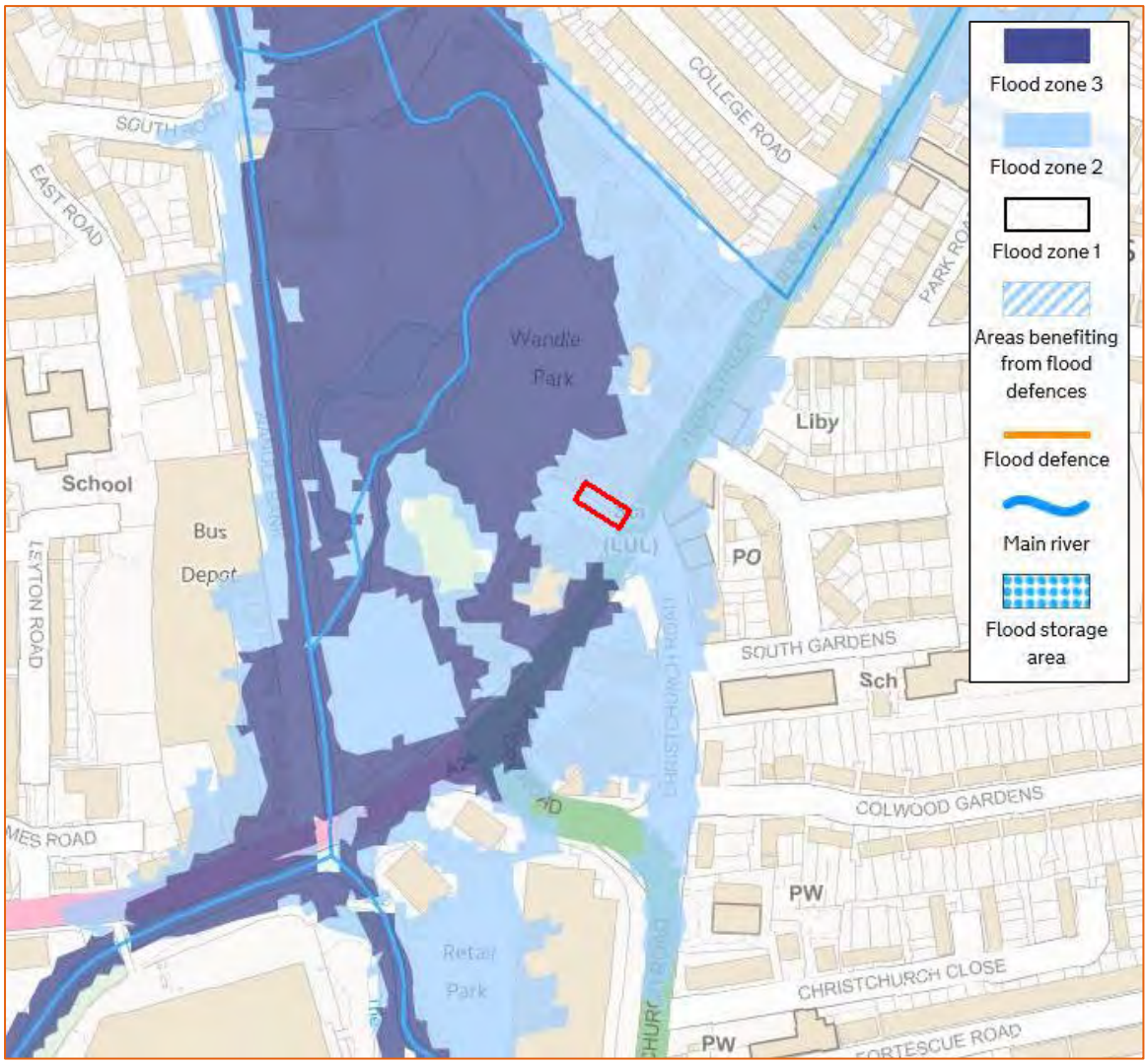


Figure 3: EA Flood Map for Planning, Site Boundary Outlined in Red
Contains EA data © Crown copyright and database right 2017. All rights reserved.

5.4 Flooding from Surface Water

The EA *Risk of Flooding from Surface Water* map (Figure 4) identifies most of the Site as having a very low risk (less than 1 in 1,000 (0.1%) annual probability) of surface water flooding. A small proportion of the eastern extent of the Site, neighbouring High Street Collier's Wood, has a low risk (between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability) of flooding from this source.

It is considered that the overall risk of flooding from surface water is low.

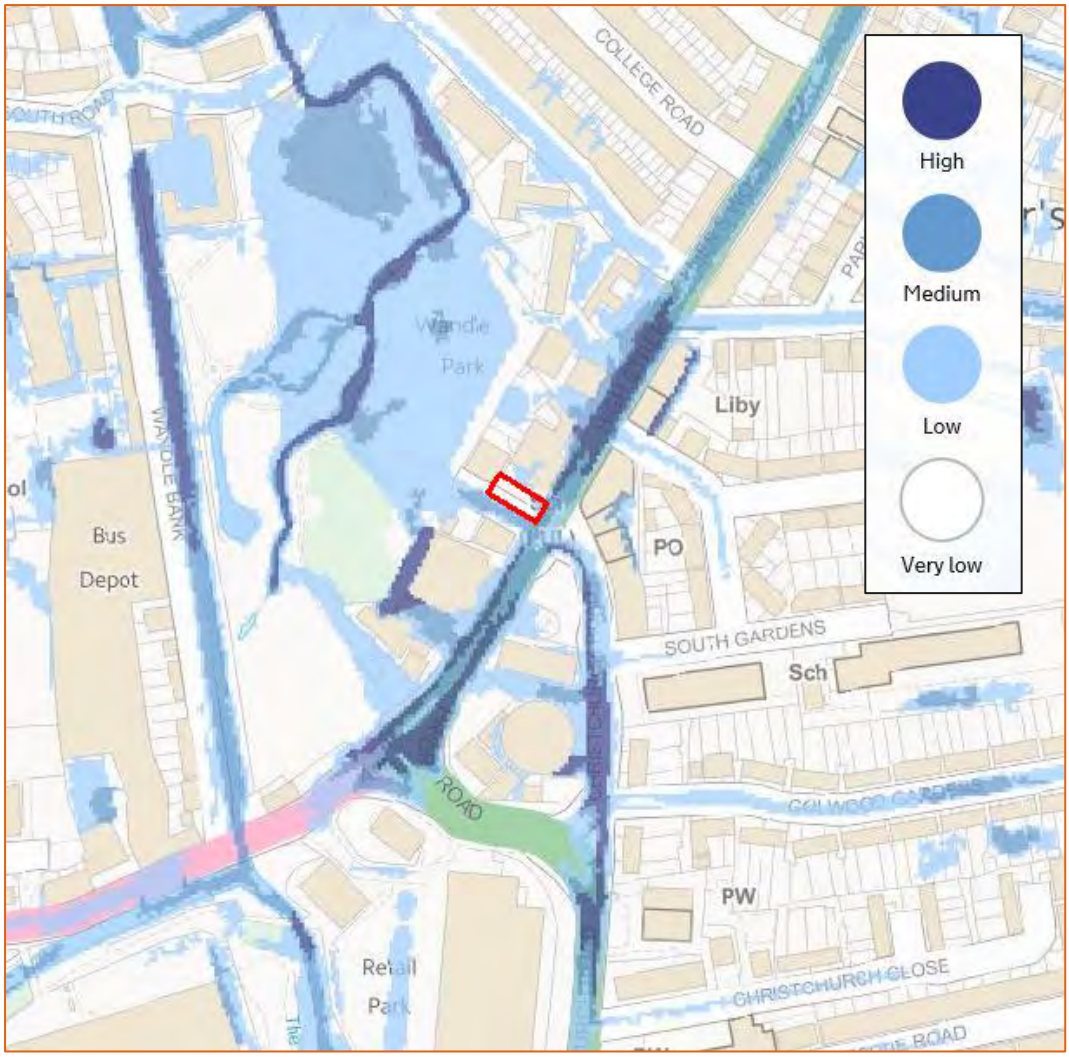


Figure 4: EA Risk of Flooding from Surface Water, site boundary outlined in red.
Contains EA data © Crown copyright and database right 2017. All rights reserved.

5.5 Flooding from Groundwater

The MLBC LFRMS *Flood Risk from Groundwater* map identifies the Site within an area having *'potential for groundwater flooding to occur at surface',* linked to the underlying Secondary A superficial aquifer and soils with naturally high groundwater levels. Water levels in the aquifer may have hydraulic connectivity with the River Wandle, which could cause localised flooding if river levels were high for prolonged periods. The MLBC *Level 1 Strategic Flood Risk Assessment* identifies 34 records of groundwater flooding within the Borough, however the *Groundwater Flooding Records* map identifies that none of these incidences were near the Site.

The overall risk of flooding from groundwater sources is low.

5.6 Flooding from Artificial Sources and Sewers

There are no significant bodies of water (lakes, reservoirs or canals), retained above natural ground level upstream of the Site. The EA *Risk of Flooding from Reservoirs* map indicates that the Site is not at risk from reservoir flooding.

The overall risk of flooding from artificial sources is low.

The LMBC Level 1 SFRA states that the Collier's Wood area is known to experience sewer flooding during heavy rainfall, however the LMBC PFRA *Sewer Flooding Incidences* map records no incidences of sewer flooding affecting the Site.

Overall, it is considered that the risk of flooding from sewers is low.

6 RISK RATING & RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

Following the assessment of flooding to the Site from all likely sources, it is considered that there is a **Medium** risk of flooding to the Site from main rivers and a **Low** risk of flooding from surface water, groundwater and artificial sources, including sewers, as summarised in Table 4.

Table 4: Flood Risk Sources

Source of Flooding	Flood Risk
1. Flooding from rivers (Fluvial)	Medium
2. Flooding from land (Surface Water)	Low
3. Flooding from groundwater	Low
4. Flooding from reservoirs, canals, sewers and other artificial sources	Low

The EA *Flood Map for Planning* identifies the Site as within Flood Zone 2. Following the NPPF guidance, the Site would be suitable for all development types, but triggering the requirement for application of the Exception Test for '*Highly Vulnerable'* developments (which includes emergency services stations and command centres; basement dwellings; caravans, mobile homes and park homes intended for permanent use; and installations requiring hazardous substance consent). Use for '*More Vulnerable'* development, including residential land use, is appropriate in this Flood Zone in accordance with the NPPF, subject to satisfaction of the Sequential Test, which steers new development to Flood Zone 1. A Flood Risk Assessment (FRA) would need to be prepared in support of a planning application for any development on the Site.

The FRA would be a more detailed assessment than is presented in this Flood Risk Review and would need to be specific to the type and layout/configuration of development that is proposed. The FRA should demonstrate that the proposed development would not be subject to an unreasonable risk of flooding and that developing the Site would not subsequently increase flood risk to third parties. EA modelled flood data indicates maximum flood depths on Site of up to 0.66m during the extreme flood event. Further investigation, via the FRA, would therefore be required to demonstrate how the Site can be developed safely, identifying necessary design measures to provide adequate protection in these flood scenarios, without increasing flood risk to third parties.

It is considered that there is a low risk of surface water flooding, however there is a known history of surface water flooding in areas local to the Site. Surface water drainage and runoff from the Site should be further investigated and it should be ensured that drainage is managed to a high standard. Current rainfall-runoff rates and volumes, as well as greenfield runoff rates for the Site should be calculated. A Drainage Strategy should then be developed, in consultation with the Lead Local Flood Authority and Thames Water, which should detail methods, including the use of Sustainable Drainage Systems (SuDS) to manage site runoff, which would ideally be controlled to match greenfield rates.

Subject to production of an FRA and Drainage Strategy and the implementation of the flood resilience recommendations from these studies, it is considered that flood risk would not limit any form of development on the Site.

7 REFERENCES

1. Her Majesty's Stationary Office, 2017. Open Government License, LiDAR Composite Digital Terrain Model (DTM) 2m spatial resolution. Accessed May 2017, via http://environment.data.gov.uk/ds/survey/
2. Centre for Ecology and Hydrology, 2017. Flood Estimation Handbook (FEH) Web-Service. Accessed May 2017 via: https://fehweb.ceh.ac.uk/GB/map
3. Cranfield Soil and Agrifood Institute University, 2017. Soilscapes Viewer. http://www.landis.org.uk/soilscapes/
4. British Geological Survey, 2017. Geology of Britain viewer. Accessed May 2017 via: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
5. Environment Agency, 2017. What's In Your Backyard? Groundwater map. Accessed May 2017 via: http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683&y=355134&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=groundwate
6. Environment Agency, 2017. Long term flood risk information. Accessed May 2017 via https://flood-warning-information.service.gov.uk/long-term-flood-risk/
7. Environment Agency, 2017. Flood Map for Planning. Accessed May 2017 via https://flood-map-for-planning.service.gov.uk/
8. AECOM, 2015. London Boroughs of Croydon, Merton, Sutton and Wandsworth Level 1 Strategic Flood Risk Assessment
9. AECOM, 2017. London Borough of Merton Level 2 Strategic Flood Risk Assessment
10. Capita URS, 2014. London Borough of Merton Local Flood Risk Management Strategy
11. URS Scott Wilson, 2011. London Borough of Merton Preliminary Flood Risk Assessment
12. Greater London Authority, 2011. Surface Water Management Plan for the London Borough of Merton
13. Department for Communities and Local Government, 2012. National Planning Policy Framework
14. Department for Communities and Local Government, 2014. Planning Practice Guide: Flood Risk and Coastal Change

Arcadis

Arcadis House
34 York Way
London N1 9AB
United Kingdom

T: +44 (0)20 7812 2000

arcadis.com

ARCADIS Design & Consultancy for natural and built assets

TFL_PSF_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE
SITE OPPOSITE COLLIERS WOOD STATION, MERTON, SW19 2BN

Site Ref. 2546

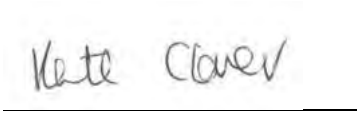
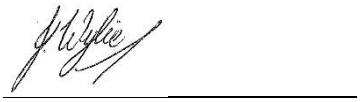
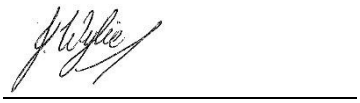
Archaeology Desktop Review

OCTOBER 2017

Incorporating
EC HARRIS BUILT ASSET CONSULTANCY
Hyder

Site Opposite Colliers Wood Station, Merton, SW19 2BN

Archaeology Desktop Review

Author	Kate Clover	
Checker	Jenny Wylie	
Approver	Jenny Wylie	
Report No	303-UA009686-UE21R-05	
Date	OCTOBER 2017	

VERSION CONTROL

Version	Date	Author	Changes
001	31/5/2017	Kate Clover	
002	1/6/2017	Kate Clover	Review comments
003	6/6/2017	Kate Clover	Review comments
004	21/6/2017	Kate Clover	Summary added and TfL's amendments
005	2/10/2017	Kate Clover	Final Issue

CONTENTS

FIGURES

1 INTRODUCTION

1.1 Background

Arcadis Consulting (UK) Limited (Arcadis) has been commissioned by Transport for London (TfL) 'the Client' to undertake a number of technical surveys for a Site opposite Colliers Wood Station, Merton ('the Site').

TfL is aiming to divest a number of small sites to enable prospective regeneration. The objective of this archaeology desktop review is to identify potential development constraints due to archaeology conditions on the Site.

1.2 Scope of Works

The scope of the review is to carry out a desktop search of publicly available information on designated and un-designated heritage assets within a study area of 500m of the Site boundary. Using this information, a brief assessment of potential heritage/archaeological constraints and opportunities at the Site has been made, focusing on key constraints. The review also highlights when a Site should be subject to further detailed assessment (i.e. additional scope) to support a planning application for any future development.

1.3 Limitations

This report has been prepared for TfL in accordance with the terms and conditions of appointment. Arcadis cannot accept any responsibility for any use of or reliance on the contents of this report by any third party. The copyright of this document, including the electronic format shall remain the property of Arcadis.

This report has been compiled from a number of sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time. Consequently, there is a potential for further information to become available, which may change this report's conclusion and for which Arcadis cannot be responsible.

2 SITE OVERVIEW

The Site is located on the High Street, Colliers Wood, opposite Colliers Wood Underground Station, in the London Borough of Merton (NGR 526759 170363). The rectangular piece of land covers an area of 0.02 ha and is currently a carpark. To the north-west is Oslo Court and to the rear of these flats lies Wandle Park. To the south-west is Baltic Close, to the north-east is 192 High Street and to the south-east are advertising hoardings fronting the High Street.

3 DATA SOURCES

Records for the Site and a 500m study area were examined. Data was obtained for designated heritage assets from the Heritage List for England on 29th May 2017 and for un-designated heritage assets and Archaeology Priority Areas (APA) from the Greater London Historic Environment Record (GLHER) on the 19th May 2017. Information of Conservation Areas and Locally Listed Buildings was obtained from Merton Council's website and details on other designations was obtained from the Defra's MAGIC website (http://www.magic.gov.uk/MagicMap.aspx).

Numbers in brackets in the text are unique identifiers assigned to heritage assets for the purposes of this report. A list of all heritage assets including archaeological events can be found on Tables 1 and 2. All heritage assets and APAs are shown on Figure 1.

4 BASELINE CONDITIONS

4.1 Designated Heritage Assets

There are no Scheduled Monuments within the Site boundary however there is one within the study area; the Augustinian Priory of St Mary at Merton which is located 0.4km to the south-west of the Site (1). There are eight Listed Buildings within the study area, all Grade II, but none within the Site boundary. One Listed Building - Colliers Wood Train Station - is located opposite the Site (Table 1). There are no Registered Parks and Gardens within the study area.

The Site lies within The Wandle Valley Conservation Area as defined by Merton Council. A brief history of the Wandle Valley is included in the Conservation Area Character Appraisal (http://www.merton.gov.uk/sub_area_2_appraisal.pdf). This area had formed a particular focus for riverside industry from at least the medieval period onwards, with several corn mills being located along this stretch of the river during that period. This type of industry was supplanted in the post-medieval period by textile working, initially cloth fulling, and calico bleaching and subsequently textile printing particularly at the works of Arthur Liberty and of William Morris. Flour milling continued at the Merton Mill until the 1st World War. It is also the site of a historic river crossing over the Wandle. The Colliers Wood High Street, roughly follows the route of the Roman Road, Stane Street. The north-west corner of Wandle Park once formed part of the grounds of Wandlebank House to which Wandle Lodge, a 19th Century building, provides a surviving link.

There are no Locally Listed Buildings within the Site confines however there are several within the study area. A comprehensive list is not available online or from the GLHER, however The Wandle Valley Conservation Area Character Appraisal does show the Locally Listed Buildings which are in close proximity to the Site. Nos. 180-182 High Street, Colliers Wood (Royal Standard Public House) as well as No. 220 (Millers Mead) and 222 (Royal Six Bells Public House) are all on the Local List. On Wandle Bank, Connolly's Mill (now known as Nos. 37 to 50 Kendall Court) is on the Local List as well as a stone sculpture near Wandle Bank footbridge (near Bygrove Road).

There are four APAs within the Study Area; Lavender Park, Merton Priory, Stane Street and Wandle Valley/Colliers Wood. The Site lies within the Wandle Valley/Colliers Wood APA which follows the course of the Wandle River between the railway line at the northern edge of Wandle Meadow Nature Park and Morden Hall Park. It is classified as Tier 2 because it is an area of historic industry and also because of the concentration of earlier sites around the crossing point of Stane Street over the Wandle. Remains of the Priory's outer precincts may be located within the APA. The Site also lies on the boundary of the Stane Street APA, formed of an area flanking Stane Street Roman Road which follows the line of the High Street at this location. It has been classified as a Tier 2 APA because of the potential to reveal elements of the road itself or of roadside activity and settlement. Whilst APAs do not receive statutory protection they have been identified in the Council's local plan as areas where potential for below-ground archaeological remains to survive is high and where archaeological investigations are therefore likely to be required. Historic England's website provides more information about APAs and the different levels of sensitivity to development (https://www.historicengland.org.uk/services-skills/our-planning-services/greater-london-archaeology-advisory-service/greater-london-archaeological-priority-areas/).

4.2 Un-designated Heritage Assets

There are 50 un-designated heritage assets although none within the Site boundary (Table 2). The area has been actively investigated, with 28 'events' or archaeological investigations recorded as carried out within the study area, including trial trench evaluations, watching briefs and excavations.

Prehistoric palaeo-channels were recorded during an evaluation in 1997 on the High Street, Colliers Wood (12). These formed part of a braided system of the River Pickle/Wandle, and confirmed that this area has been marshy and low-lying since at least the prehistoric period. Despite its waterlogged character the area was utilised by prehistoric groups as evidenced by a findspot of three prehistoric handaxes found in Priory grounds (13). Bronze Age agricultural features have been recorded by archaeological excavations along Western Road, Merton (14).

The Site lies adjacent to the Roman road Stane Street which ran from London to Chichester (16) and follows the line of the High Street in Colliers Wood. The area flanking the Roman road has been prioritised as an APA. Excavations (15) have revealed the road surface and accompanying drainage ditches and earthen banks to the road, which may have passed through a ford over the River Wandle just to the south-west. Some Roman sherds were found in the excavations of the priory chapter house and Roman building material was found in a medieval bridge over the river.

Previous courses of the River Wandle in medieval period have been mapped (29, 38 and 46). Merton High Street and the surrounding area was prone to flooding and medieval and post-medieval flooding deposits have been recorded here (11,19).

Merton Priory (1 and 41), sometimes referred to as Merton Abbey, was one of the largest in the country. Situated by the River Wandle and built across the line of Stane Street it was founded in 1117 for Augustinian canons. Now largely demolished, remains of a cloister (23), church (24), chapter house (25) and infirmary (22) have been found by excavation. A monastic textile mill (28), fishponds (39), drains and cemetery (26) have also been recorded. The River attracted industries such as iron working (27) and corn milling (50) from the medieval period.

During the 17th and 18th centuries, the ruins of the sacked priory were gradually replaced by mills as heavy textile industry developed along the River Wandle. A Calico Factory was established in 1724 within Merton Priory grounds (46, 48) and some traces of the industry dating to the 18th and 19th century were recorded during an evaluation on Colliers Wood High Street in 1997 (51). 18th century or earlier copper mills were sited at the north-eastern corner of the Priory (49) and a leather working industry was established on Wandle Bank (53). 19th century watercress beds are marked on historic maps on Colliers Wood High Street and have been detected by evaluation (56).

The Site of the late 18th century Wandlebank House (54) lies to the north-west and Wandle Park was formed from its grounds and opened to the public in 1907.

Historic OS maps show that the Site itself was occupied by one of a row of houses with narrow garden plots from the early 1870s or earlier. These were demolished at some point before 1935.

Table 1: Designated Heritage Assets (Scheduled Monument and Listed Buildings)

ID Number	Grade	Asset Name	NGR	GLHER Number
1		**Scheduled Monument** - Augustinian Priory of St Mary at Merton, founded 1117. This large site included the church with Lady Chapel, cloister and associated ranges, including a probable infirmary complex, possible royal lodgings and outbuildings.	TQ 2641 6976	MLO10782 and DLO13263
Listed Buildings				
2	II	13 Wandle Bank. Row of houses, early-mid 19th century.	TQ 26581 70265	DLO25499 and MLO90528
3	II	70 Christchurch Road, mid 19th century house.	TQ 26811 70076	MLO90466 and DLO25437
4	II	Colliers Wood London Regional Transport Station, 1926.	TQ 26798 70369	MLO90446 and DLO25417
5	II	Drinking fountain in Wandle Park about 5 yards to north of southern entrance, 1907.	TQ 26750 70458	MLO90495 and DLO25466
6	II	Portion of wall on the west side of river pickle between merton high street and merantun way, medieval part of precinct wall to Merton Priory.	TQ 26657 70041	MLO90560 and DLO25543

ID Number	Grade	Asset Name	NGR	GLHER Number
7	II	Singlegate School, 1897 and undated gatepiers, Christchurch Road.	TQ 26853 70270	MLO86140 and DLO25510
8	II	16 Wandle Bank, Colliers Wood, cottage, 1840.	TQ 26574 70303	MLO90391 and DLO25362
9	II	17 Wandle Bank, Colliers Wood, cottage, 1840.	TQ 26573 70307	MLO103060 and DLO25362

Table 2: Un-Designated Heritage Assets

ID Number	Asset Name	NGR	Description	GLHER Number
10	Byegrove Road, Collier's Wood	526624 170594	Flood deposit, peat.	MLO67730
11	Holmes Road, Wimbledon	526435 170198	A sequence of flood deposits associated with the River Wandle were found during a watching brief carried out by the Museum of London Archaeology Service in 1994.	MLO66142
12	High Street Colliers Wood, [Retail Park], Merton	526728 170036	Prehistoric palaeo-channels were recorded during an evaluation in 1997. These formed part of a braided system of the River Pickle/Wandle, and confirmed that this area has been marshy and low-lying since at least the prehistoric period.	MLO71555
13	Station Road area	526750 170150	Prehistoric axe.	MLO484
14	Western Road, [Former Kings College Sports Ground), Merton	527130 169980	Middle Bronze Age to Late Bronze Age agricultural features were identified through excavation by the Department of Greater London Archaeology in 1989. Part of a possible Banjo enclosure, three linear ditches and a pit were recorded.	MLO22508
15	High Street Colliers Wood, [Retail Park], Merton	526650 170160	Excavations in 1997-1999 revealed extensive remains of part of Stane Street Roman Road. This included the road surface, and accompanying drainage ditches and earthen banks. The road may also have passed through a ford in this area.	MLO71558
16	High Street Colliers Wood, Merton	527026 170803 to 525698 168652	Route of the Roman road Stane Street.	MLO71557
17	Station Road	526525 169925	Findspot of Roman pottery.	MLO70941
18	Station Road	526700 170201	Roman ditch.	MLO57231
19	Merton High Street	526550 170370	Medieval flood deposit, surface 1485 AD to 1600 AD.	MLO22515
20	Merton High Street	526550 170370	Medieval ditch, post hole, stake hole.	MLO22514
21	Station Road	526605 169955	Medieval surface.	MLO28196
22	Station Road	526605 169955	Infirmary to Merton Priory, Medieval.	MLO28201
23	Station Road	526605	Cloister to Merton Priory, Medieval.	MLO28205

ID Number	Asset Name	NGR	Description	GLHER Number
		169955		
24	Station Road	526605 169955	Church to Merton Priory, Medieval.	MLO28210
25	Station Road	526605 169955	Chapter House to Merton Priory, Medieval.	MLO28211
26	Merantum Way, [Savacentre], Merton	526544 169937	Medieval cemetery to Merton Priory. Evaluations in 2006 showed that the area under the petrol station has been extensively truncated.	MLO28208
27	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the river Wandle & Merantun Way)	526470 169830	Medieval ironworking site. An archaeological evaluation carried out by MOLAS 2003. The remains of a medieval road, and ditches were recorded, as was a layer of burnt brickearth containing iron working remains.	MLO97926
28	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526530 169840	Medieval mill. An archaeological evaluation carried out by MOLAS 2003.The evaluation revealed a 12th-13th century mill believed to belong to Merton Priory.	MLO97927
29	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526440 169725	Previous river course found by an archaeological evaluation carried out by MOLAS 2004.	MLO97928
30	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526440 169725	Medieval post, wall, floor, iron working site, foundation, road, drain, ditch found by an archaeological evaluation carried out MOLAS 2003-2004.	MLO97929
31	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526520 169840	Medieval building, head race, tail race, furnace, tank, cellar found by an archaeological excavation carried out by MOLAS 2002.	MLO97930
32	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526520 169840	Medieval fishpond, drain and ditch found by an archaeological excavation carried out by MOLAS 2003.	MLO97931
33	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526520 169840	An archaeological excavation carried out by MOLAS in 2004.recorded the foundations of a number of medieval buildings, river channels, a potential bridge abutment, and a medieval trackway.	MLO97932
34	Merantun Way, [Savacentre], Merton/Colliers Wood	526581 169978	A medieval wall foundation was uncovered during a watching brief by Lindsey Archaeological Services in 2005 to 2008, when excavations were occurring within the area of the Priory.	MLO100503
35	Mill Road/Merton High Street, Merton	526429 170098	A medieval pit and a linear ditch were found through excavation at Mill Road and Merton High Street, by MOLAS in 1992.	MLO59006
36	Colliers Wood [land bordered by Bennett's Ditch, River Wandle and	526520 169840	Wall foundations of unknown to 16th Century date found during an archaeological watching brief by MOLAS in2004.	MLO98140

ID Number	Asset Name	NGR	Description	GLHER Number
	Merantun Way], Merton			
37	Station Road (former allotment area)	526650 170050	Medieval road.	MLO553
38	Merantum Way, [Merton Abbey Mills], Merton,	526562 169808	A palaeochannel, the former route of the medieval channel of the River Wandle, identified during geophysical and geotechnical works in 1999.	MLO77184
39	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526520 169829	An archaeological excavation carried out by MOLAS in 2003 revealed two medieval fish ponds and east-west aligned overflow drain.	MLO97931
40	Colliers Wood, 2CW (Land bordered by Bennett's Ditch, the River Wandle & Merantun Way)	526520 169829	An archaeological excavation carried out by MOLAS in 2004.revealed the foundations of a number of medieval buildings, river channels, a potential bridge abutment, and a medieval trackway.	MLO97933
41	Merton High Street to Liberty Avenue,	526411 169768	Site of the precinct of the medieval Merton Priory.	MLO10782
42	Merantun Way, [Savacentre], Merton/Colliers Wood	526497 169985	A possible 16th century demolition layer was uncovered during a watching brief by Lindsey Archaeological Services in 2008.	MLO100502
43	Wandle Park, Merton	526658 170296	An infilled 18th century mill pond was identified in a test pit during a watching brief undertaken in Wandle Park by MOLAS in 1995.	MLO62589
44	Merton High Street	526605 170205	Post-medieval bridge.	MLO72055
45	Merantun Way, [Savacentre], Merton/Colliers Wood	526498 169985	The foundations and demolition debris of 19th to 20th century buildings were uncovered during a watching brief by Lindsey Archaeological Services in 2005-2008.	MLO100501
46	Bennett's Ditch/River Wandle/Merantun Way,	526638 169911	A number of 18th century calico trenches were found through excavation by MOLAS in 2001.	MLO77191
47	Merantun Way/Bennett's Ditch	526615 169872	Ditches, a demolition layer and an alluvial deposit dated to the 17th century were recorded during an evaluation in 2001.	MLO76138
48	Mill Road/Merton High Street	526429 170098	16th Century to 19th Century buildings and other features including cess pit, drain, well, soakaway, ditch, cellar, calico mill? Found through excavation by MOLAS in 1992.	MLO59005
49	Merantum Way, [Savacentre], Merton,	526517 170112	Site of a copper mill thought to have been established before 1719. Copper mills continued on this site until around the late 19th century.	MLO513
50	Wandle Bank	526568 170554	A corn mill was located in the vicinity of Wandle Bank, from the late 13th century. The timber building was rebuilt in brick in the late 18th century. In the 1920s the site became a currying works for the Connolly brothers leather, manufacturers	MLO529

ID Number	Asset Name	NGR	Description	GLHER Number
51	High Street Colliers Wood, [Retail Park], Merton	526653 170156	Some traces of the calico industry dating to the 18th and 19th century were recorded during an evaluation in 1997. This included a possible ditch or channel.	MLO71559
52	Merantum Way, [Savacentre], Merton,	526528 170097	A layer of demolition deposits, probably Victorian in date, was recorded here during an evaluation in 2005.	MLO99465
53	Wandle Bank	526522 170627	The remains of 19th century buildings, possibly associated with an early phase of the Connolly Leather Works and with the 19th century Wandlebank Villa, were found through excavation at Wandle Bank by Thames Valley Archaeological Service in 1.	MLO100837
54	Wandle Bank	526599 170516	The remains of an 18th century building associated with Wandlebank House were found through excavation by MOLAS in 1993.	MLO58883
55	Merantum Way, [Savacentre], Merton	526535 170082	This is the site of a board mill known to have been in operation at least between 1933 and 1986. It had a railway sidings to a now demolished railway line, and ran on the River Wandle.	MLO515
56	High Street Colliers Wood, [Retail Park], Merton,	526723 170132	Site of watercress beds seen on OS maps of the period. In 2007 an evaluation recorded a clayey silt layer thought to be associated with this use.	MLO71904
57	Wandle Bank, [Connolly Leather Works (Southern Area)], Wimbledon:	526517 170510	A 19th century water feature, probably a lake associated with the ornamental garden of Wandlebank House, was recorded through excavation at the Connolly Leather Works, Wimbledon, by Thames Valley Archaeological Services in 1999.	MLO74162
58	Holmes Road, Wimbledon {19th century	526435 170198	A late 19th century foundation bedding deposit was identified during a watching brief at Holmes Road, Wimbledon, by MOLAS in 1994.	MLO66143
59	Merton High Street	526510 170410	Findspot of undated pottery.	MLO22516
Events				
60	Merantun Way, Bennett's Ditch and River Wandle, [Land bordered - 2CW]	526573 169824	Excavations and Watching Briefs.	ELO6330
61	Merantum Way, Bennett's Ditch and River Wandle, [Land bordered - 2CW],	526564 169903	Watching Brief.	ELO6287
62	Merantun Way, Bennett's Ditch and River Wandle, [Land bordered - 2CW],	526647 169901	Excavation and Evaluation.	ELO6289

ID Number	Asset Name	NGR	Description	GLHER Number
63	Merantum Way, (Merton Abbey Mills and Savacentre sites), Merton,	526678 169945	Excavation.	ELO4065
64	Merantum Way, (Savacentre - Petrol Station), Merton,	526472 169950	Evaluation and Watching Brief.	ELO7119
65	High Street (No 125), Colliers Wood, Merton, SW19:	526774 170315	Evaluation.	ELO13114
66	Merantun Way, [Savacentre] Merton/Collierswood:	526547 170016	Watching Brief.	ELO7954
67	Wandle Bank, [Connolly Leather Works (Southern Area)], Wimbledon:	526504 170513	Evaluation.	ELO3046
68	Merantum Way, (Merton Savacentre), Merton	526528 170097	Evaluation.	ELO7953
69	Wandle Bank, [Connolly's Leather Site C], Wimbledon:	526593 170556	Evaluation.	ELO9999
70	Mill Road and Merton High Street, Merton	526429 170098	Evaluation.	ELO9993
71	High Street Colliers Wood, Christchurch Road, Priory Road, River Pickle, (Area bounded by)	526728 170036	Evaluation.	ELO2951
72	High Street Colliers Wood, Christchurch Road, Priory Road, River Pickle, (Area bounded by),	526673 170189	Excavation.	ELO8848
73	Merantun Way, Bennett's Ditch and River Wandle, [Land bordered by],	526629 169896	Trial Trenching Evaluation.	ELO636
74	Merantum Way, [Savacentre], Merton/Collierswood,	526622 170140	Evaluation and Watching Brief.	ELO8846
75	Merantum Way, (Merton Abbey Mills and Savacentre sites), Merton,	526578 169916	Excavation.	ELO4065
76	Mill Road and Merton High Street, Merton	526417 170122	Evaluation.	ELO9993
77	Merantum Way, Bennett's Ditch and River Wandle, [Land Bounded by]:	526548 169834	Geophysical Survey.	ELO635
78	Christchurch Road, [Tandem Works], Colliers Wood:	526991 169938	Evaluation.	ELO3009
79	Western Road, [Former Kings	527296 169930	Evaluation.	ELO3770

ID Number	Asset Name	NGR	Description	GLHER Number
	College Sports Ground], Merton			
80	High Street Colliers Wood, Christchurch Road, Priory Road, River Pickle, [Area bounded by]	526730 170253	Watching Brief.	ELO8849
81	Merantum Way, (Merton Abbey Mills), Merton,	526556 169909	Evaluation.	ELO4063
82	Merantum Way (Merton Priory and Savacentre site), Merton	526615 169938	Excavation.	ELO4066
83	Merantum Way, (Merton Abbey Mills), Merton	526594 169906	Evaluation.	ELO4064
84	Merantum Way, Bennett's Ditch and the River Wandle, [Land bordered by]	526706 169911	Watching Brief.	ELO884
85	High Street Colliers Wood, Christchurch Road, Priory Road, River Pickle, (Area bounded by)	526730 170132	Evaluation.	ELO2951
86	Wandle Bank, [Connolly Leather Works - Northern Area], Wimbledon:	526462 170713	Evaluation.	ELO9996
87	Wandle Bank, [Connolly Leather Works - Central Area], Wimbledon:	526497 170672	Evaluation.	ELO9997
88	All Saints Road (No 55), Colliers Wood, Merton, SW19 1BU	526394 170451	Evaluation.	ELO13274
89	High Street (No 125), Colliers Wood, Merton	526765 170299	Evaluation.	ELO13196
90	Holmes Road, Wimbledon	526421 170207	Watching Brief.	ELO3614
91	Merantum Way, (Savacentre), Merton	526630 170000	Watching Brief.	ELO4047
92	Merton Bus Garage	526545 170369	Evaluation and Excavation.	ELO4049
93	Byegrove Road, Collier's Wood	526624 170594	Watching Brief.	ELO2922
94	Burge and Gunson	526955 170755	Watching Brief.	ELO3121
95	Wandle Park, Merton	526658 170296	Watching Brief.	ELO4859
96	1-11 High Street, Colliers Wood	527030 170736	Evaluation.	ELO6038
97	1-11 High Street, Colliers Wood	527028 170740	Watching Brief.	ELO6677
98	Merantun Way, [Former Merton Abbey Mills site], Merton	526602 170074	Watching Brief.	ELO10021

5 CONCLUSIONS

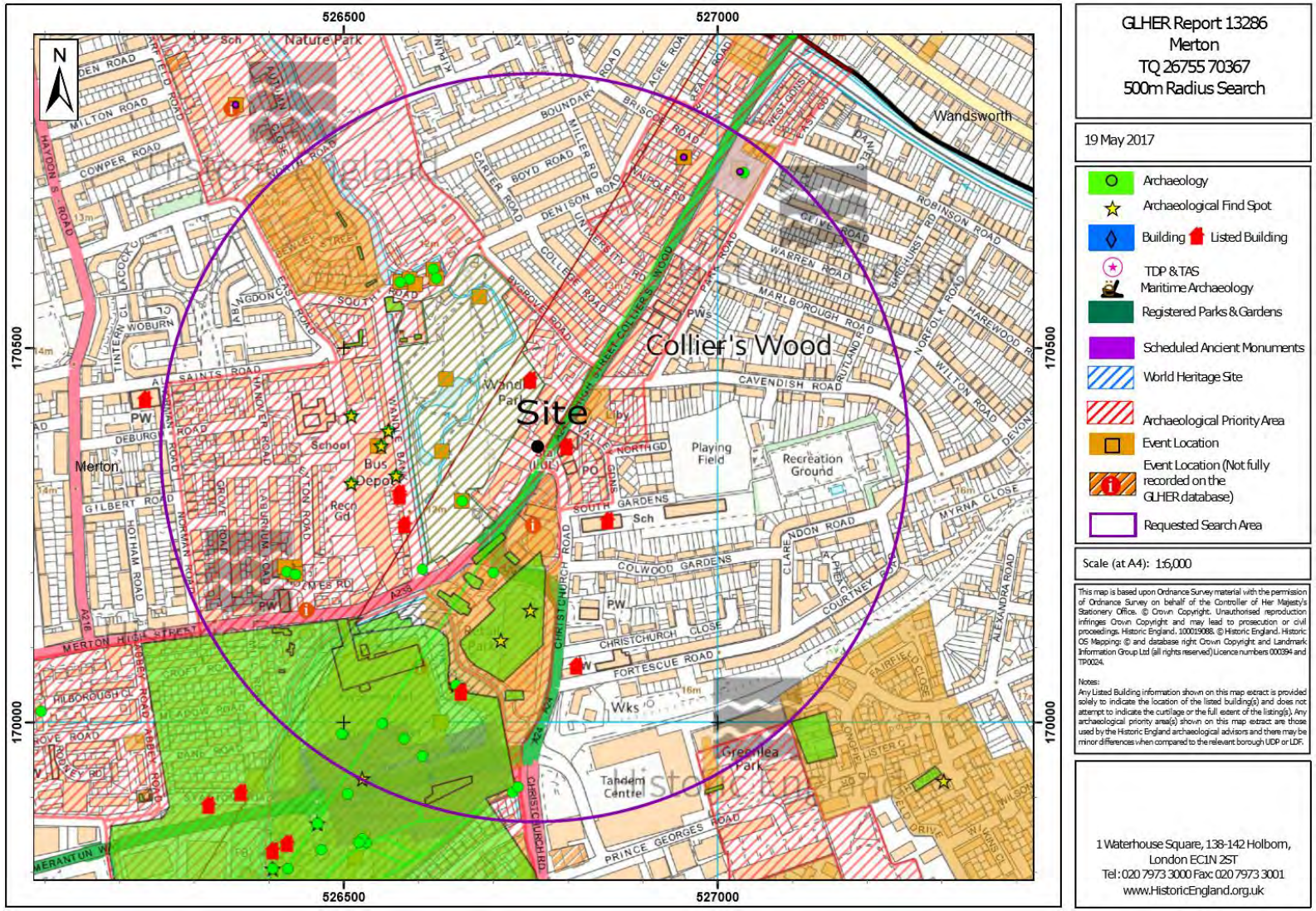
Although the Site has potential for buried archaeological remains to exist, these heritage assets are not considered likely to prevent development on the Site. The key heritage constraints to development are that the Site lies within the Wandle Valley/Colliers Wood APA. As such there is a medium potential for Roman remains including possible survival of the road surface of Stane Street and roadside activity such as drainage ditches. The location of the Site has attracted settlement and industry in the past, being located between a Roman thoroughfare and the River Wandle. There is a medium potential for medieval and post-medieval industrial activity to survive on the Site. The Site may contain deposits from previous courses of the River and past flooding events. Waterlogged remains could be present which may offer good potential for survival of organic remains.

There are no Scheduled Monuments within the Site. There are eight Listed Buildings within the study area, all Grade II, but none within the Site boundary. One Listed Building - Colliers Wood Train Station - is located opposite the Site. There are no Registered Parks and Gardens within the study area. The Site lies within The Wandle Valley Conservation Area.

For any future planning application, the potential for below ground remains needs to be fully evaluated The Greater London Archaeological Advisory Service (GLAAS) who advise the local planning authority are likely to recommend a full archaeological desk-based assessment and an evaluation to be undertaken prior to planning permission being determined. It is recommended that GLAAS are consulted at the earliest opportunity in order to clarify if any investigations such as trial trenching are required.

A full archaeological desk-based assessment would provide more information and a more detailed discussion of the Site and the potential impacts than is presented in this brief review. It would include a Site walkover, a visit to the record office to gather historic maps and relevant documentary evidence, a map regression exercise as well as preparation of distribution maps showing designated and un-designated heritage assets. The evaluation would likely consist of a programme of trial trenching and subsequent reporting. If heritage assets of significance are encountered during the evaluation stage, there may be a requirement for further recording in the form of an excavation or watching brief. This may be delivered through a post-determination condition.

FIGURES



GLHER Report 13286
Merton
TQ 26755 70367
500m Radius Search

19 May 2017

- Archaeology
- Archaeological Find Spot
- Building / Listed Building
- TDP & TAS
- Maritime Archaeology
- Registered Parks & Gardens
- Scheduled Ancient Monuments
- World Heritage Site
- Archaeological Priority Area
- Event Location
- Event Location (Not fully recorded on the GLHER database)
- Requested Search Area

Notes:
Any Listed Building information shown on this map extract is provided solely to indicate the location of the listed building(s) and does not attempt to indicate the curtilage or the full extent of the listing(s). Any archaeological priority area(s) shown on this map extract are those used by the Historic England archaeological advisors and there may be minor differences when compared to the relevant borough UDP or LDF.

1 Waterhouse Square, 138-142 Holborn,
London EC1N 2ST
Tel: 020 7973 3000 Fax: 020 7973 3001
www.HistoricEngland.org.uk

Figure 1: Designated and Un-Designated Heritage Assets within the Study Area

Arcadis (UK) Limited

Arcadis House
34 York Way
London N1 9AB
United Kingdom

T: +44 (0)20 7812 2000

arcadis.com

ARCADIS Design & Consultancy for natural and built assets

TFL_PSF_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE
SITE OPPOSITE COLLIERS WOOD STATION, MERTON, SW19 2BN

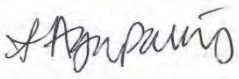
Site Ref. 2546

Preliminary Geotechnical and Geo-Environmental Report

NOVEMBER 2017

Incorporating
EC HARRIS BUILT ASSET CONSULTANCY
Hyder

Site Opposite Colliers Wood Station, Merton, SW19 2BN
Preliminary Geotechnical and Geo-Environmental Report

Author	Benedict Clarke / Jon Raven	
Checker	Tukhanh Agapakis	
Approver	Tony Windsor	
Report No	301-UA009686-UP32R-02	
Date	NOVEMBER 2017	

VERSION CONTROL

Version	Date	Author	Changes
01	10/07/2017	BC/JR	First issue
02	02/11/17		Final Issue

CONTENTS

APPENDICES

1 Introduction

1.1 Terms of Reference

Arcadis Consulting (UK) Limited (Arcadis) has been commissioned by Transport for London (TfL) 'the Client' to undertake a Geotechnical and Geo-environmental desk study report and limited site investigation for the Site Opposite Colliers Wood Station, Merton ('the Site').

TfL is aiming to divest a number of small sites to enable positive regeneration. The objective of this review is to identify any potential abnormal development costs due to geotechnical and geo-environmental conditions on the Site.

The objectives of this review are to:

- Review geo-environmental information regarding the Site and its surrounding area;
- Undertake a limited site investigation to obtain preliminary information relating to ground conditions with limited testing to inform the assessment of contamination issues and foundation constraints;
- Provide outline information on potential geo-environmental and geotechnical constraints which may impact on the land value or redevelopment potential for the Site; and
- Identify potential abnormal development constraints due to geotechnical and geo-environmental conditions on Site.

The Site location is shown in Figure 1 below.

Figure 1: Site Opposite Colliers Wood Station Location Plan provided by TfL

1.2 Sources of Information

As part of the desk study review, various sources of information have been used and are detailed below:

- The on-line British Geological Survey (BGS) 1:50 000 scale geological map comprising the Site (Ref. 1);
- Historical borehole records available through BGS website;
- Historical Ordnance Survey maps (included in Appendix A);
- Groundsure GeoInsight Report (Appendix B);
- The Environment Agency (EA) What's in Your Backyard Website (Ref. 2);
- Google maps (Ref. 3);
- Zetica Regional Unexploded Ordnance Map (Appendix C); and
- National Archives (www.bombsight.org – Ref. 4).

1.3 Limitations and Expectations

This report has been prepared for the Client in accordance with the terms and conditions of appointment. Arcadis cannot accept any responsibility for any use of or reliance on the contents of this report by any third party. The copyright of this document, including the electronic format shall remain the property of Arcadis.

This report has been compiled from a number of sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time. Consequently, there is a potential for further information to become available, which may change this report's conclusion and for which Arcadis cannot be responsible.

Ground conditions can only be inferred between test locations and as such localised conditions on site may vary. Furthermore, observations made at the time of investigations and during the monitoring visit may be subject to variation due to atmospheric, seasonal or other effects.

This report is based on a preliminary ground investigation and the purpose of which is to provide a preliminary indication of ground conditions and potential ground abnormals and enable an assessment of contamination issues and foundation constraints. Further development-specific ground investigation and risk assessment will be required.

It should be noted that the locations for undertaking the drilling works on the Site was subject to the following restrictions:

- A 20m stand-off on the eastern half of the site from London Underground assets as advised by London Underground; and
- Avoidance of buried services.

2 Site Setting and History

2.1 Site Location

Table 2.1 Details Relating to Site Location

Site Location / Address	Site Opposite Colliers Wood Station, Merton, London, SW19 2BN
National Grid Reference	526759,170363
Approximate Site Area	The Site is rectangular in shape covers an area of approximately 0.02 hectares.
Description of Site	The Site is a vacant parcel of land fronting onto High Street, Collier's Wood (A24). It is covered in hardstanding, predominantly bituminous bound material which appeared to be of generally good condition and is currently used as a car park for the underground station staff. The Site is secured with metal mesh security fencing to the south and east, to the west there is a brick wall with an apartment block beyond and to the north there is an estate agents office with first floor flats. Baltic Close to the south is block paved with planted borders and decorative metal structures. Access to the site is gained via Baltic Close where there are gates on the southern boundary.
Topography	Generally flat and level. Elevation is approximately 12m Above Ordnance Datum (AOD).
Surrounding Area	The Site is located on the High Street within a suburban area of South London, surrounded by a mix of residential, commercial, retail, public buildings and serviced by a London Underground Station (opposite the Site). The Site is bounded by the A24 to the east, Baltic Close to the south with a public house beyond, Oslo Court (apartment block) to the west and an estate agents office with first floor flats to the north.

2.2 Site History

A review of the available historical Ordnance Survey maps (Appendix A) has been undertaken to assess the historical development of the Site and surrounding areas.

It is not the intention of this report to provide a full history, but to identify those past uses on and within the vicinity of the Site that could have resulted in contamination of the soils and/or waters. Significant changes to the land use of the Site and surrounding areas are summarised in Table 2.2 below.

Table 2.2 History of Site and Surrounding Area

Date	Historical Development (Site and Surrounding Area)
1865-66	The Site and immediate surrounding area was developed with terraced housing and a road (current day High Street A24) adjacent to the east boundary. A stream running south to north is shown approximately 100m west and Copper Mills are recorded approximately 250m southwest of the Site. The map shows the Site being located within a small village of Merton with much of the village centred around the High Street.

Date	Historical Development (Site and Surrounding Area)
1894	No significant changes are noted within the Site. Further away, the surrounding residential area had expanded. A fire brigade station and smithy are shown opposite the Site on the eastern side of the A24. The terraced houses immediately to the south of the Site had been demolished and a road (later identified as Baltic Close) developed. Mill Ponds and watercress beds were recorded approximately 100m south/southwest and further away, a Sewage Works (approximately 210m north) had developed and Copper Mills (250m southwest) had become Merton Abbey (paper) Mills and Works.
1913 & 1919	A tramway had developed along the course of the High Street and the smithy opposite the site was no longer present. West of the Site was Wandle park, with two laundries approximately 100m southwest of the Site and two new schools approximately 100m to the southeast. Further away, the sewage works had reduced in size and much of the surrounding area continued to expand.
1934	The map shows the two terraced houses within the Site had been demolished by this time. The fire station is now referred to as a station. Tramlines are still shown on the High Street however it is not known whether these are still operational. A swimming baths (outdoor) had developed approximately 100m southwest. The watercress beds are no longer shown and an Omnibus depot had been established approximately 200m to the west with Wandle (leather) Mill approximately 200m northwest and Saw Mills approximately 250m south. Further expansion of the wider area is noted.
1950	The map shows a square demarcated 'feature' within the western part of the Site but it is not known whether it represents a new building or variation in hardstanding. Oslo Court had established adjacent to the western boundary and an engineering works and overhead power line and pylon are shown approximately 50m southwest. Collier's Wood Underground Station is now shown opposite the Site (at the former fire station). There is a tank shown approximately 95m west and by this time only one laundry is shown (White Abbey Laundry approximately 100m to the south). A cork factory had established approximately 100m north and a Cardboard Box Factory had developed approximately 200m south.
1968	No significant changes are noted within the Site. A large garage had developed approximately 50m north of the Site and the laundry approximately 100m south is no longer shown, the area having been redeveloped into commercial / retail area with a new multi-storey car park.
1975	The square demarcated feature is no longer shown within the Site. The tramlines are no longer shown on the map and no other significant changes are noted within the immediate surrounding area.

Date	Historical Development (Site and Surrounding Area)
1987	No significant changes noted on the Site. The properties approximately 50m south had been demolished and replaced by larger retail / commercial unit with a substation noted. Further away, the engineering works and Merton Abbey Mill / Works are no longer shown.

2.3 Unexploded Ordnance

With reference to the Zetica Regional Unexploded Bomb Risk of South London (Appendix C), the Site is designated as lying within an area denoted as “low to medium” bomb risk area.

Further reference has been made to the National Archives (www.bombsight.org) which shows no bombs were recorded on the Site. The nearest is a high explosive WWII bomb that was recorded to have been dropped approximately 260m northwest, close to Byegrove Road.

3 Physical and Environmental Setting

3.1 Published Geology, Hydrogeology and Hydrology

With reference to the sources of information detailed in Section 0, the following information has been obtained.

Table 3.1 Information Regarding Geology, Hydrogeology and Hydrology

Geology (Aquifer Status)	**Superficial Deposit:** Alluvium (Secondary A Aquifer) **Solid Geology:** London Clay Formation (Unproductive Strata) The London Clay Formation is underlain in sequence by the Lambeth Group, Thanet Sand Formation and White Chalk Subgroup.
BGS Boreholes (within 100m of the site)	Five historic BGS boreholes are recorded within 70m of the Site, the two closest are summarised below. TQ27SE348 (40m northeast) is a borehole dated 1974 that was drilled for Thames Water. Made Ground comprising "brick and concrete fragments in sand clay matrix" was encountered to 2m below ground level (bgl), which was underlain by silty and sandy clay and gravel to 3.7m which was locally organic and had shells (likely to be Alluvium). This was underlain by a stiff, becoming very stiff, grey brown fissured silty clay to the termination of the borehole at 9m (London Clay Formation). Groundwater was encountered at 2.7m. Record TQ27SE14 is a water well (near the public house off Baltic Close) drilled to a depth of approximately 54.9m. Although the description on the log is limited, they reveal the presence of Drift Deposits, underlain by London Clay, the Woolwich and Reading Beds, in turn by the Thanet Sand which are in turn underlain by the Upper Chalk.
Within a Source Protection Zone	Located within SPZ Zone 1 (inner catchment) associated with the groundwater abstraction discussed below.
Licensed Groundwater Abstraction Points	Merton Abbey Pumping Station located 360m south registered to Thames Water Utilities. Active license for the abstraction for potable water.
Surface Water Feature	A number of watercourses are present within 250m of the Site. The closest is a stream approximately 80m northwest. The River Graveney is culverted approximately 140m northeast, the River Wandle (a primary river) flows approximately 150m west and the River Pickle flows approximately 230m southwest of the Site.
Likely Groundwater Flow Direction	Based on the topography and the location of nearby surface waters (towards the west), it is inferred that shallow groundwater within the Alluvium could potentially flow in a westerly direction.

3.2 Environmental Public Registers

Public register information for the Site and the surrounding area from the Groundsure Report (Appendix B) and other sources has been summarised in Table 3.2 below.

It is not the purpose of this section to provide a comprehensive account of the environmental data but only to detail those factors that are or could impact the Site.

Table 3.2. Environmental Data

Data type	Description	Distance (m) and Direction
Radon	The site is not in a radon affected area, as less than 1% of properties are above the Action Level.	N/A
Landfill sites	None identified within 250m of the site.	N/A
Current Industrial Data	12 entries within 250m of the Site relating to infrastructure and facilities (substations & pylon), industrial products, road and rail including an underground station, consumer products and motoring supplies and a works.	Approximately 30m to 250m from the Site
Part A(2) and Part B Activities	Petrol Filling Station Dry Cleaners (source: Google maps) Dry Cleaners (historical)	40m northeast 50m east on Christchurch Road 70m southeast

The Site and immediate surrounding area have been subject to various phases of demolition and redevelopment into housing and roads including infrastructure (tramway and underground) and commercial / industrial uses. Made Ground is likely to be present within and immediately adjacent to the Site associated with these activities.

Whilst the Site is located in a mixed residential and commercial / retail area, potential off-site sources have been identified locally within the surrounding area including a petrol filling station, dry cleaners and further away, paper works, sewage works and saw and leather mills (Section 2.2).

4 Preliminary Conceptual Site Model

Geo-environmental assessments are required in accordance with current regulatory guidance (CIRIA C552, Ref. 5) and CLR11 (Ref. 6) to consider the significance of potential contamination in terms of plausible contaminant source-pathway-receptor contaminant linkages. As part of this process, it is necessary to develop a conceptual site model (CSM) of these potential contaminant linkages by identifying the potential contamination sources, sensitive receptors and any potential exposure pathways. A risk assessment is then undertaken to determine the likelihood and significance of these potentially complete contaminant linkages.

4.1 Potential Contaminant Sources

Based on the information obtained from the existing data and information obtained from historical and environmental research and the Site walkover, there are a number of potential contaminative sources identified on and off-Site. These are summarised in Table 4.1 below.

It should be noted that it is considered unlikely that all these substances would be present at significant concentrations within the Site.

Table 4.1: Potential Sources of Contamination On- and Off-site

Source	Potential Contaminants
On Site	
Made Ground associated with demolition and redevelopment	Metals, polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs), asbestos, ground gas and vapours.
Alluvium	Ground gas
London Clay	Sulphates
Off Site	
Made Ground associated with demolition and redevelopment adjacent to the Site	Metals, PAHs, TPHs, asbestos, ground gas and vapours
Historical industrial activities including tramway, smithy, dry cleaners, tanks, garages within 100m Current commercial / industrial activities (PFS, garages, dry cleaners)	Metals, PAHs, TPHs, asbestos, ground gas and vapours Chlorinated solvents (dry cleaners)

4.2 Potential Receptors

The proposed land use is currently unknown however, based on the Site's current setting and location, it has been assumed that residential properties without gardens (such as flats / apartments) with limited landscaped areas are likely. Residential flats above ground floor retail is a further possibility however, as a precautionary approach, the residential end-use scenario is more conservative and has been used within this initial assessment.

It is considered possible that any potential contamination within the soils may be disturbed during the construction phase, or during gardening within landscaped areas by future site users.

4.2.1 Human Health

- Site Users (residents, visitors, maintenance workers and contractors).

Contamination risks to construction workers are not appraised by chronic (long term) exposure human health risk assessments. There are no appropriate published criteria applicable to assessment of potential risks to

construction workers. The potential risks should be addressed by a site-specific construction workers risk assessment and implementation of appropriate health and safety measures, to adequately mitigate any potential risks. All works should be conducted in accordance with the CDM Regulations (2015) or any other relevant guidance. Constructions workers are not considered further in this assessment.

4.2.2 Controlled Waters

- Groundwater beneath the Site – the Alluvium is a Secondary A Aquifer.
- The site is within a Groundwater Source Protection Zone (SPZ) 1 and there is an active groundwater abstraction for potable water supply 360m south. The aquifer associated with this abstraction is likely to underlie the London Clay (in the Thanet Sand or Chalk), which is likely to be greater than 50m bgl.
- A number of watercourses are present within 250m, the closest is a stream approximately 80m northwest of the Site.

4.2.3 Buildings

- Underground structures/services (water pipes, concrete, foundations) including sulphate attack.
- Proposed buildings.

4.3 Potential Pathways

Potential pathways are the routes that link the receptor to the contamination. The potential pathways for this Site are summarised in the table below.

Table 4.2: Potential Contaminant Pathways

Receptor	Description
Human Health (residents, visitors, maintenance workers and contractors)	Accidental ingestion of contaminants within soil, water and dust Inhalation of dust, vapours and ground gases Dermal contact with contaminants within soil, water and dust (although considered to be limited post development due to potential coverage by hardstanding and buildings)
Controlled Waters (Secondary A Aquifer, surface waters, SPZ 1)	Leaching of potential contaminants in soil or Made Ground into groundwater Vertical migration of soluble contaminants through the unsaturated zone into groundwater beneath the site Horizontal migration of contaminated groundwater into drinking water abstractions or surface waters
Buildings	Direct contact of building services or foundations with contaminants in the soil and Made Ground including sulphate attack Gas accumulation in confined and poorly ventilated spaces

4.4 Summary

Terraced housing has been recorded within the Site from the first map edition (1866) until 1913. Potentially a further feature was recorded within the Site from around 1950 to 1975. Off-site potential sources of contamination have been recorded including PFS, dry cleaners, garages and other historical former uses.

The Site is on a Secondary A Aquifer (Alluvium) which overlies the London Clay (Unproductive Strata). There are a number of surface water features, the closest is a stream approximately 80m to the northwest.

Within the Site, the Made Ground is likely to be present which could be a source of contamination. Human exposure could occur in gardens or soft landscaped areas, especially if soils are disturbed by activities such

as digging/gardening. Ground gas / vapours could be generated by the Made Ground which could accumulate in confined spaces and poses potential risk to future site users.

Based on the historic use of the Site and surrounding area, gross contamination capable of impacting the built environment is unlikely to be significant.

The London Clay is a source of naturally occurring sulphates which could impact buried concrete.

Near surface investigation comprising dynamic sampling to assess the chemical properties of the existing near surface soils and to characterise the underlying subsurface soils is discussed in the following sections.

5 Preliminary Ground Investigation

5.1 Scope and Rationale of Investigation

A preliminary ground investigation was undertaken on the 7th June 2017 to provide an initial indication of ground conditions at two locations within the Site. An exploratory hole location plan is included within Appendix D.

5.1.1 Rationale

The development of the preliminary CSM highlighted possible pollutant linkages with respect to the proposed future development. The ground investigation was designed to provide a better understanding of these potential pollutant linkages to facilitate a preliminary contamination and foundation assessment and to provide further recommendations, as necessary. The objectives of the investigation were therefore to:

- Characterise the Made Ground, Alluvium and London Clay;
- Establish a preliminary understanding of the geo-environmental regime (soil only);
- Establish the groundwater conditions beneath the site;
- Establish the soil borne gas regime;
- Preliminary waste classification based on the *Hazwaste* tool; and
- Identify the geotechnical properties of the Made Ground and natural soils.

It should be noted that as part of the preliminary nature of the investigation, testing comprised a general suite of contaminants which were used within the preliminary assessment. No Volatile Organic Compounds (VOCs) were tested as no olfactory evidence of contamination was noted during the works and, in addition, no asbestos quantification testing, leachates or groundwater testing was included.

5.1.2 Scope

The ground investigation involved the following:

- 2 windowless sampling boreholes to a maximum depth of 5.45m. The boreholes were positioned within the west where previously, a square demarcated area was marked and also in the centre (which is outside the 20m London Underground stand-off).
- Chemical testing – 5 soil samples were tested for the following suite; arsenic, boron, cadmium, chromium (total), chromium (vi), copper, lead, mercury, nickel, selenium, zinc, PAH (16 speciated), pH and sulphate (water soluble). In addition, 3 of the samples of Made Ground were screened for the presence of asbestos (identification only).
- 3 soil samples were analysed for moisture content and Atterberg limits, 2 samples were tested for particle size distribution (wet sieving).
- Gas and groundwater monitoring standpipes were installed into each of the boreholes with response zones targeting the Made Ground / Alluvium upon completion and one return monitoring visit to measure ground gas concentrations and groundwater levels was carried out.

An exploratory hole location plan, Engineer's verified exploratory holes logs, test results and monitoring data is presented within Appendix D.

5.2 Ground Conditions Encountered

The window sampling boreholes were placed in the north-west and roughly within the centre of the Site to provide general coverage, the logs, which are presented within Appendix D revealed:

- Hardstanding described as bituminous bound material to 0.03m (WS101) and 0.05m (WS102). It is underlain by a 0.07m (WS101) and 0.09m (WS102) thick layer of concrete recorded to a depth of 0.12m.
- At both locations, the hardstanding is underlain by Made Ground to depths of between 1.2m (WS102) and 1.4m (WS101). The Made Ground is generally described as comprising dark brown slightly clayey

gravelly sand with occasional fragments of brick, flint, ceramics, concrete metal and glass (including bottle).

- Underlying the Made Ground is Alluvium comprising interbanded soft greyish brown sandy clay with shell fragments and very loose yellow brown very silty / clayey sand with occasional pockets of brown clay to approximately and locally described as slightly glauconitic (WS101) and brown or mottled black. Towards the base of the Alluvium (3.8m in WS101 and 3m in WS102), it is described as a very sandy gravel of flint with occasional cobbles to depths of 4.8m (WS101) and 3.8m (WS102).
- The surface of the London Clay was encountered underlying the Alluvium and was not proven beyond 5.45m. It is described as a fissured dark grey clay.
- Groundwater was encountered at 2.4m in WS101 and 2.8m in WS102, associated with the sandy bands.
- No visual or olfactory evidence of contamination was encountered during the investigation.

5.3 Geotechnical Laboratory and Field Testing

5.3.1 Made Ground

Samples of the Made Ground were not tested for geotechnical properties.

5.3.2 Alluvium

The general geotechnical properties for the Alluvium are summarised below:

Table 5.3 Alluvium – Geotechnical Testing Summary

Parameter	Number of Tests	Values	Average	Assessment
Natural Moisture Content (%)	2	48 & 25	37	-
Liquid Limit (%)	1	61	-	High plasticity Modified plasticity index of medium volume change potential
Plastic Limit (%)	1	31	-	
Plasticity Index (%)	1	30	-	
% passing 425 sieve	1	99	-	
SPT N Values	3 3	1-16 1-7	7 3	Very loose to medium dense (loose) Very soft to soft (very soft)

Two particle size distribution tests were undertaken on samples of the granular Alluvium from WS101; one each from the sandy and gravelly layers. In WS101 at 2.2m, it is described as a clayey/silty slightly gravelly sand and at 4.2m, the sample is described as slightly clayey/silty sandy gravel.

5.3.3 London Clay

The general geotechnical properties for the London Clay are summarised below:

Table 5.4 London Clay – Geotechnical Testing Summary

Parameter	Number of Tests	Values	Average	Assessment
Natural Moisture Content (%)	2	26 & 26	26	-
Liquid Limit (%)	2	60 & 67	64	High plasticity
Plastic Limit (%)	2	24 & 25	25	Modified plasticity index of medium volume change potential
Plasticity Index (%)	2	36 & 42	39	
% passing 425 sieve	2	82 & 99	91	
SPT N Values	2*	10 & 12	11	Firm (firm)

*see note below

It should be noted that 3 Standard Penetration Tests (SPTs) were carried out in the London Clay, however, the SPT carried out in WS101 at 4m recorded an N-value of 3. The results have been queried and it has been confirmed that the values reported are correct. Reference has therefore been made to the photographs (Appendix D) which suggests the surface of the London Clay may have been affected by the overlying groundwater within the Alluvium.

A sample of the same strata at 4.8m was described as stiff (based on BS5930 - Ref. 7) and, has a calculated consistency index I_c (BS EN ISO14688 Part 2 – Ref. 8) of about 1 (or stiff) which confirms the description. Therefore, the above suggests the London Clay is locally softer at this interface potentially associated with the above and the SPT N-values obtained from 4m in WS101 have been omitted from the initial assessment.

5.4 Concrete Assessment

Chemical testing of soils for concrete classification (Ref. 9) indicates that a preliminary classification for concrete extending into Made Ground (maximum concentration of 240mg/l and pH7.9) or Alluvium (maximum of 410mg/l and pH7.9), assuming mobile groundwater conditions indicates a potential classification of DS-1 and Aggressive Chemical Environment for Concrete (ACEC) class of AC-1 for concrete within the Made Ground and Alluvium. However, sulphate resistant concrete may be required within foundations extending into the London Clay which should be confirmed during development specific ground investigation in accordance with current guidance (Ref. 9).

6 Preliminary Qualitative Risk Assessment

6.1 Human Health

The proposed use is not currently known therefore as a preliminary assessment, the chemical test results have been screened against the LQM / CIEH S4ULs (Ref. 3) for a residential without plant uptake scenario which is considered to the suitably conservative and representative of development without gardens with limited landscaped area. Exceedances are summarised in Table 6.1 below.

Asbestos fragments or fibres were not visually identified during the investigation however, loose fibrous debris (chrysotile) was detected by the laboratory in sample WS101 E1 (0.3m bgl) located in the west.

Table 6.1. Exceedances of the Human Health Screening Criteria in Soils

Determinant	Location	Screening Criteria (mg/kg) *Residential with plant update*	Concentration (mg/kg)
Arsenic	WS102 (0.5m – Made Ground) WS102 (1.0m – Made Ground)	40	46 42
Lead	WS101 (0.3m – Made Ground) WS102 (0.5m – Made Ground) WS102 (1.0m – Made Ground)	310	2,300 880 640
Benzo(b)fluoranthene	WS101 (0.3m – Made Ground)	3.9	8.1
Benzo(a)pyrene	WS101 (0.3m – Made Ground)	3.2	5.8
Dibenzo(a,h)anthracene	WS101 (0.3m – Made Ground) WS102 (0.5m – Made Ground)	0.31	1.2 0.32
Asbestos	WS101 (0.3m – Made Ground)	N/A	Loose fibrous debris (chrysotile)

* screening criteria for lead from C4SL value (DEFRA)

The above shows exceedances have been recorded within samples of the Made Ground and are likely to be associated with anthropogenic inclusions. Whilst the development proposals are unknown, it is likely that to facilitate the development the Made Ground or part of it will be removed. The source removal, the non-volatile nature of the contaminants and likely coverage of the Site by hardstanding and buildings will sever the potential pathway and, therefore, mitigate the risk to future human health receptors. In areas of soft landscaping, a clean cover system will be required.

6.2 HazWaste Online

The chemical results from the 5 soil samples tested, comprising 2 from the Made Ground and 3 natural soils (Alluvium), were screened using HazWaste Online software to determine whether excavated materials requiring off-site disposal would potentially be classified as hazardous or non-hazardous waste.

The initial screen of the results indicated that 2 of the Made Ground samples (WS01 0.30 m bgl) and (WS102 0.5 m bgl) were initially classified as hazardous due to the high levels of lead and zinc found, which exceeded the concentration threshold for HP7 Carcinogenic and HP14 Ecotoxic.

However, the screening tool for lead and zinc used its baseline as lead and zinc chromate. This was changed by Arcadis as lead and zinc chromate cannot be present due to a lack of chromium VI. Subsequently the assessment has been revised to **non-hazardous** for WS102 (0.50 m bgl). Concentration of lead and zinc in WS101 exceeded the threshold for HP7 Carcinogenic and HP14 Ecotoxic, and therefore remains classified as **hazardous**.

Owing to the presence of lead and zinc in the sample of the Made Ground (WS101), this may be classified as hazardous waste subject to further testing including Waste Acceptance Criteria (WAC) testing and the landfill operator's license. Sorting and separating waste, reducing volume and reducing the hazardous nature of the waste may be required prior to off-site disposal.

The results of the HazWaste assessment are attached as Appendix D.

6.3 Soil Borne Gas

One monitoring visit was carried out on the 26th June 2017, the results of which are summarised below.

Table 6.2. Ground Gas and Groundwater Monitoring Results

Parameter	Unit	WS101	WS102
Gas flow rate	l/h	<0.1	<0.1
Methane (CH_4)	% v/v	<0.1	<0.1
Carbon Dioxide (CO_2)	% v/v	8.2	11.7
Oxygen (O_2)	% v/v	0.9	0.8
Carbon Monoxide (CO)	ppm	1	2
Hydrogen Sulphide (H_2S)	ppm	0	0
Volatile Organic Compounds (VOC)	ppm	0.0	0.0
Depth to groundwater	m bgl	2.60	2.74

Note: Ground gas concentrations monitored for a minimum of 90 seconds or until stabilised. Maximum readings are given for all parameters except oxygen for which the minimum value is shown.

The gas monitoring revealed concentrations of carbon dioxide to a maximum of 11.7% and depleted oxygen concentrations to a minimum of 0.8%. Concentrations of methane, hydrogen sulphide and VOCs were below detection limits as were gas flow rates.

An initial assessment was carried out in accordance with CIRIA C665 (Ref. 10). This indicated that the highest gas concentration (carbon dioxide) of 11.7% and maximum flow of 0.8l/hr result in a gas screening value (GSV) of 0.0936l/hr for carbon dioxide, potentially, placing the Site within 'Characteristic Gas Situation 2' (low risk) based upon modified Wilson and Card methodology (Ref. 11) or Amber 1 / Amber 2 in accordance with NHBC guidance (Ref. 11).

For preliminary assessment purposes and based on the development of private housing type buildings and CS2 classification, a Gas Protection Score of 3 or 4 (Ref. 12) would be required, and may typically comprise the following:

- A structural barrier of the floor slab, or of the basement slab and walls if a basement is present or fully tanked basement;
- Sub-slab de-pressurisation; and,
- A gas resistant membrane fitted by a specialist contractor and certification that the protection measures have been installed correctly is also required. All joints and service penetrations should be sealed.

6.4 Refined Conceptual Site Model

Exceedances of the screening values have been recorded in the soils tested including arsenic, lead, PAHs and asbestos containing materials were identified in samples of the Made Ground and the following refined CSM has been prepared based on the available information.

Table 6.3 Refined Conceptual Site Model

Source	Pathway	Receptor
On-Site Made Ground arsenic, lead, PAH and asbestos Potential off-site sources	Dermal contact with contaminants within soil, water and dust (although considered to be limited post development due to coverage of the majority of the Site by hardstanding and buildings).	Human Health (residents, visitors, maintenance workers and contractors)
Potential On-Site sources	Horizontal migration of contaminated groundwater into drinking water abstractions or surface waters.	Controlled Waters (Secondary A Aquifer, surface waters, SPZ 1)
Made Ground / Alluvium	Gas accumulation in confined and poorly ventilated spaces.	Buildings
London Clay	Direct contact of building services or foundations with London Clay	Buildings

7 Waste Management and Potential Development Constraints

7.1 Waste Management

Consideration should be given to disposal of waste soils / Made Ground generated by the development. Chemical testing of soils / Made Ground is likely to be required to inform a waste classification assessment and determine the potential disposal options. It should be noted that the waste contractor may require testing of the actual material to be disposed prior to acceptance, and that there is no obligation on a landfill operator to accept the waste.

Soils suspected of being contaminated should be segregated from soils which appear to be 'clean' and should not be used elsewhere on the site as fill or landscaping unless they can be proven to be fit for purpose.

Imported topsoil for landscaped areas should be clean, fit for purpose and validated as necessary.

7.2 Potential Development Constraints

The Site is located on the High Street within a mixed residential / commercial retail area. The historical review reveals former uses of the Site has been limited to terraced housing (and later an unknown feature) however, off-site sources have been recorded (such as PFS, garages, dry cleaners, works, mills). A preliminary ground investigation has been carried out and gross contamination was not encountered although elevated concentrations of contaminants and asbestos were recorded associated with the Made Ground.

From experience, the potential for remediation should be limited given the Site has not previously been used for industrial or commercial use and the findings of the initial ground investigation information.

The following potential environmental conditions have been identified that will warrant further consideration and/or implementation:

- Buried obstructions (foundations and services) associated with the former buildings may be present and may require removal prior to redevelopment. Buried services may require removal, protection, diversion or chasing and plugging at the boundary;
- Gross contamination is not anticipated however, provisions should be allowed for the potential for unforeseen contamination (this can be a planning requirement);
- Asbestos has been identified within one of the three Made Ground samples tested and further testing and assessment including quantification testing will be required;
- Gas exclusion measures (based on CS2 or Amber 1 / Amber 2 classification) will be required but this has been based on one return visit, therefore further monitoring and discussions with Building Control will be required. If CS1 conditions are confirmed, no gas protection measures would be required;
- Sulphate resistant concrete may be required;
- Contaminant resistant water supply pipes may be required;
- Provision of clean cover system in landscaped areas are likely to be required;
- Design specific ground investigation and consultancy advice to support planning obligations will be required; and
- A flood risk assessment will be required.

8 Geotechnical Considerations

Ground conditions encountered within the two boreholes reveal Made Ground to a maximum depth of approximately 1.4m which is underlain by very loose to medium dense and very soft to soft Alluvium to approximately 3.8m to 4.8m bgl. The surface of the underlying London Clay ranged between 3.8m and 4.8m but was not proven beyond 5.45m at both locations. Groundwater was encountered within the Alluvium at 2.4m and 2.8m, associated with the granular bands near the surface of the London Clay. The proposals for the Site including layouts and loadings are unknown therefore the following has been provided for indicative purposes only.

Potential founding solutions will be dependent on the thickness of Made Ground and the geotechnical properties of the natural deposits. The Made Ground and Alluvium is generally considered unsuitable for foundations due to its variable composition and its potential for high total and differential settlement. In addition, an upper weathered zone, potentially impacted by the shallow groundwater was encountered at the surface of the London Clay at 4m in WS101. Below ground structures and services associated with previous structures may be present and will require removal prior to redevelopment. Ground disturbance caused by the removal of historical structures may increase the thickness of Made Ground already present beneath the Site locally. At this stage, conventional shallow foundations and deeper trench fill may not be appropriate for the Site. Ground treatment e.g. vibro-stone columns are unlikely to be suitable due to the close proximity of adjoining properties, London Underground assets and the potential for liquefaction in the event that silty/clayey Alluvium is recorded in the eastern part of the Site. Therefore, a piled solution is likely to be required to support future structures within the Site. The advice of a specialist piling contractor should be sought once proposals for the Site have been developed.

Consideration will need to be given to trees that may have been removed or the planting of future trees when considering the depths of the foundations (Ref. 8). In addition, the risks associated with the London Clay include high plasticity clay which are subject to shrinkage and swelling, sulphate attack (sulphate resistant concrete) and the potential for relict shear slip surfaces should be considered during further investigation / design.

Consultation with external stakeholders (e.g. highways/railway) will be required during design. Discussions during the ground investigation with London Underground revealed that the north-bound Northern Line tunnel runs roughly northeast to southwest approximately 10m from the eastern boundary of the Site. Restrictions on the foundation solution or construction methods are likely to limit vibration or ground loading considerations.

In addition, consideration of buried services located on-site as shown on 40Seven drawing No. 2546 being retained, protected, diverted or upgrading will be required.

9 Conclusions and Recommendations

The Site is a vacant parcel of land completely covered by hardstanding which is currently used as a car park by staff at the Colliers Wood Underground Station. The Site is located on the High Street within a mixed residential / commercial / retail area. The A24 and Baltic Close adjoin the site to the east and south respectively and ground floor retail properties / flats and an apartment block are present to the north and west. Terraced properties have been recorded within the Site and a second feature was noted after the properties were demolished. Potential off-site sources including a nearby dry cleaners and petrol filling station are recorded.

A preliminary site investigation has been undertaken comprising two boreholes to consider the ground conditions and give an indication of the levels of contaminants on the Site.

9.1 Design Considerations

Potential risks to human health, controlled waters and the built environment have been identified from on-site Made Ground and ground gas / vapours are possible risks to human health from the off-site sources. Gross contamination was not encountered during the preliminary ground investigation, however, concentrations of contaminants (lead, arsenic, PAHs and asbestos) within the Made Ground were recorded in excess of applicable guideline values. The proposals for the Site are unknown however, based on the adjacent properties, apartments or retail with first floor flats have been considered, therefore, buildings and hardstanding are likely to cover the majority of the Site, which will sever potential pathways to future end-users. Where soft landscaping is proposed, a clean cover system is likely to be required.

Further development specific ground investigation will be required to confirm the requirements for (but not limited to):

- Confirm concrete design for foundations and services including the London Clay;
- Investigation of the eastern part of the Site;
- Further gas monitoring and assessment of the potential risk of ground gases to receptors, and to determine whether gas protection measures would be required for future development; and
- Consideration of shrinkage and swelling, trees, potential for relict shear slip surfaces, buried services and the nearby London Underground assets may need to be taken into account during the design.

9.2 Construction Considerations

During construction, a watching brief should be undertaken to identify the presence of any unforeseen contamination. If contamination is encountered, all works should cease until the advice of a suitably qualified professional can be sought.

Construction / demolition workers should use appropriate PPE and follow the site-specific contractors risk assessment which should include risks to human health from potential contamination. Due to the historic phases of development and demolition (and identification of asbestos fibres in the preliminary ground investigation) consideration should be given to the presence of asbestos within the Made Ground.

Good site management practices should be adopted during the construction phase such as covering stockpiles to minimise surface runoff/dust creation.

In the event that unforeseen contamination is encountered, a foundation works risk assessment may be required to assess the risks to the underlying if foundations or piling which penetrate the base of Made Ground.

The Site is in an area where ‘low’ risk of encountering unexploded ordnance is present and further assessment is not considered necessary.

Material reused on Site would need to be assessed in terms of its chemical and geotechnical suitability for reuse as engineering or landscaping fill. If off-site disposal is required, a waste assessment for the Made Ground and shallow soil materials would need to be undertaken to determine whether they are classified as hazardous or non-hazardous waste.

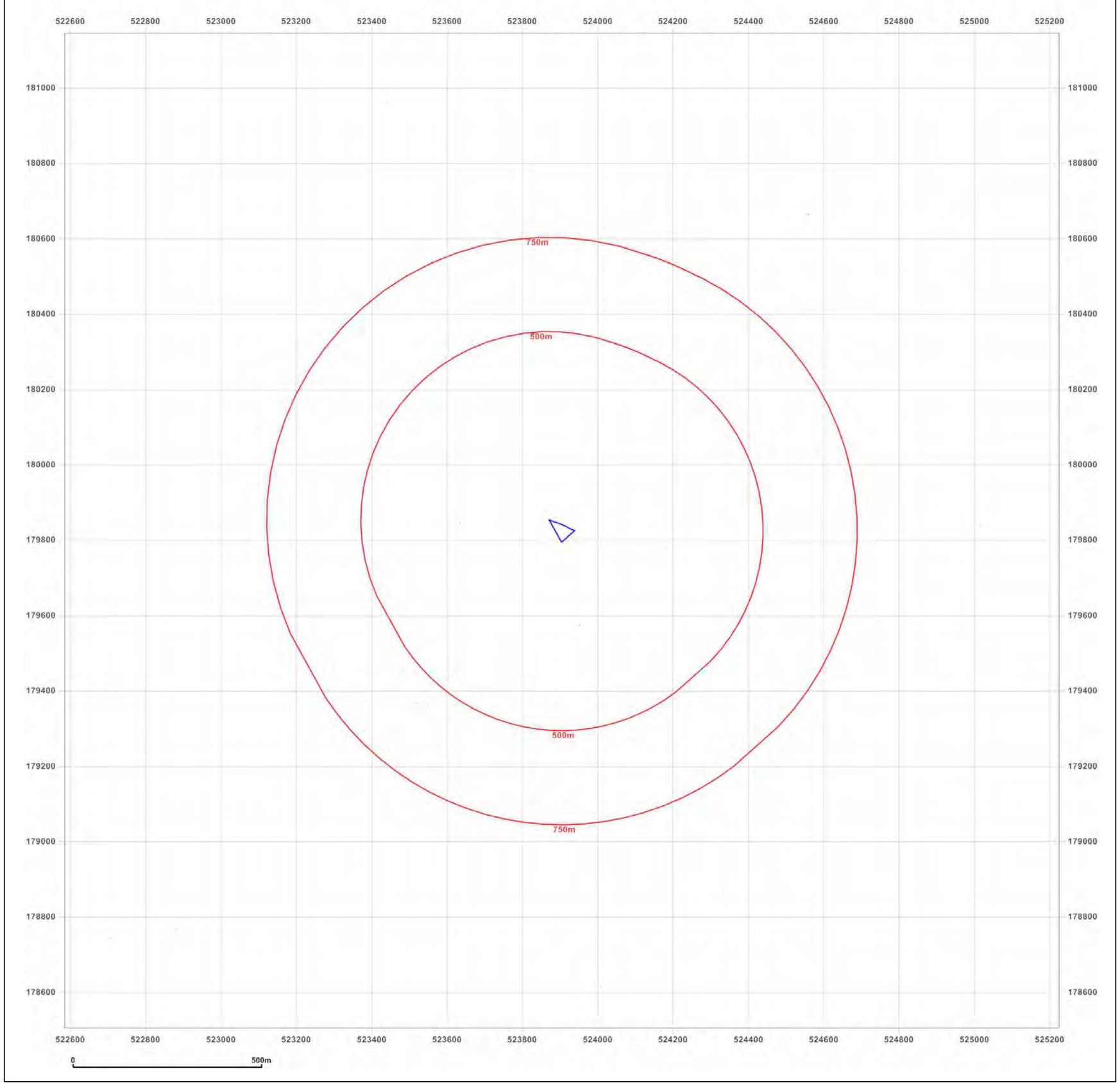
10 References

1. British Geological Survey (BGS) Online Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
2. Environment Agency (EA) What's in my backyard http://maps.environment- agency.gov.uk/wiyby/
3. LQM / CIEH LQM / CIEH (2015) The LQM / CIEH S4ULs for Human Health Risk Assessment

   "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3223. All rights reserved"
4. Environment Agency, Chemical Database (2015) http://evidence.environment-agency.gov.uk/chemicalstandards/
5. CIRIA C552 (2001) Contaminated Land Risk Assessment. A Guide To Good Practice.
6. Model Procedures for The Management of Land Contamination, CLR11, Environment Agency, 2004.
7. British Standards Institution. BS5930 Code of Practice for Site Investigations (A2:2010), 1999.
8. British Standards Institution. BS EN ISO 14688-2 Geotechnical Investigation and testing – Identification and Classification of Soils (A1:2013), 2004.
9. BRE (2005) Special Digest 1 -- Concrete in aggressive ground
10. CIRIA C665. (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings
11. NHBC Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide Are Present. Report Edition No. 04. March 2007.
12. British Standards Institution (BSI), 2015, BS 8485: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, ISBN 9780580830716, BSI Standards Limited.

APPENDIX A

Historical Maps



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: County Series

Map date: **1866**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

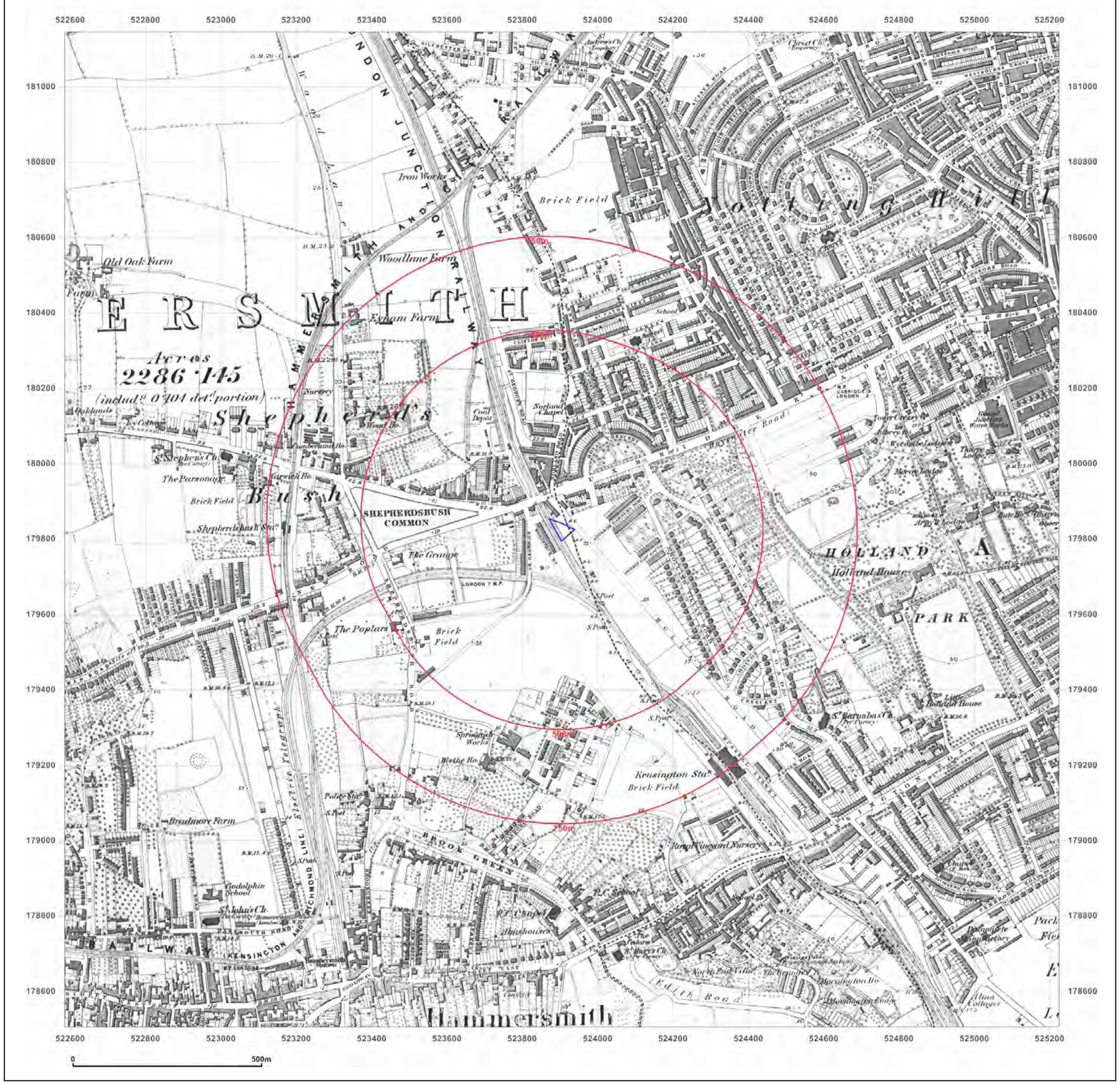
Surveyed 1866
Revised 1866
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: County Series

Map date: **1873-1874**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

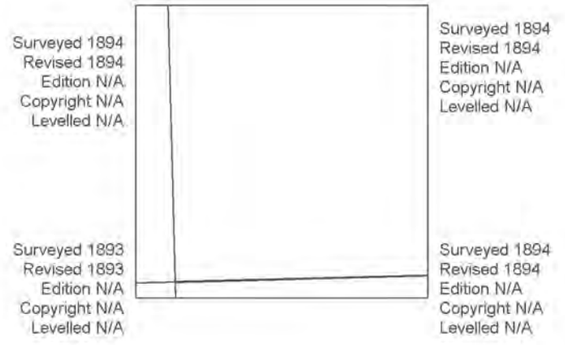
Map Name: County Series

Map date: **1893-1894**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

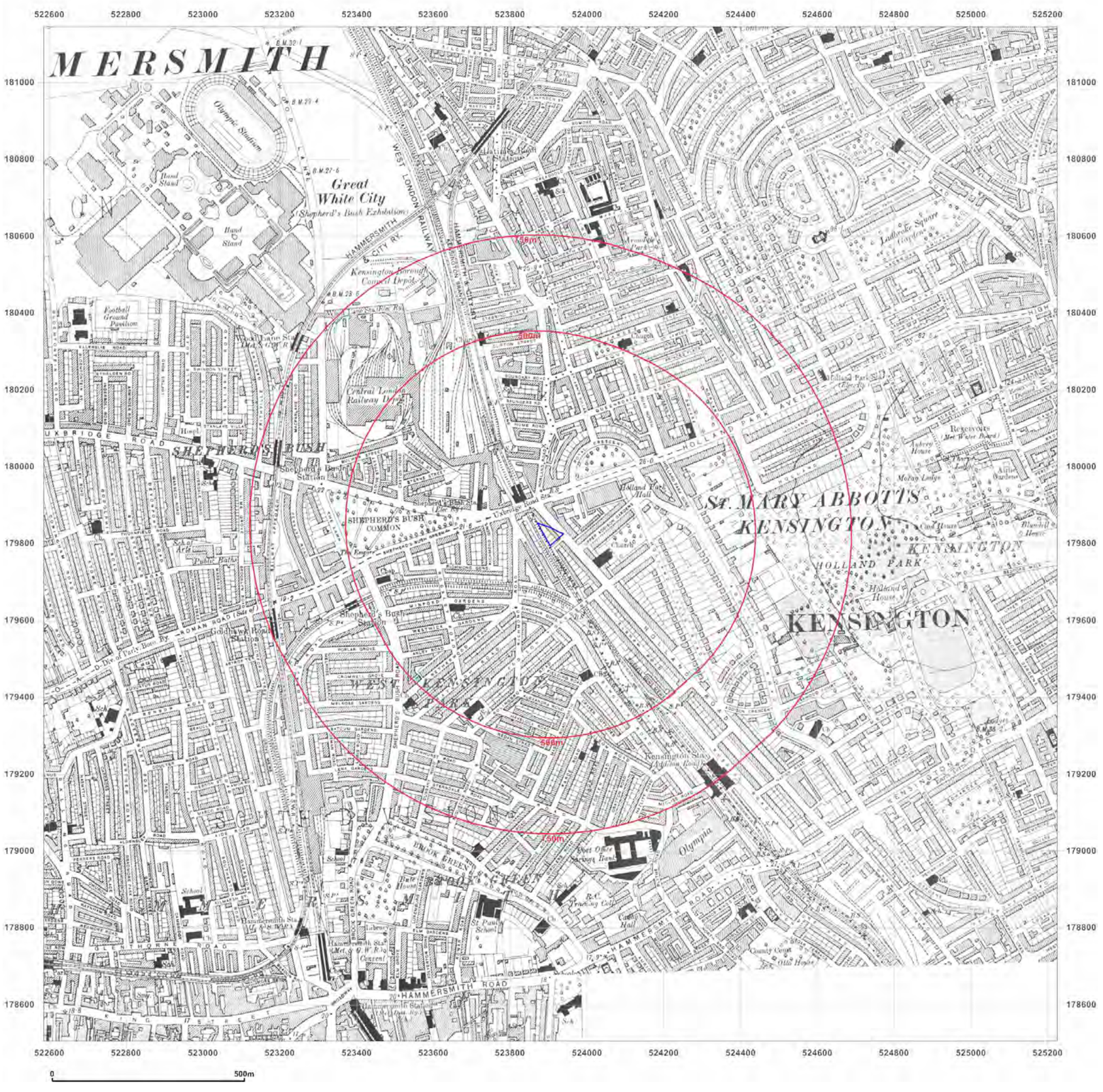


Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

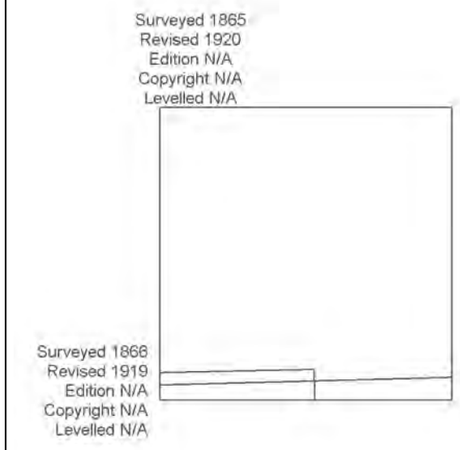
Map Name: County Series

Map date: **1919-1920**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

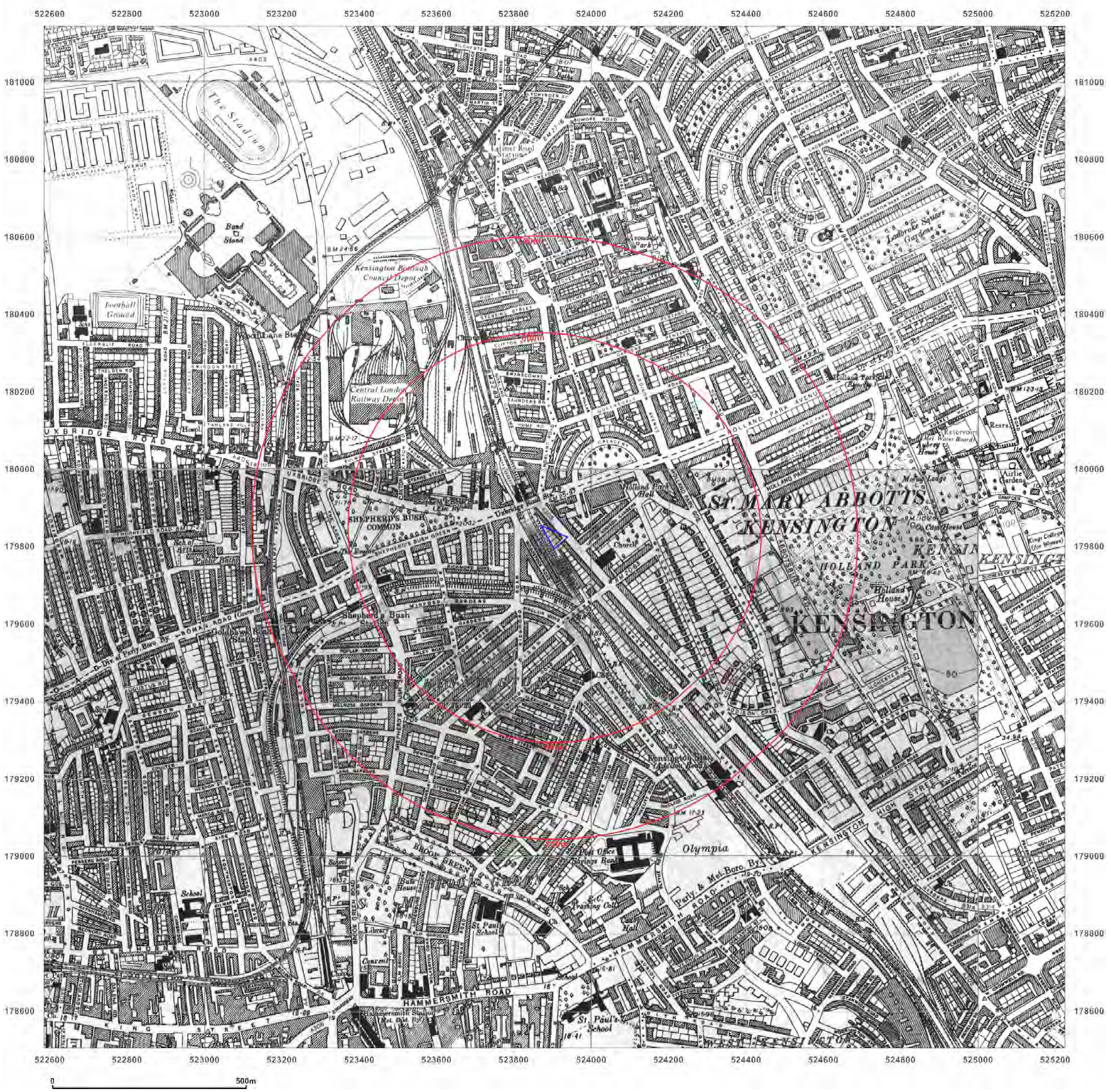


Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: Provisional

Map date: **1947-1951**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1948
Edition 1951
Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1949
Edition N/A
Copyright 1951
Levelled N/A

Surveyed 1940
Revised 1947
Edition N/A
Copyright N/A
Levelled N/A

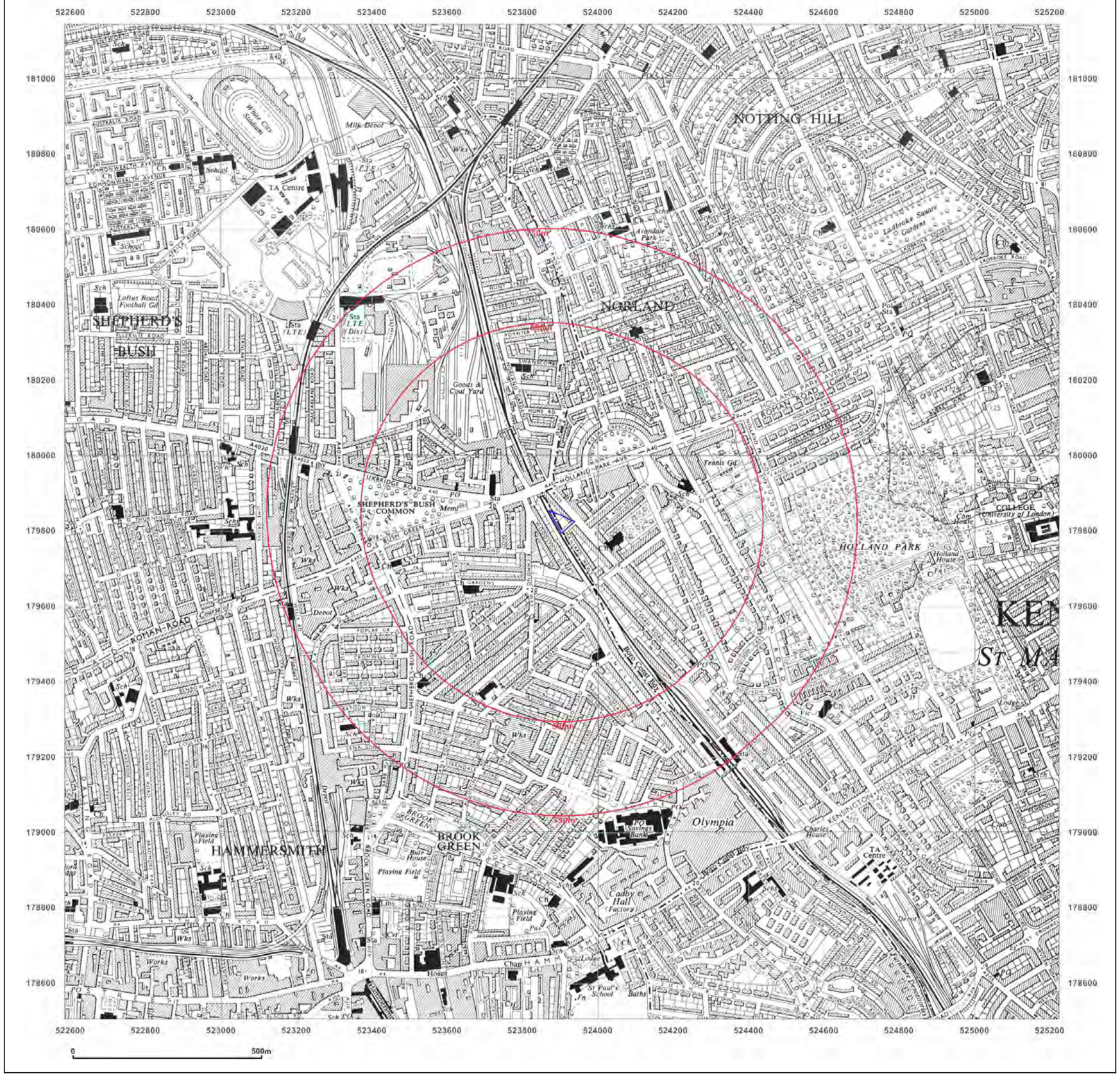
Surveyed N/A
Revised 1948
Edition N/A
Copyright N/A
Levelled 1921

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: Provisional

Map date: **1955-1958**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1957
Revised 1957
Edition N/A
Copyright 1957
Levelled N/A

Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1958
Revised 1958
Edition N/A
Copyright N/A
Levelled N/A

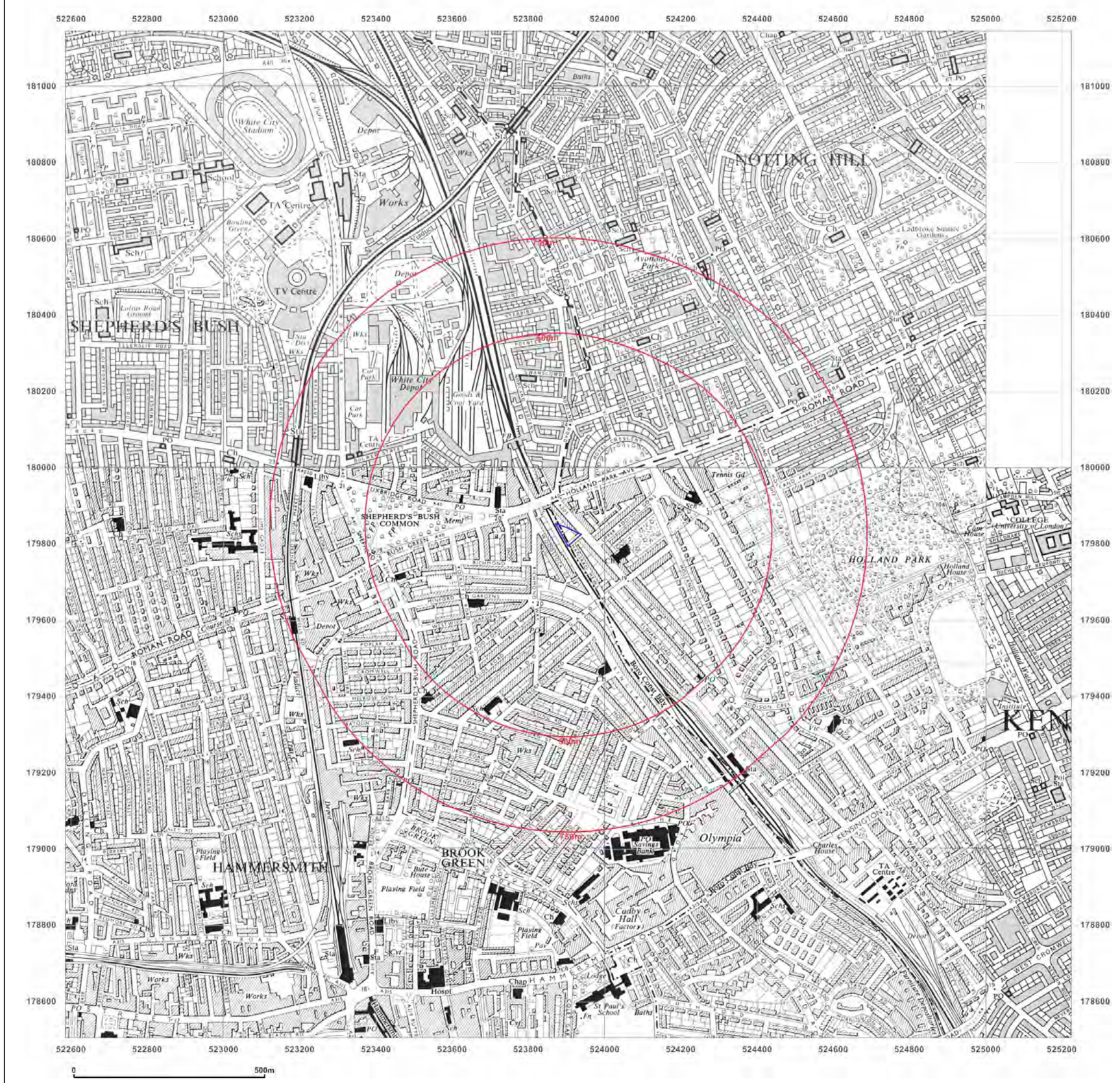
Surveyed 1955
Revised 1955
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: Provisional

Map date: **1962-1967**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1965
Revised 1965
Edition N/A
Copyright 1967
Levelled N/A

Surveyed 1958
Revised 1962
Edition 1958
Copyright 1958
Levelled N/A

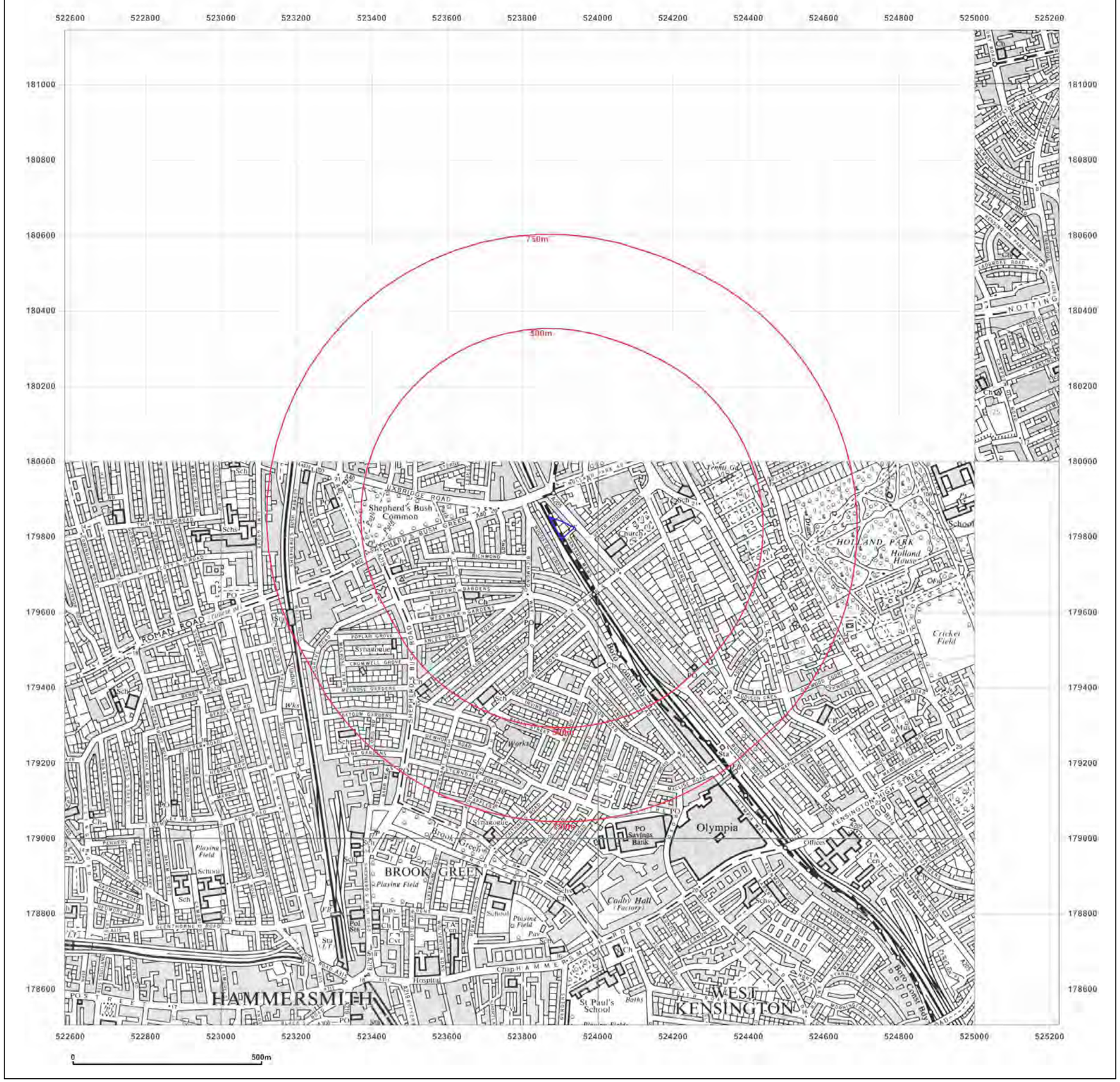
Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: Provisional

Map date: **1967-1968**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

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

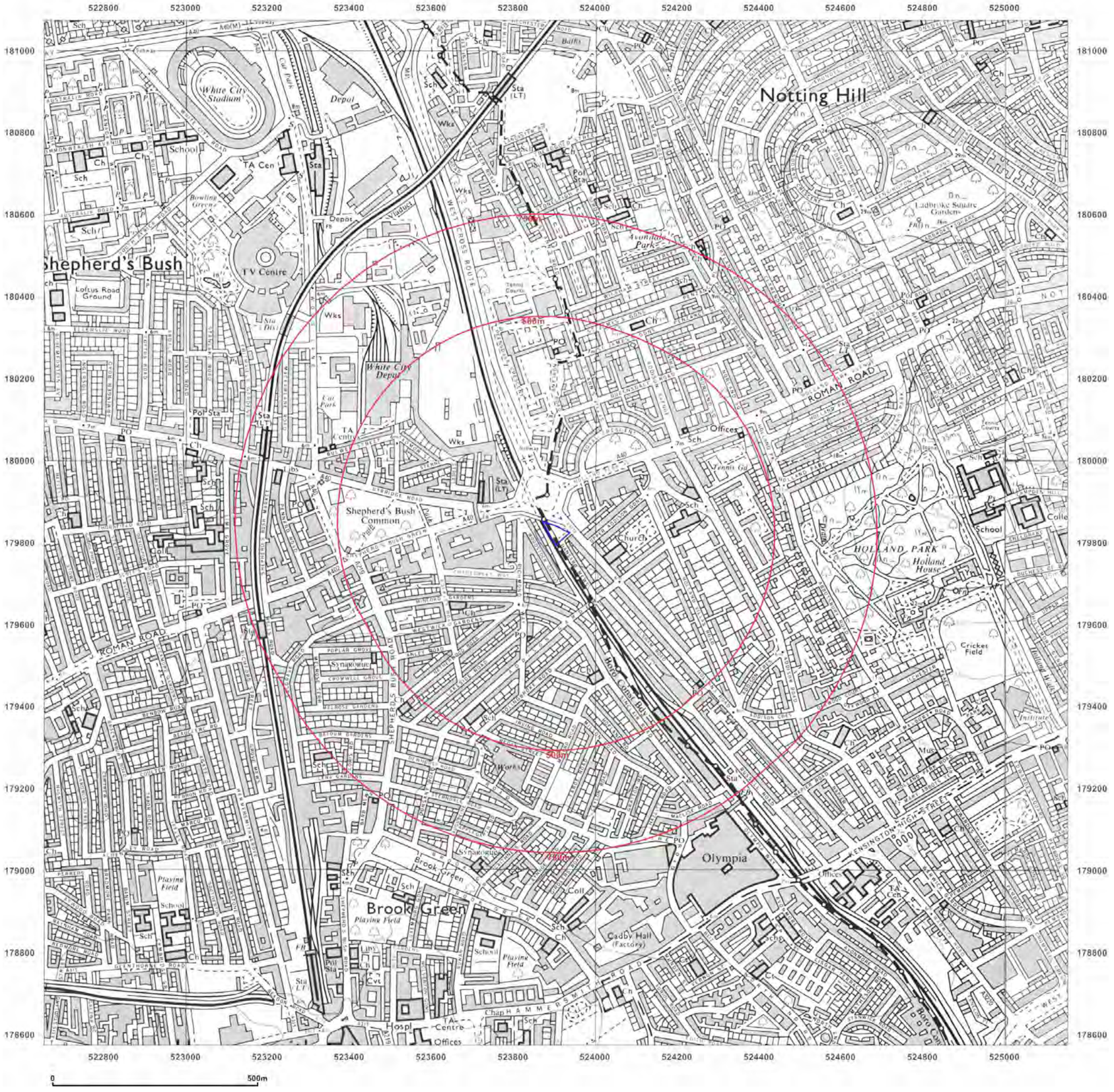
Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1973-1974**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1973
Revised 1973
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1972
Revised 1973
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1974
Revised 1974
Edition N/A
Copyright N/A
Levelled N/A

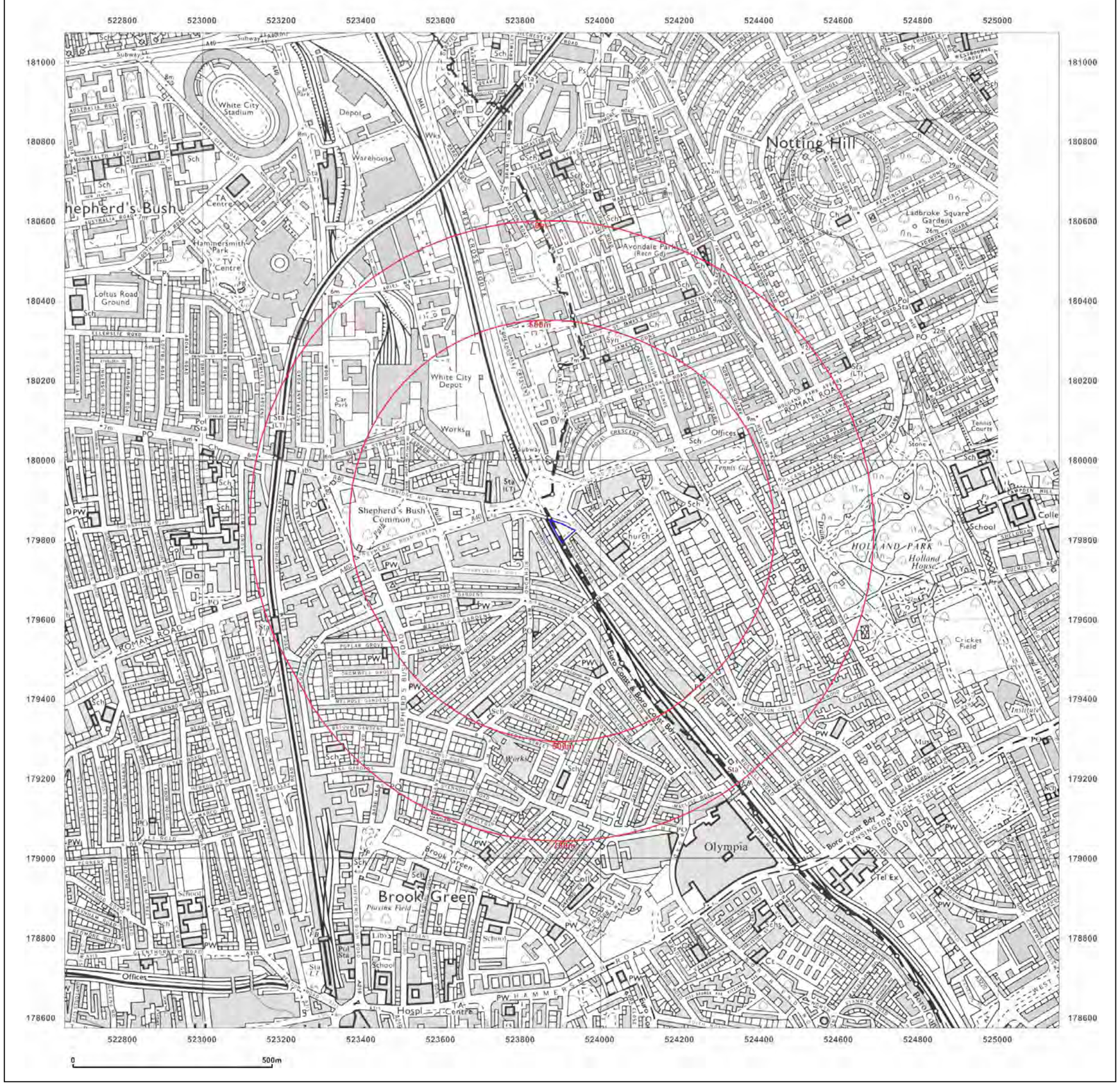
Surveyed 1973
Revised 1973
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1982-1987**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1981
Revised 1982
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1981
Revised 1987
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1984
Revised 1985
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

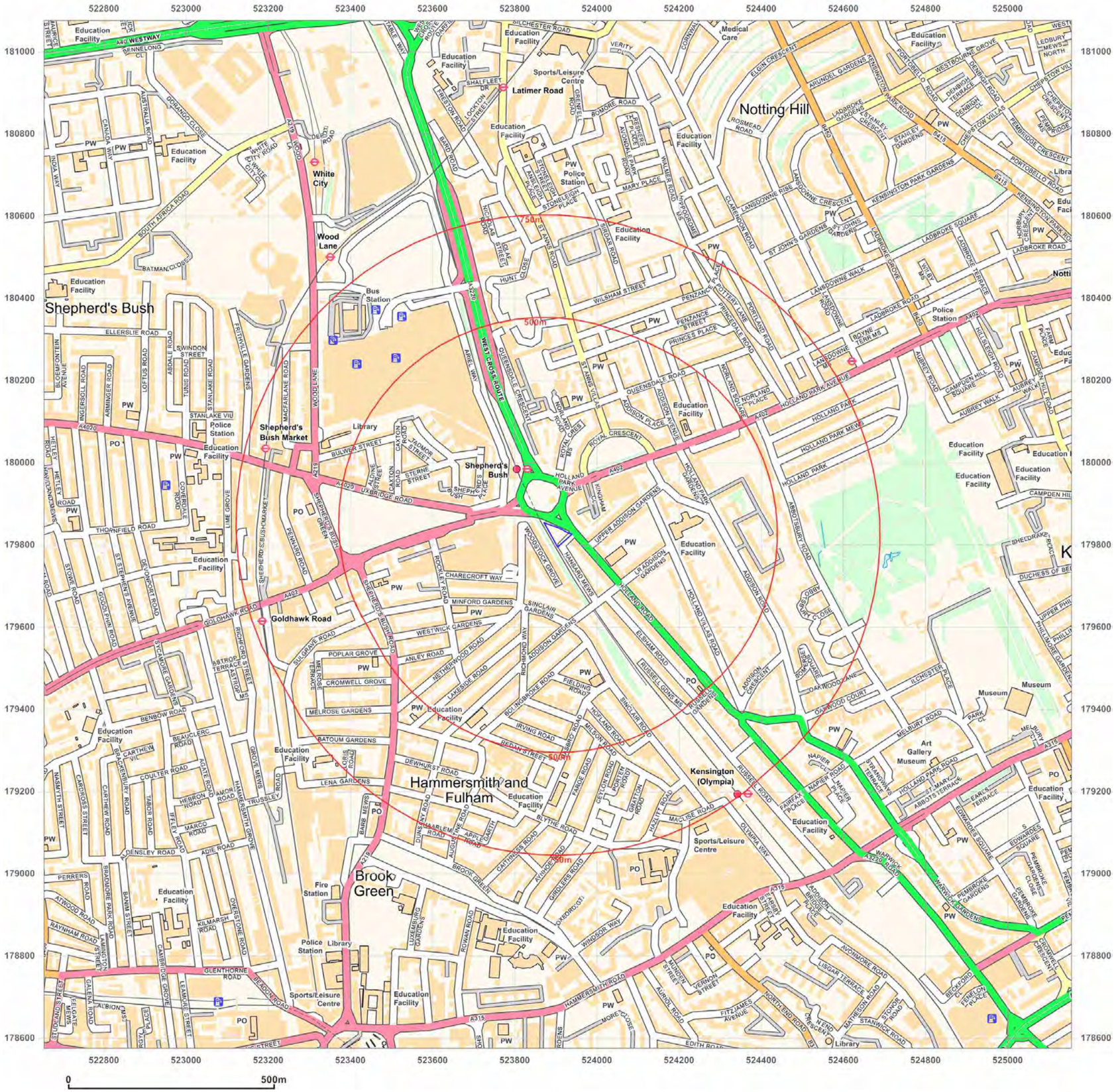
N
W E
S

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

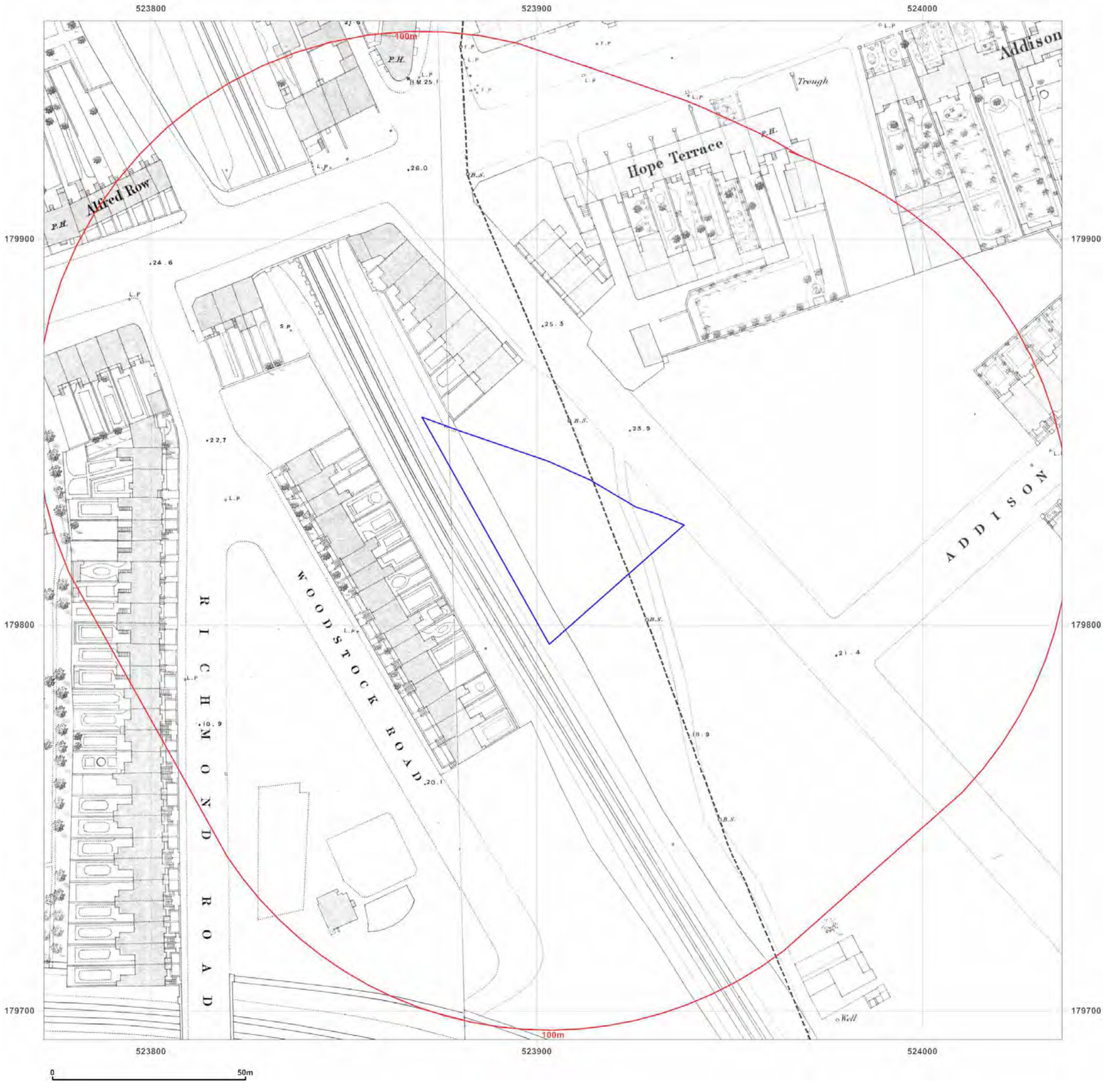
Map Name: National Grid
Map date: 2014
Scale: 1:10,000
Printed at: 1:10,000

N W E S

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

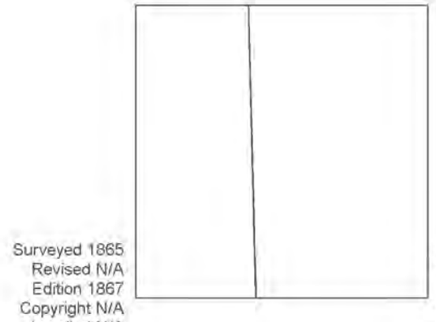
Map Name: 1056 Scale Town Plan

Map date: **1865-1867**

Scale: 1:1,056

Printed at: 1:1,056

N
W E
S



Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

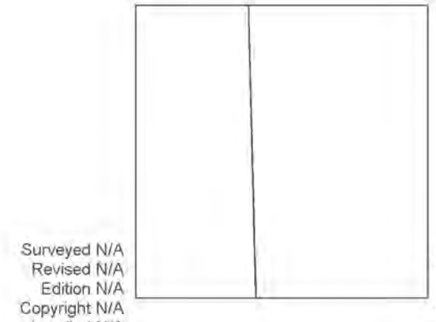
Map Name: 1056 Scale Town Plan

Map date: **1865-1868**

Scale: 1:1,056

Printed at: 1:1,056

N
W E
S

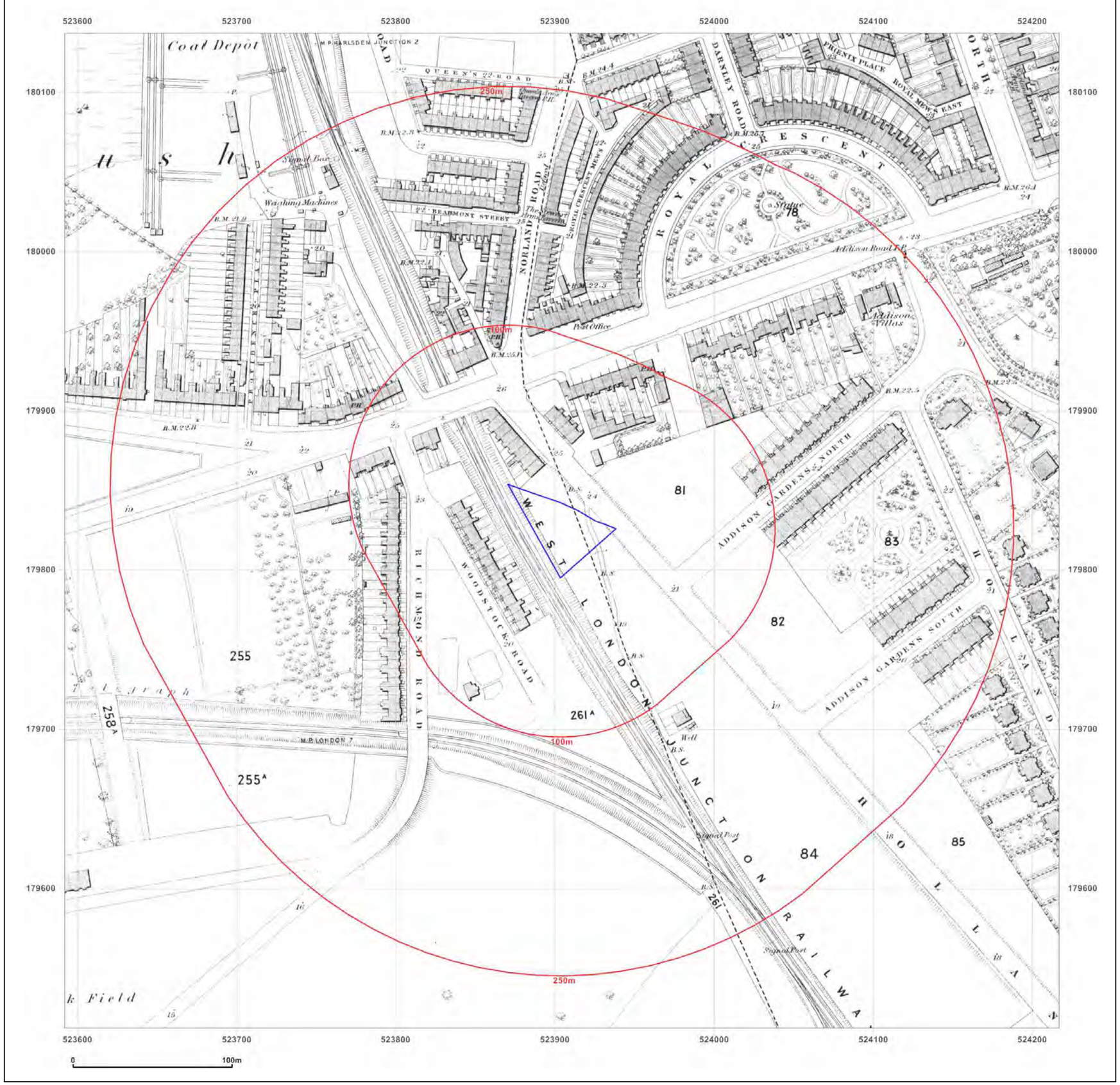


Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: County Series

Map date: **1869**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1865
Revised N/A
Edition 1869
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

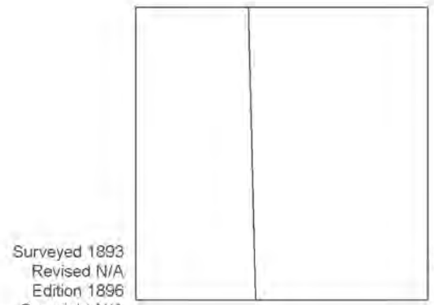
Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: 1056 Scale Town Plan
Map date: **1896**
Scale: 1:1,056
Printed at: 1:1,056

N
W E
S



Surveyed 1893
Revised N/A
Edition 1896
Copyright N/A
Levelled N/A

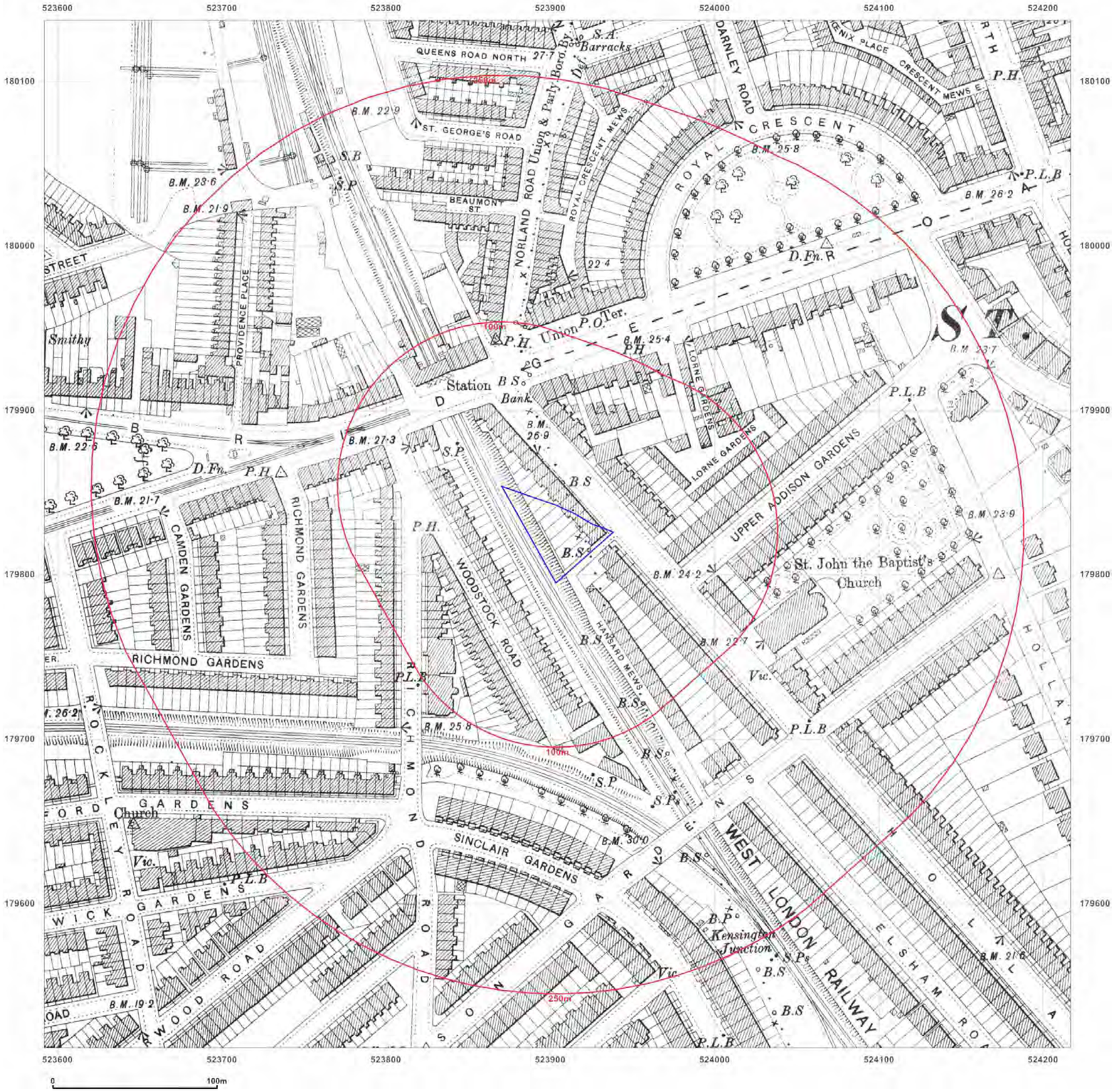
Surveyed 1893
Revised N/A
Edition 1896
Copyright N/A
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: County Series

Map date: **1896**

Scale: 1:2,500

Printed at: 1:2,500

N W E S

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

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: County Series

Map date: **1916**

Scale: 1:2,500

Printed at: 1:2,500

N W E S

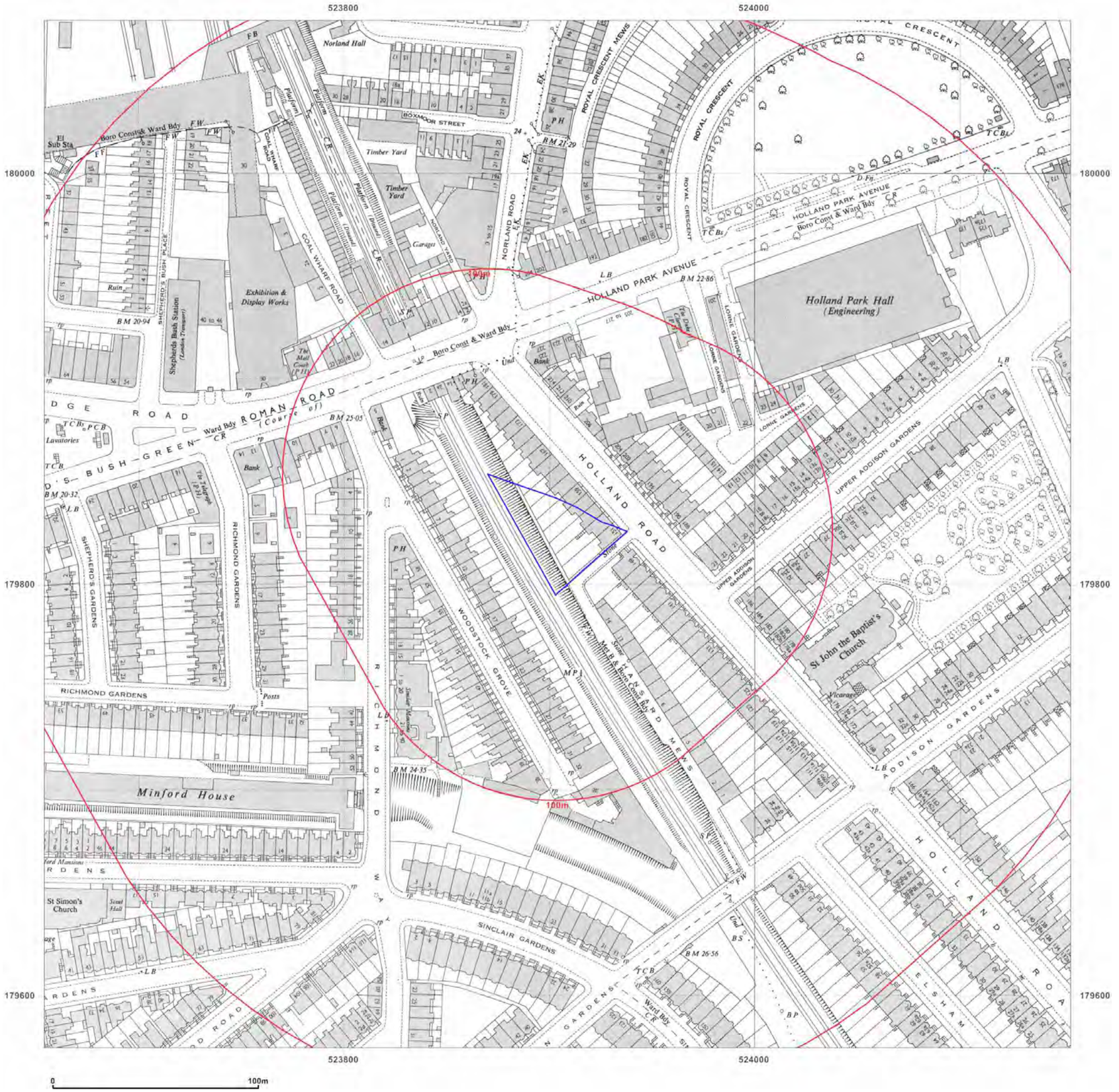
Surveyed 1916
Revised 1916
Edition N/A
Copyright N/A
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1952-1953**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

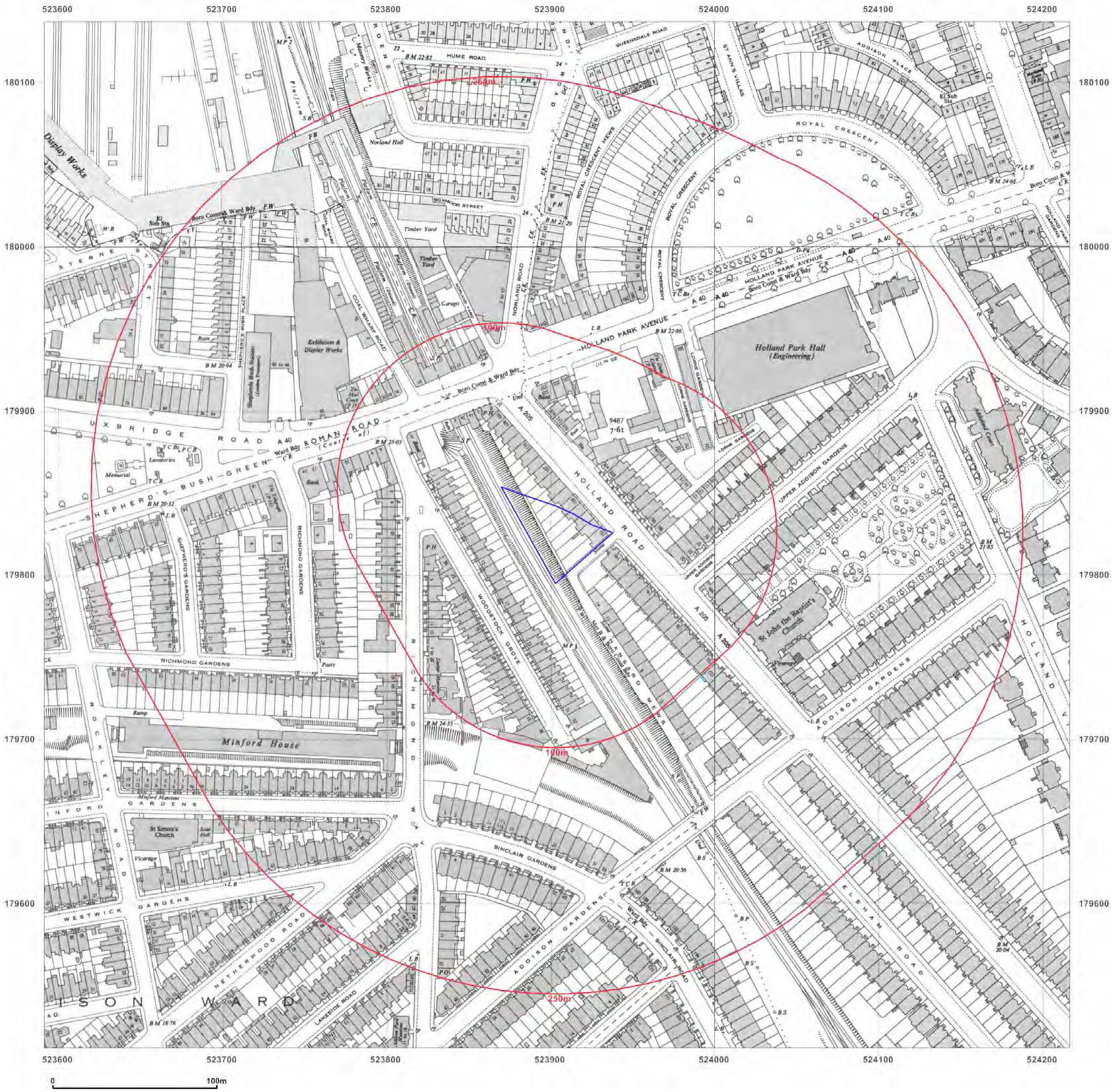
Surveyed 1953 Revised 1953 Edition N/A Copyright N/A Levelled 1953	Surveyed 1953 Revised 1953 Edition N/A Copyright N/A Levelled 1934
Surveyed 1952 Revised 1952 Edition N/A Copyright N/A Levelled 1934	Surveyed 1952 Revised 1952 Edition N/A Copyright N/A Levelled 1934

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1952-1953**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1953
Revised 1953
Edition 1955
Copyright N/A
Levelled 1953

Surveyed 1953
Revised 1953
Edition 1955
Copyright N/A
Levelled 1934

Surveyed 1952
Revised 1952
Edition 1954
Copyright N/A
Levelled 1934

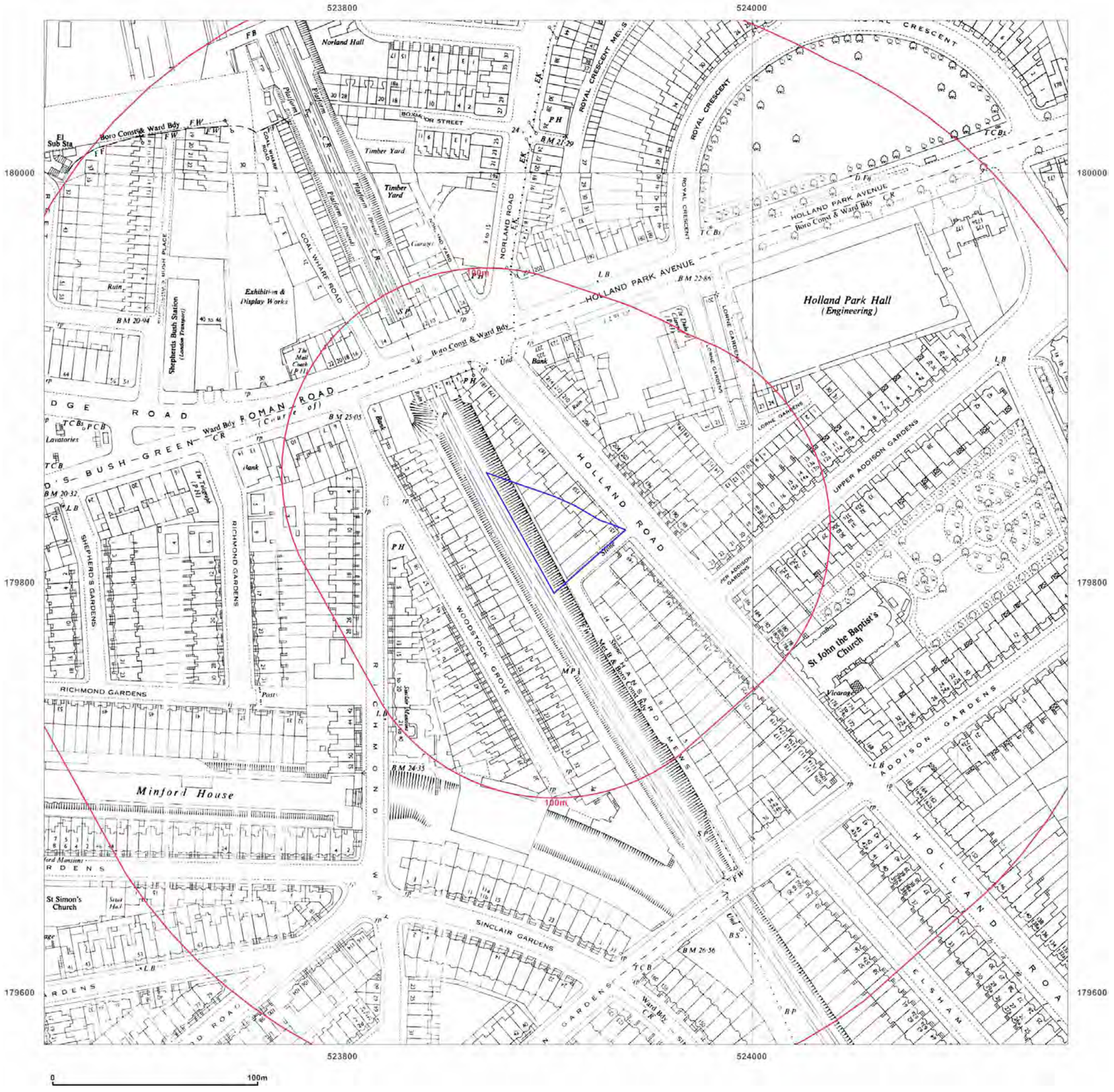
Surveyed 1952
Revised 1952
Edition N/A
Copyright N/A
Levelled 1934

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1953-1954**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

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

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

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

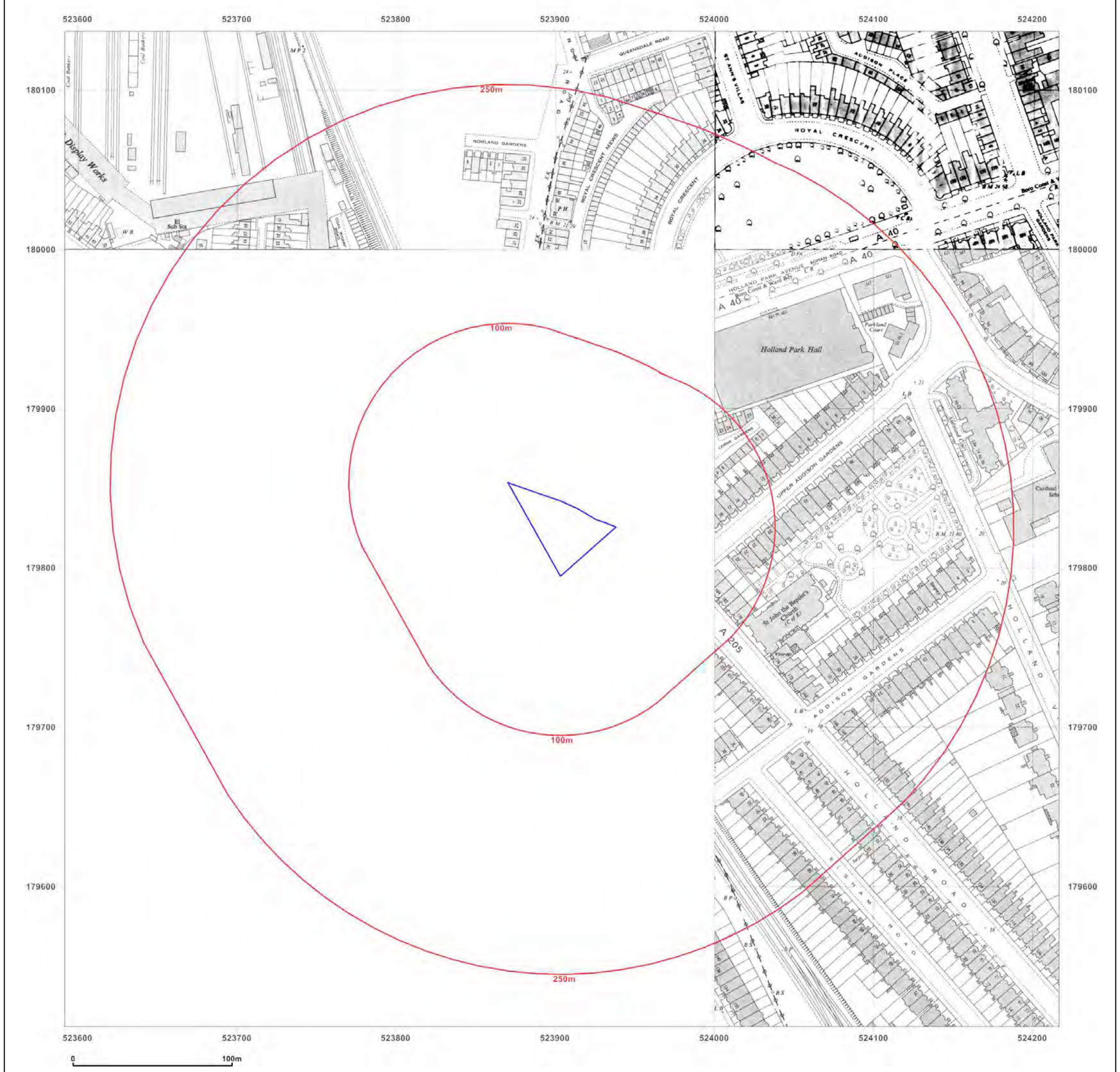
Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1963-1967**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1967
Revised 1967
Edition N/A
Copyright 1969
Levelled 1953

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

Surveyed 1963
Revised 1963
Edition N/A
Copyright 1967
Levelled 1954

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1963-1968**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1953
Revised 1967
Edition N/A
Copyright 1968
Levelled 1953

Surveyed 1952 Revised 1962 Edition N/A Copyright 1963 Levelled 1953	Surveyed 1952 Revised 1963 Edition N/A Copyright 1964 Levelled 1953

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1966-1970**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

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

Surveyed 1963
Revised 1963
Edition 1966
Copyright 1966
Levelled 1953

Surveyed N/A
Revised 1967
Edition N/A
Copyright 1970
Levelled N/A

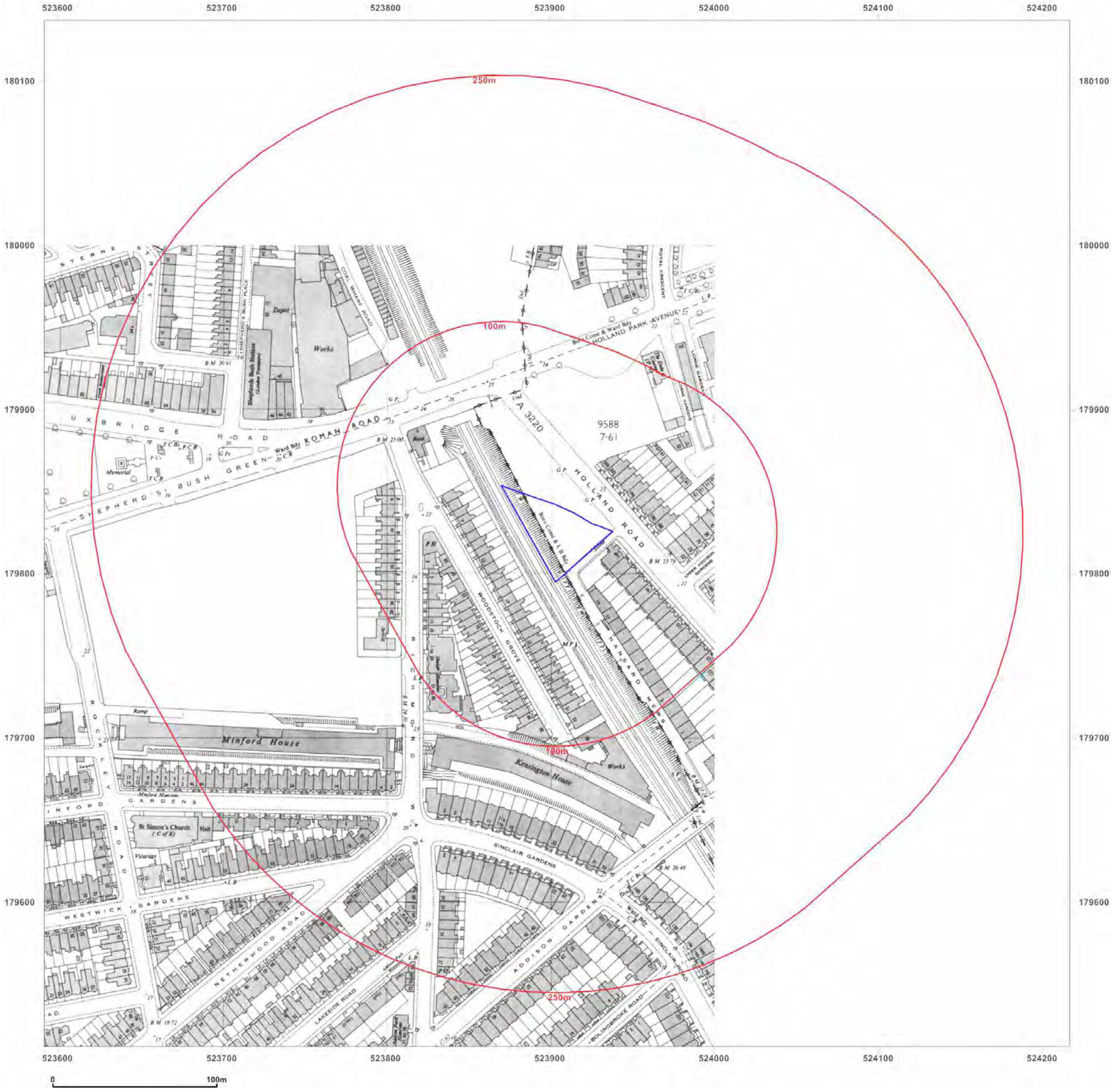
Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

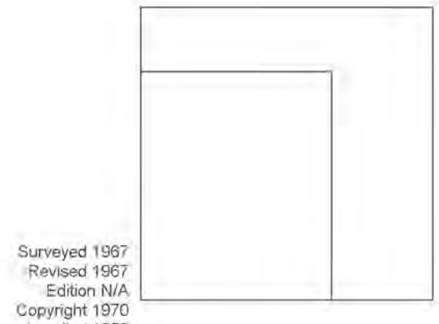
Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S



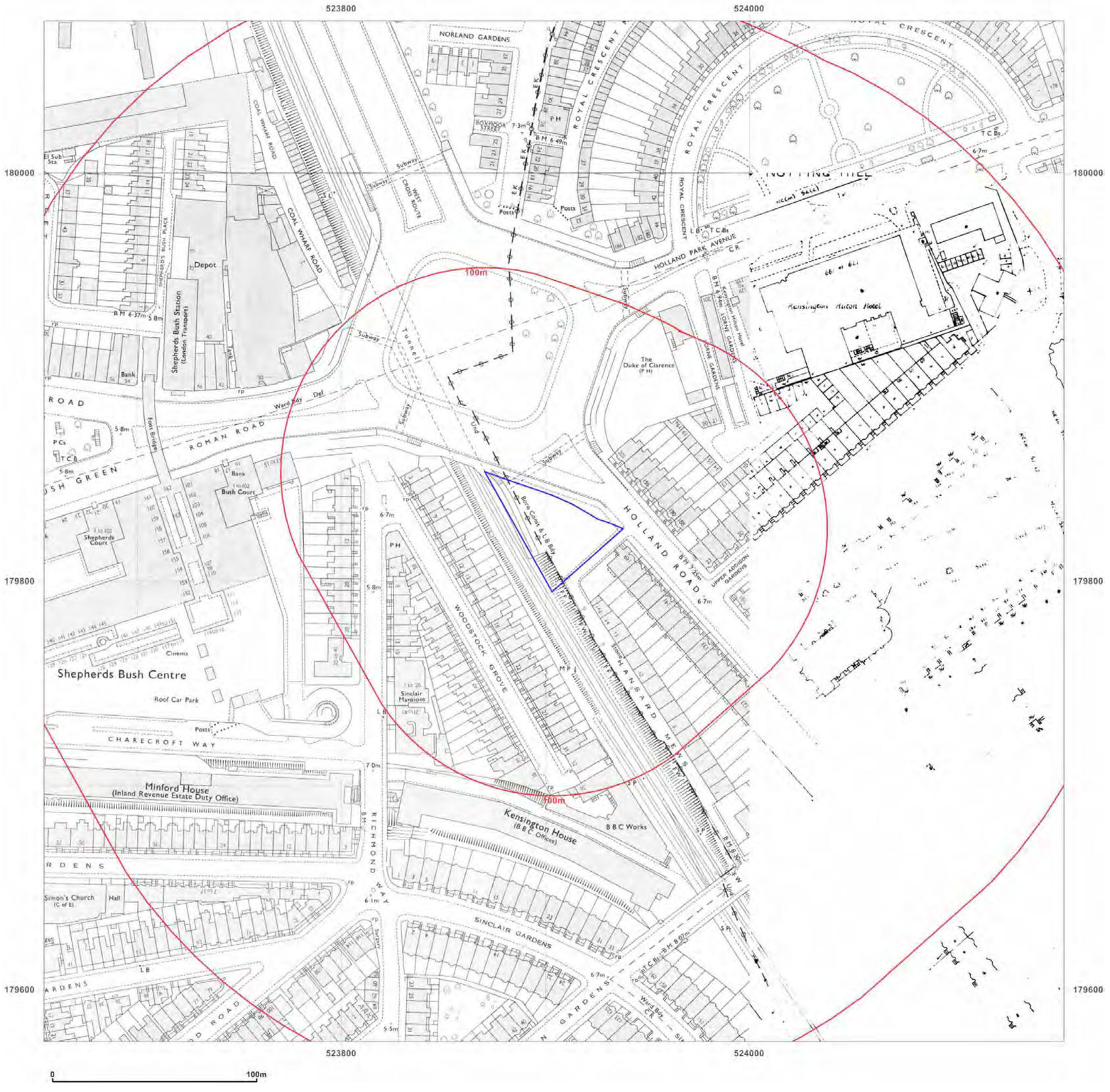
Surveyed 1967
Revised 1967
Edition N/A
Copyright 1970
Levelled 1953

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1971-1974**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

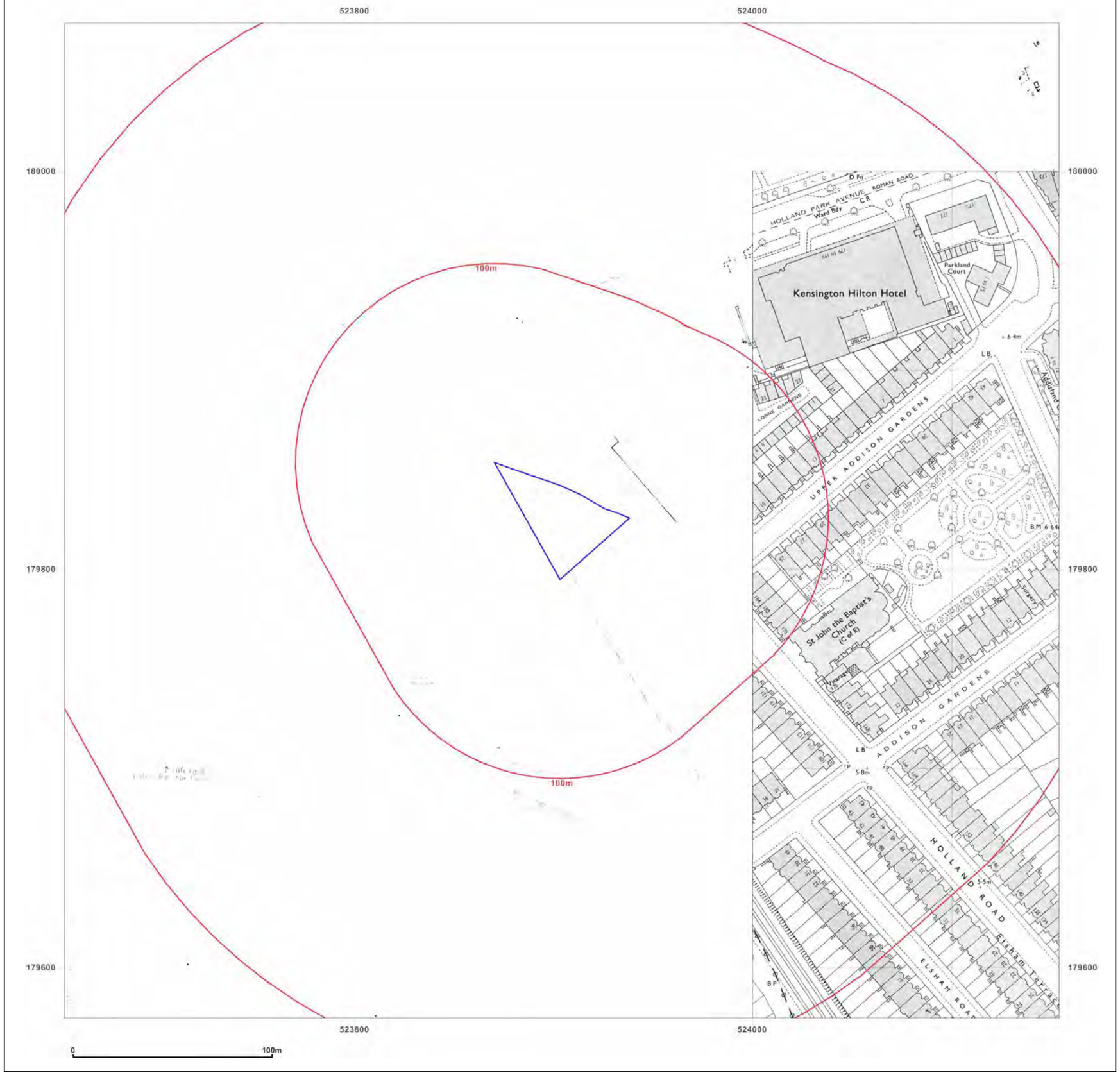
Surveyed 1953 Revised 1971 Edition N/A Copyright 1971 Levelled 1953	Surveyed 1953 Revised 1971 Edition N/A Copyright 1972 Levelled 1953
Surveyed 1952 Revised 1973 Edition N/A Copyright 1973 Levelled 1953	Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1973-1975**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

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

Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A	Surveyed 1952 Revised 1974 Edition N/A Copyright 1975 Levelled 1953

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1991**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

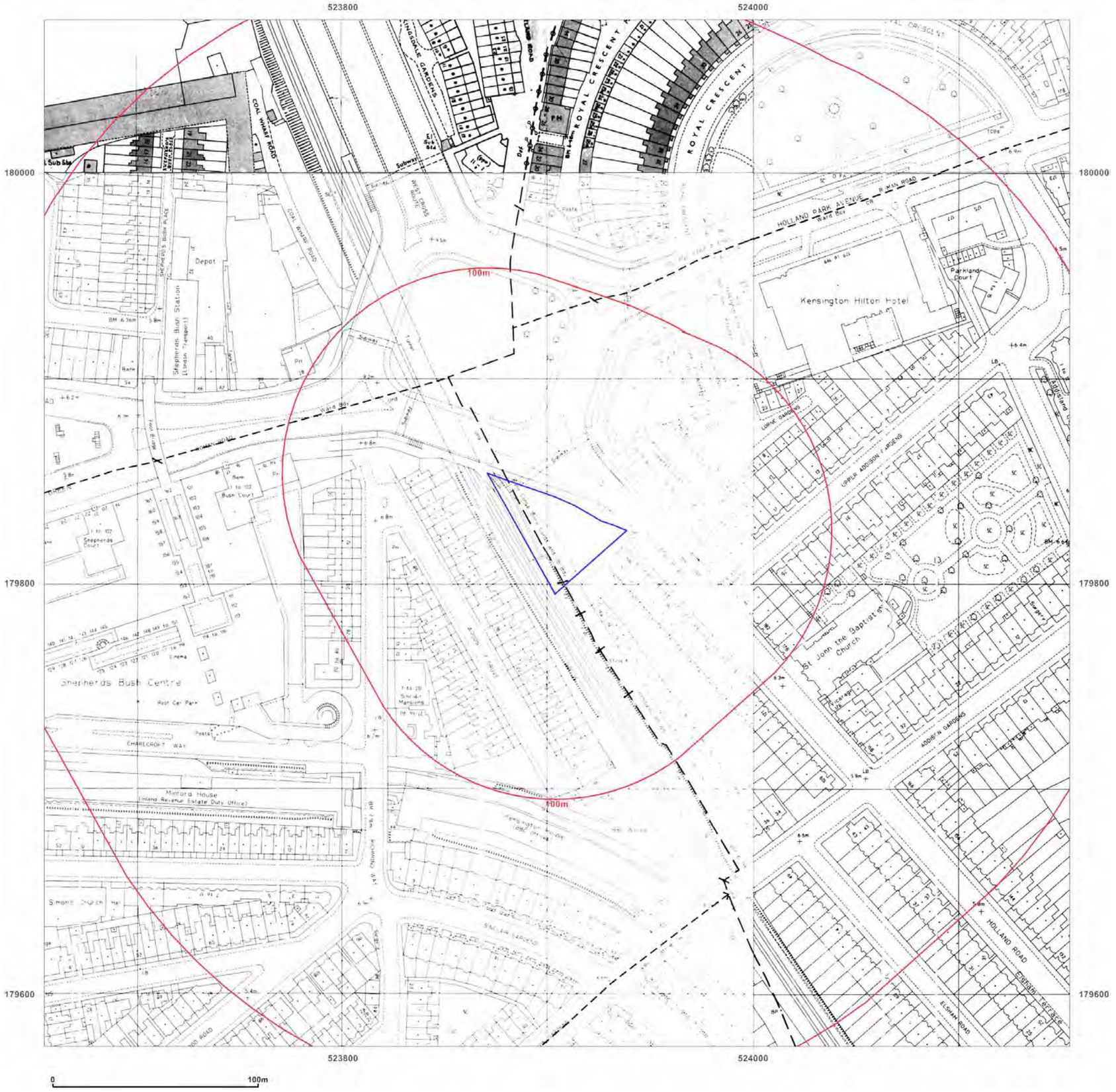
Surveyed N/A Revised N/A Edition N/A Copyright 1991 Levelled N/A	Surveyed 1991 Revised 1991 Edition N/A Copyright 1991 Levelled N/A
Surveyed 1991 Revised 1991 Edition N/A Copyright 1991 Levelled N/A	Surveyed 1991 Revised 1991 Edition N/A Copyright 1991 Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1988-1991**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1974
Revised 1988
Edition N/A
Copyright 1988
Levelled 1974

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1991
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1991
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1991
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1991-1995**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1991
Revised 1991
Edition N/A
Copyright 1991
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

169 Holland Road, RBKC , W11 4XB

Client Ref: PO0067007-1
Report Ref: GS-3885772
Grid Ref: 523904, 179825

Map Name: National Grid

Map date: **1992-1995**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 16 May 2017

To view map legend click here *Legend*

APPENDIX B

Groundsure Data Sheets

Arcadis

Arcadis,10, MEDAWAR ROAD,
GUILDFORD, GU2 7AR

Groundsure Reference:	GS-3885770
Your Reference:	PO0067007-1
Report Date	16 May 2017
Report Delivery Method:	Email - pdf

Groundsure Enviro Insight

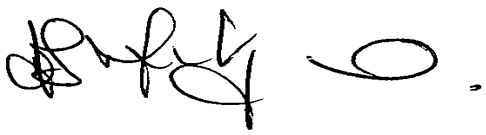
Address: 169 Holland Road, RBKC , W11 4XB

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Groundsure Enviro Insight

Address:	**169 Holland Road, RBKC , W11 4XB**
Date:	**16 May 2017**
Reference:	**GS-3885770**
Client:	**Arcadis**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	07-Jun-2015
Grid Reference:	523919,179819
Site Size:	0.16ha

Report Reference: GS-3885770
Client Reference: PO0067007-1

Contents Page

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	5	3	46	40
1.2 Additional Information – Historical Tank Database	0	0	5	14
1.3 Additional Information – Historical Energy Features Database	0	0	7	86
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	1	2	30
1.6 Potentially Infilled Land	4	1	16	10

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	2	5
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	0
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	2	2
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	0	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	1	0	1

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	9	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	2
4.3 National Grid Underground Electricity Cables	0	1	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	5
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	0	1	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	0	0	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	No	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	Yes
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Moderate

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	2
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Very Low
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Negligible
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

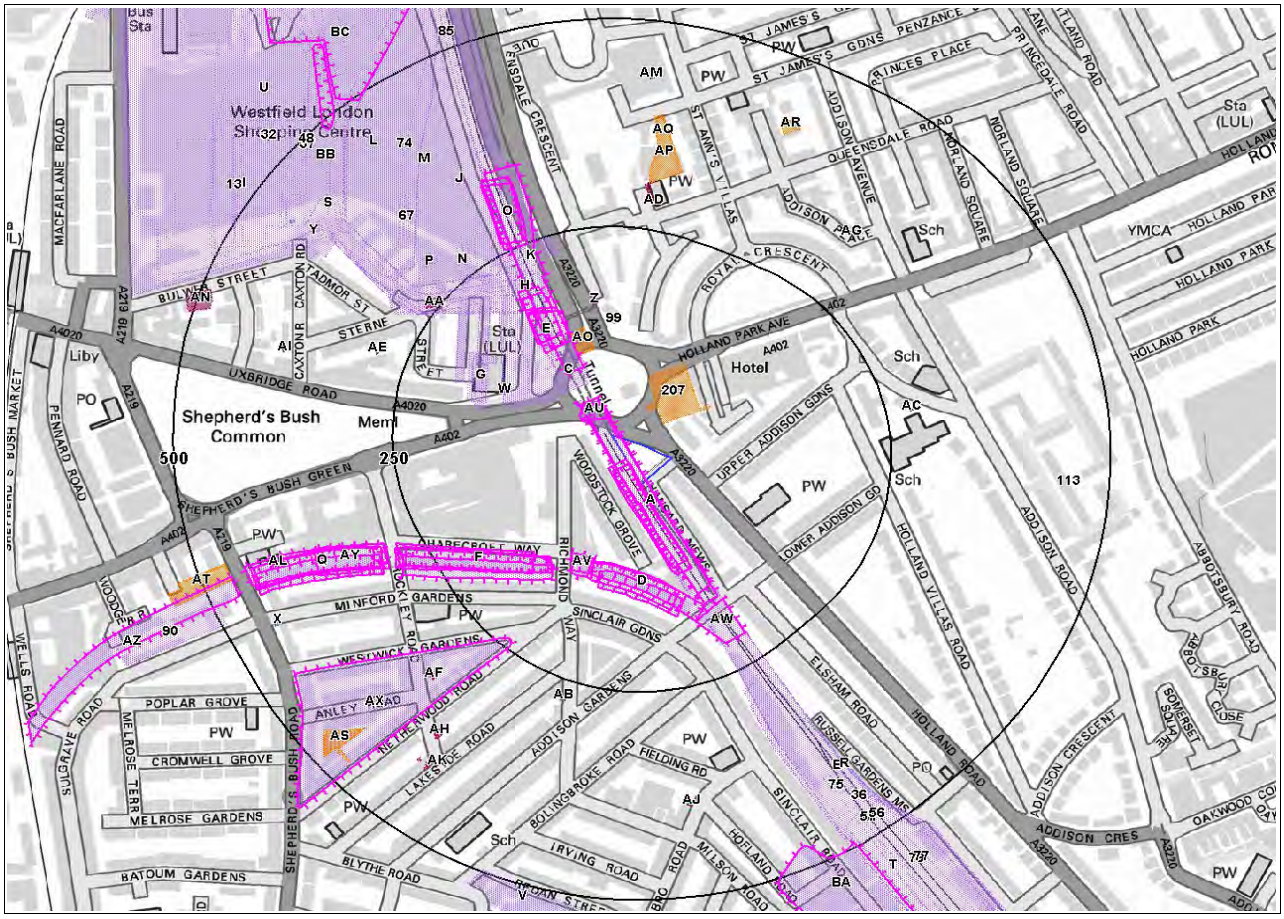
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 94

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Cuttings	1894
2A	0	On Site	Cuttings	1866
3A	0	On Site	Cuttings	1920
4A	0	On Site	Railway Sidings	1967
5A	0	SW	Cuttings	1947
6AU	21	N	Cuttings	1958
7B	48	SE	Railway Sidings	1974
8B	48	SE	Railway Sidings	1987
9C	67	NW	Railway Station	1920
10C	69	NW	Railway Station	1894
11BB	75	NW	Railway Sidings	1920
12C	78	NW	Unspecified Station	1947
13	78	NW	Railway Depot	1920
14K	87	N	Cuttings	1866
15D	101	S	Cuttings	1866
16D	103	S	Cuttings	1947
17AV	104	SW	Cuttings	1958
18D	110	S	Cuttings	1920
19E	116	NW	Railway Station	1987
20E	116	NW	Railway Station	1974
21E	122	NW	Cuttings	1920
22E	122	NW	Unspecified Pit	1958
23E	133	NW	Cuttings	1947
24F	136	SW	Cuttings	1894
25F	137	SW	Cuttings	1947
26F	139	SW	Cuttings	1920
27F	147	SW	Cuttings	1866
28G	148	W	Railway Station	1958
29G	148	W	Electricity Railway Station	1920
30G	149	W	Unspecified Station	1962
31G	154	W	Electricity Railway Station	1947
32	164	NW	Unspecified Works	1957
33H	167	NW	Railway Buildings	1973
34AW	167	SE	Cuttings	1866

35H	168	NW	Cuttings	1951
36	174	SE	Railway Sidings	1967
37	182	NW	Railway Depot	1951
38I	184	NW	Unspecified Depot	1996
39I	184	NW	Unspecified Depot	1973
40I	184	NW	Unspecified Depot	1982
41S	187	NW	Unspecified Depot	1967
42J	191	N	Railway Sidings	1894
43J	202	NW	Coal Depot	1866
44J	208	NW	Railway Sidings	1866
45K	211	NW	Railway Building	1894
46L	216	NW	Railway Sidings	1957
47L	216	NW	Railway Sidings	1967
48	226	NW	Railway Sidings	1951
49M	238	NW	Goods and Coal Yard	1957
50M	238	NW	Goods and Coal Yard	1967
51AX	239	SW	Brick Field	1866
52N	245	NW	Railway Building	1920
53N	248	NW	Railway Building	1894
54O	248	NW	Cuttings	1920
55O	254	NW	Cuttings	1951
56	264	SE	Railway Sidings	1958
57	269	SE	Railway Sidings	1920
58P	286	NW	Railway Building	1920
59P	287	NW	Unspecified Works	1982
60P	287	NW	Unspecified Works	1973
61	288	SE	Railway Sidings	1947
62Q	290	SW	Cuttings	1866
63AY	292	SW	Cuttings	1958
64Q	295	SW	Cuttings	1894
65Q	301	SW	Cuttings	1920
66Q	304	SW	Cuttings	1947
67	330	NW	Railway Building	1920
68R	338	SE	Railway Building	1947
69Y	407	NW	Railway Building	1920
70R	409	SE	Railway Building	1947
71R	412	SE	Railway Building	1987
72R	412	SE	Railway Building	1967
73R	412	SE	Railway Building	1974
74	413	NW	Railway Building	1920
75	420	SE	Railway Building	1920
76S	431	NW	Railway Building	1920
77	436	SE	Railway Sidings	1866
78	436	SE	Railway Sidings	1962
79	458	SE	Railway Sidings	1894
80AZ	466	W	Cuttings	1866

81T	467	SE	Railway Building	1987
82T	467	SE	Railway Building	1967
83T	467	SE	Railway Building	1974
84BA	474	SE	Brick Field	1866
85	476	N	Railway Sidings	1982
86U	483	NW	Railway Sidings	1996
87U	483	NW	Railway Sidings	1982
88U	483	NW	Railway Sidings	1973
89BC	494	NW	Brick Field	1894
90	494	SW	Unspecified Depot	1958
91V	497	S	Unspecified Works	1958
92V	499	S	Unspecified Works	1974
93V	499	S	Unspecified Works	1967
94V	499	S	Unspecified Works	1987

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 19

ID	Distance (m)	Direction	Use	Date
95W	130	W	Unspecified Tank	1991
96W	131	W	Unspecified Tank	1993
97W	131	W	Unspecified Tank	1991
98W	131	W	Unspecified Tank	1973
99	134	N	Unspecified Tank	1973
100X	441	SW	Unspecified Tank	1952
101X	441	SW	Unspecified Tank	1970
102X	442	SW	Unspecified Tank	1952
103X	442	SW	Unspecified Tank	1973
104X	442	SW	Unspecified Tank	1993
105X	442	SW	Unspecified Tank	1994
106X	443	SW	Unspecified Tank	1990
107X	443	SW	Unspecified Tank	1991
108Y	443	NW	Unspecified Tank	1953
109Y	444	NW	Unspecified Tank	1953
110Y	444	NW	Unspecified Tank	1967
111Y	444	NW	Unspecified Tank	1953
112Y	444	NW	Unspecified Tank	1968
113	452	E	Unspecified Tank	1916

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 93

ID	Distance (m)	Direction	Use	Date
114Z	157	N	Electricity Substation	1988
115Z	157	N	Electricity Substation	1984
116Z	157	N	Electricity Substation	1991
117Z	158	N	Electricity Substation	1993
118Z	158	N	Electricity Substation	1992
119Z	158	N	Electricity Substation	1994
120Z	158	N	Electricity Substation	1991
121AA	252	NW	Electricity Substation	1984
122AA	253	NW	Electricity Substation	1991
123AA	253	NW	Electricity Substation	1953
124AA	253	NW	Electricity Substation	1953
125AA	253	NW	Electricity Substation	1967
126AA	253	NW	Electricity Substation	1971
127AA	253	NW	Electricity Substation	1953
128AA	253	NW	Electricity Substation	1968
129AA	253	NW	Electricity Substation	1991
130AA	253	NW	Electricity Substation	1994
131AA	253	NW	Electricity Substation	1993
132AA	253	NW	Electricity Substation	1992
133AA	253	NW	Electricity Substation	1988
134AB	269	S	Electricity Substation	1991
135AB	270	S	Electricity Substation	1991
136AB	270	S	Electricity Substation	1993
137AC	276	E	Electricity Substation	1975
138AC	277	E	Electricity Substation	1991
139AD	279	N	Electricity Substation	1953
140AD	279	N	Electricity Substation	1971
141AD	280	N	Electricity Substation	1953
142AD	280	N	Electricity Substation	1953
143AE	283	W	Electricity Substation	1991
144AE	283	W	Electricity Substation	1993
145AE	283	W	Electricity Substation	1991
146AE	284	W	Electricity Substation	1973
147AF	329	SW	Electricity Substation	1991
148AF	330	SW	Electricity Substation	1993
149AF	330	SW	Electricity Substation	1991
150AF	330	SW	Electricity Substation	1973

151AG	336	NE	Electricity Substation	1991
152AG	336	NE	Electricity Substation	1995
153AG	336	NE	Electricity Substation	1953
154AG	337	NE	Electricity Substation	1972
155AG	337	NE	Electricity Substation	1953
156AG	337	NE	Electricity Substation	1953
157AG	337	NE	Electricity Substation	1991
158AG	337	NE	Electricity Substation	1970
159AH	372	SW	Electricity Substation	1952
160AH	372	SW	Electricity Substation	1952
161AH	374	SW	Electricity Substation	1968
162AH	374	SW	Electricity Substation	1993
163AH	374	SW	Electricity Substation	1991
164AH	374	SW	Electricity Substation	1990
165AH	374	SW	Electricity Substation	1990
166AH	374	SW	Electricity Substation	1991
167AH	374	SW	Electricity Substation	1991
168AI	384	W	Electricity Substation	1990
169AI	384	W	Electricity Substation	1973
170AI	384	W	Electricity Substation	1991
171AI	384	W	Electricity Substation	1993
172AI	384	W	Electricity Substation	1994
173AI	384	W	Electricity Substation	1993
174AJ	385	S	Electricity Substation	1991
175AJ	385	S	Electricity Substation	1970
176AJ	386	S	Electricity Substation	1968
177AJ	387	S	Electricity Substation	1990
178AJ	387	S	Electricity Substation	1990
179AJ	387	S	Electricity Substation	1991
180AJ	387	S	Electricity Substation	1993
181AK	407	SW	Electricity Substation	1991
182AK	407	SW	Electricity Substation	1968
183AK	409	SW	Electricity Substation	1952
184AK	409	SW	Electricity Substation	1952
185AL	409	W	Electricity Substation	1952
186AL	409	W	Electricity Substation	1952
187AL	409	W	Electricity Substation	1952
188AK	412	SW	Electricity Substation	1970
189AK	412	SW	Electricity Substation	1990
190AK	413	SW	Electricity Substation	1990
191AK	413	SW	Electricity Substation	1991
192AK	414	SW	Electricity Substation	1991
193AM	430	N	Electricity Substation	1984
194AM	430	N	Electricity Substation	1988
195AM	430	N	Electricity Substation	1971
196AM	431	N	Electricity Substation	1968

197AM	431	N	Electricity Substation	1991
198AM	431	N	Electricity Substation	1993
199AM	431	N	Electricity Substation	1994
200AM	431	N	Electricity Substation	1992
201AM	431	N	Electricity Substation	1967
202AM	431	N	Electricity Substation	1985
203AN	483	W	Electricity Substation	1991
204AN	483	W	Electricity Substation	1995
205AN	500	W	Electricity Substation	1991
206AN	500	W	Electricity Substation	

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 33

ID	Distance (m)	Direction	Use	Date
207	33	NE	Garage	1963
208AO	103	N	Garages	1952
209AO	103	N	Garage	1952
210AP	305	N	Garage	1991
211AP	305	N	Garage	1984
212AP	305	N	Garage	1988
213AP	306	N	Garage	1953
214AP	306	N	Garage	1953
215AP	306	N	Garage	1967
216AQ	347	N	Garage	1953
217AQ	347	N	Garage	1968
218AQ	347	N	Garage	1971
219AQ	348	N	Garage	1994
220AQ	348	N	Garage	1992
221AQ	348	N	Garage	1993
222AQ	348	N	Garage	1991

223AR	407	NE	Motor Vehicle Repair Works	1972
224AR	407	NE	Motor Vehicle Repair Works	1970
225AS	429	SW	Garage	1968
226AS	434	SW	Garage	1952
227AS	434	SW	Garage	1990
228AS	434	SW	Garage	1991
229AS	434	SW	Garage	1990
230AS	434	SW	Garage	1952
231AS	434	SW	Garage	1991
232AS	436	SW	Garage	1993
233AS	436	SW	Garage	1973
234AT	466	W	Garage	1994
235AT	466	W	Garage	1993
236AT	466	W	Garage	1991
237AT	466	W	Garage	1990
238AT	467	W	Garage	1991
239AT	467	W	Garage	

1.6 Potentially Infilled Land

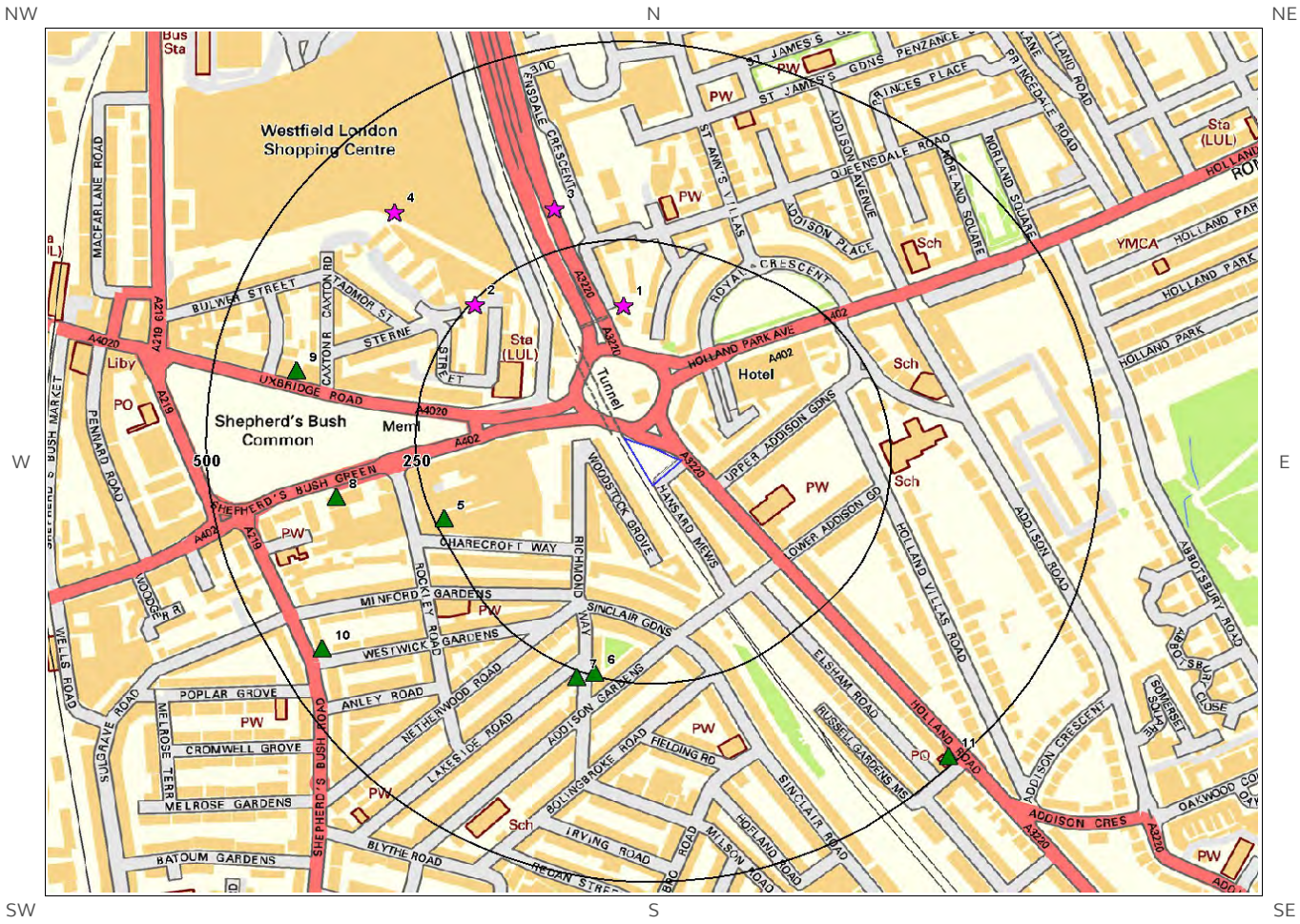
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 31

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
240A	0	On Site	Cuttings	1866
241A	0	On Site	Cuttings	1894
242A	0	On Site	Cuttings	1920
243A	0	SW	Cuttings	1947
244AU	21	N	Cuttings	1958
245K	87	N	Cuttings	1866
246D	101	S	Cuttings	1866
247D	103	S	Cuttings	1947
248AV	104	SW	Cuttings	1958
249D	110	S	Cuttings	1920
250E	122	NW	Cuttings	1920
251E	122	NW	Unspecified Pit	1958
252E	133	NW	Cuttings	1947
253F	136	SW	Cuttings	1894
254F	137	SW	Cuttings	1947
255F	139	SW	Cuttings	1920
256F	147	SW	Cuttings	1866
257AW	167	SE	Cuttings	1866
258H	168	NW	Cuttings	1951
259AX	239	SW	Brick Field	1866

260O	248	NW	Cuttings	1920
261O	254	NW	Cuttings	1951
262Q	290	SW	Cuttings	1866
263AY	292	SW	Cuttings	1958
264Q	295	SW	Cuttings	1894
265Q	301	SW	Cuttings	1920
266Q	304	SW	Cuttings	1947
267AZ	466	W	Cuttings	1866
268BA	474	SE	Brick Field	1866
269BB	488	NW	Pond	1866
270BC	494	NW	Brick Field	1894

2. Environmental Permits, Incidents and Registers Map



- Site Outline
- 250 / 500 Search Buffers (m)
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

7

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
5	239	SW	523654 179751	Address: Wm Morrison Supermarkets Plc, Units 1-3, The Links West 12 Shopping Centre, Shepherd's Bush Green, London, W12 8PP Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Received Date of Enforcement: No Enforcements Received Comment: No Enforcements Received
6	248	S	523834 179557	Address: Richmond Dry Cleaners, 39 Richmond Way, London, W14 0AS Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Received Date of Enforcement: No Enforcements Received Comment: No Enforcements Received
7	260	S	523813 179551	Address: No 70 Dry Cleaners, 70 Richmond Way, London, W14 0AS Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Received Date of Enforcement: No Enforcements Received Comment: No Enforcements Received
8	352	W	523526 179778	Address: Bush Centre Service Station, 37 Shepherd's Bush Green, London, W12 8PP Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Received Date of Enforcement: No Enforcements Received Comment: No Enforcements Received
9	401	W	523478 179938	Address: Shepherds Bush Dry Cleaners, 124 Uxbridge Road, London, W12 8AA Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Received Date of Enforcement: No Enforcements Received Comment: No Enforcements Received
10	446	SW	523508 179587	Address: Total, Westwick Gardens, Kensington, W14 0BU Process: Petrol Vapour Recovery Process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Received Date of Enforcement: No Enforcements Received Comment: No Enforcements Received
11	491	SE	524257 179452	Address: Kensington Dry Cleaners, 1 Russell Gardens, W14 8EZ Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

0

Database searched and no data found.

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

4

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	167	N	523868 180021	Incident Date: 05-Jul-2001 Incident Identification: 13933 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Dust	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
2	246	NW	523690 180022	Incident Date: 09-Jun-2003 Incident Identification: 164280 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

ID	Distance (m)	Direction	NGR	Details	
3	301	N	523785 180143	Incident Date: 27-Jul-2001 Incident Identification: 19567 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Dust	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
4	396	NW	523595 180139	Incident Date: 26-Apr-2002 Incident Identification: 75004 Pollutant: Inert Materials and Wastes Pollutant Description: Mineral Materials and Wastes	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

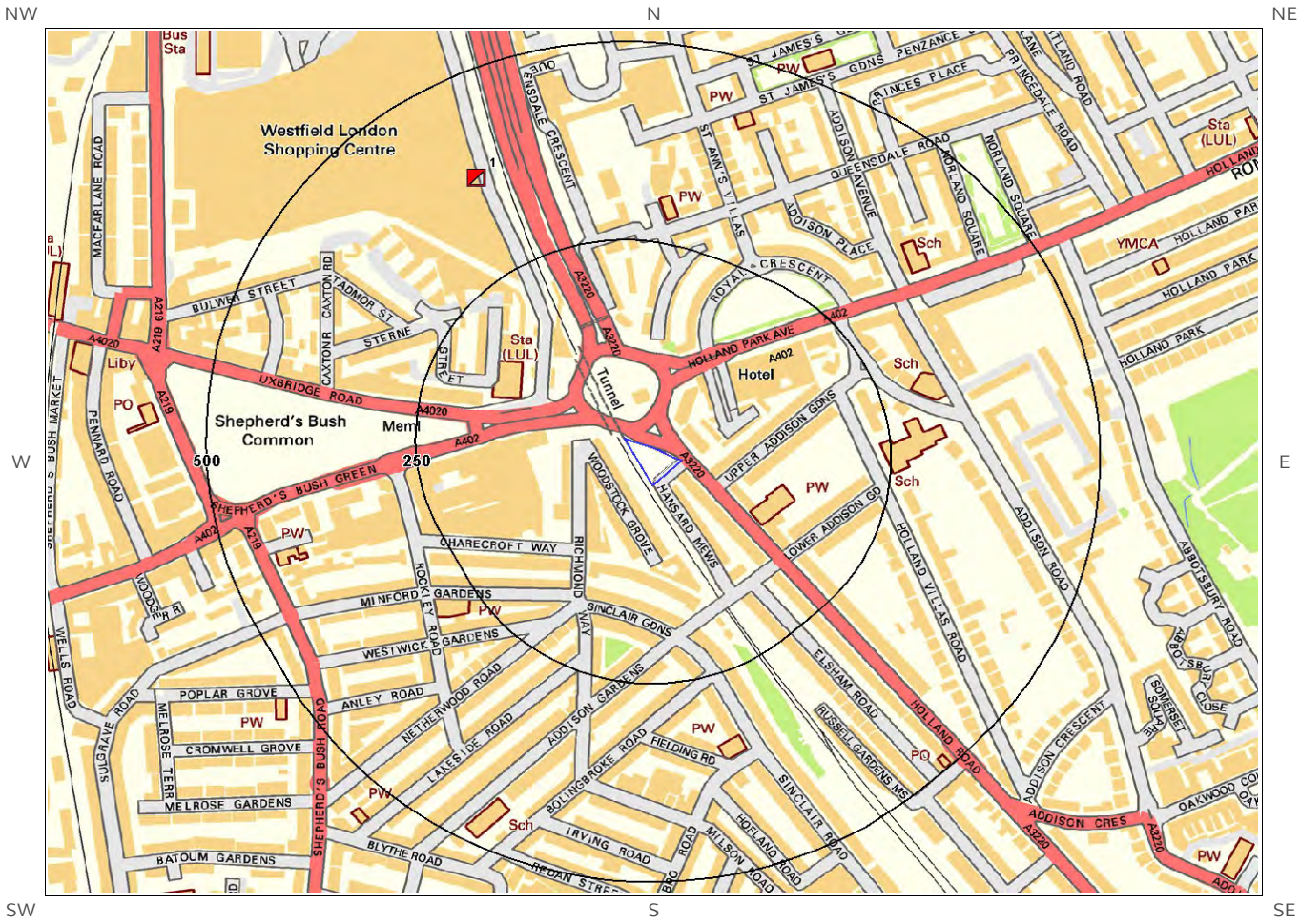
Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

Database searched and no data found.

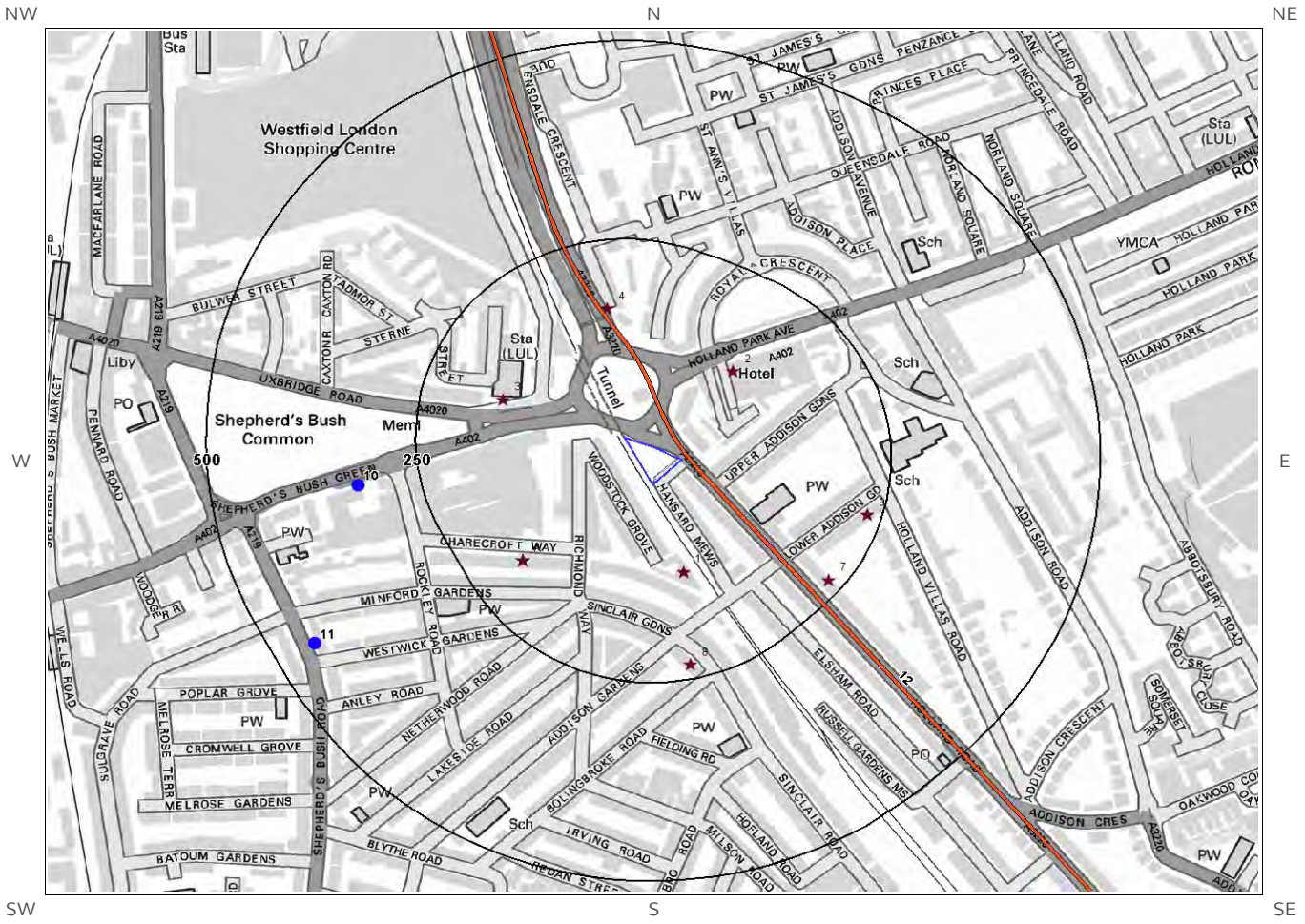
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

2

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
1	374	NW	523693 180183	Site Address: H & G Lorry Park, 38, Wood Lane, London, W12 7DT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BRI014 EPR reference: EA/EPR/VP3296NV/S004 Operator: Bridgemarts Ltd Waste Management licence No: 80047 Annual Tonnage: 19600.0	Issue Date: 30/06/1992 Effective Date: 20/12/2003 Modified: 20/12/2002 Surrendered Date: 22/07/2004 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: H & G Lorry Park, Wood Lane Correspondence Address: -
Not shown	1079	W	522846 179514	Site Address: 145, Goldhawk Road, Shepherds Bush, London, W12 8EN Type: Metal Recycling Site (Vehicle Dismantler) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ORP002 EPR reference: EA/EPR/WP3197NW/A001 Operator: Orpin Jane Waste Management licence No: 80639 Annual Tonnage: 2500.0	Issue Date: 01/11/2004 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Reg Orpin Motorcycles Correspondence Address: -

4. Current Land Use Map



Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 9

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	116	S	Wendy House Productions Ltd	523940 179685	Wendy House Productions Ltd, Unit 2/B Woodstock Studios 36, Woodstock Grove, London, W12 8LE	Recording Studios and Record Companies	IT, Advertising, Marketing and Media Services
2	127	NE	Sixt	523998 179938	Sixt, 179-199, Holland Park Avenue, London, W11 4UL	Vehicle Hire and Rental	Hire Services
3	154	W	Shepherd's Bush Central	523724 179902	Shepherd's Bush Central, Shepherds Bush Station Central, Uxbridge Road, London, W12 8ND	Underground Network Stations	Public Transport, Stations and Infrastructure
4	164	N	Electricity Sub Station	523849 180017	Electricity Sub Station, W11	Electrical Features	Infrastructure and Facilities
5A	182	SW	G U	523748 179699	G U, The Shepherds Building, Rockley Road, London, W14 0DA	Baking and Confectionery	Foodstuffs
6A	182	SW	Plenish Cleanse	523748 179699	Plenish Cleanse, The Shepherds Building, Charecroft Way, London, W14 0EE	Non Alcoholic Drinks	Foodstuffs
7	231	SE	Eco Prom	524113 179675	Eco Prom, 152-154, Holland Road, London, W14 8BE	Wood Products Including Charcoal, Paper, Card and Board	Industrial Products
8	231	S	Rooster Recording Studios	523947 179568	Rooster Recording Studios, 117, Sinclair Road, London, W14 0NP	Recording Studios and Record Companies	IT, Advertising, Marketing and Media Services
9	232	E	Y C Couture	524159 179757	Y C Couture, 5, Lower Addison Gardens, London, W14 8BG	Clothing, Components and Accessories	Consumer Products

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 2

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
10	325	W	523551 179794	BP	Bush Centre Sf Connect, Shepherds Bush Green, Shepherds Bush Green, Shepherds Bush, London, Inner London, W12 8PS	Yes	Open
11	451	SW	523499 179594	Total	Shepherds Bush Service Station, Shepherds Bush Road, Shepherds Bush Road, Westwick Gardens, Shepherds Bush, London, Inner London, W6 7NA	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 1

The following Underground Electricity Transmission Cable records are represented as linear features on the Current Land Use map:

ID	Distance (m)	Direction	Details	
12	8	NE	Cable Set: - Cable Route: LONDON POWER TUNNELS (PLANNED ROUTE) Cable Make: -	Cable Type: A/C Operating Voltage (kV): 400 Year of installation: - Cable in tunnel: Y

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
KPGR-XSV	KEMPTON PARK GRAVEL MEMBER	SAND AND GRAVEL
LASI-XCZ	LANGLEY SILT MEMBER	CLAY AND SILT

5.3 Bedrock and Solid Geology

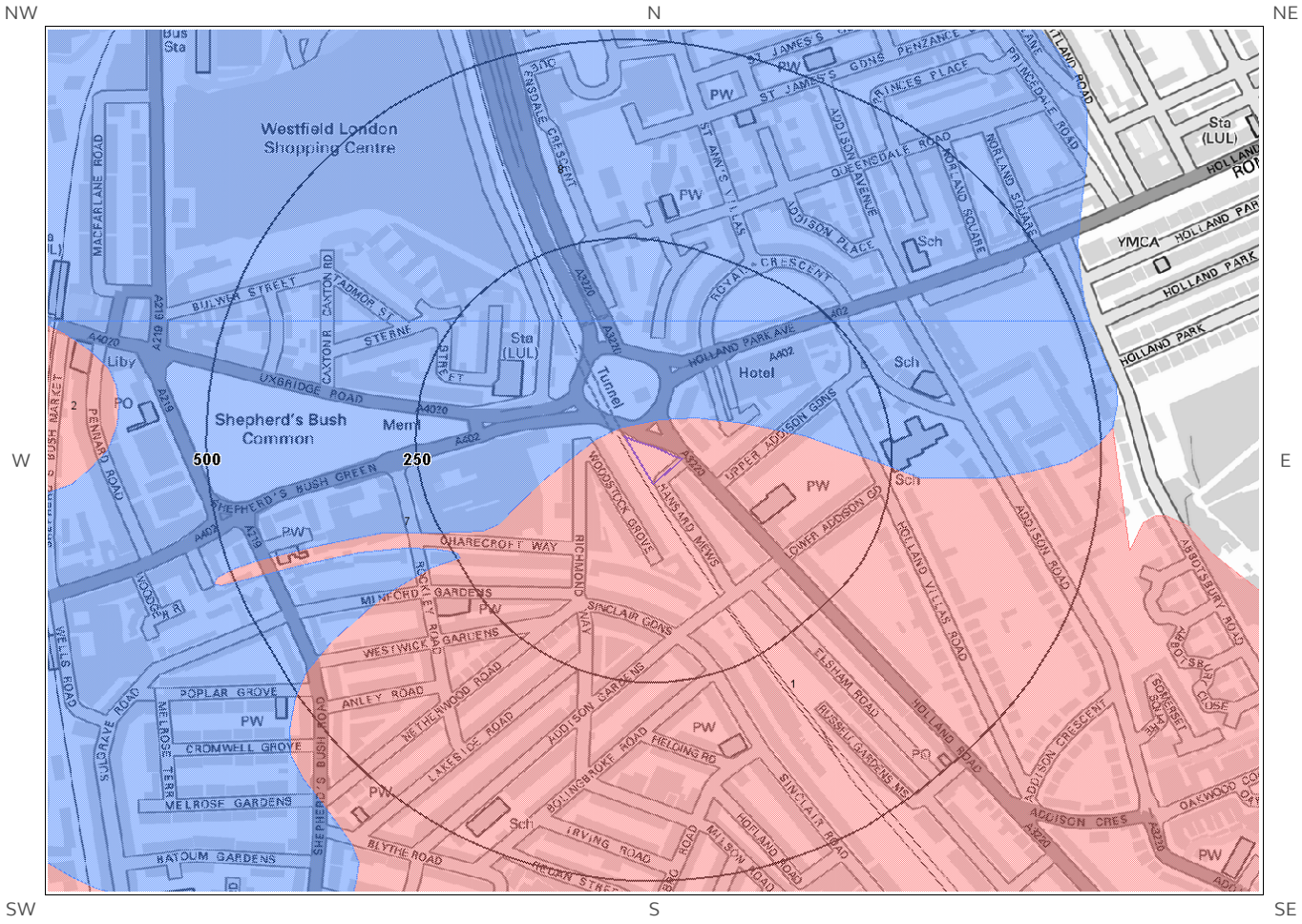
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
LC-XCZ	LONDON CLAY FORMATION	CLAY AND SILT

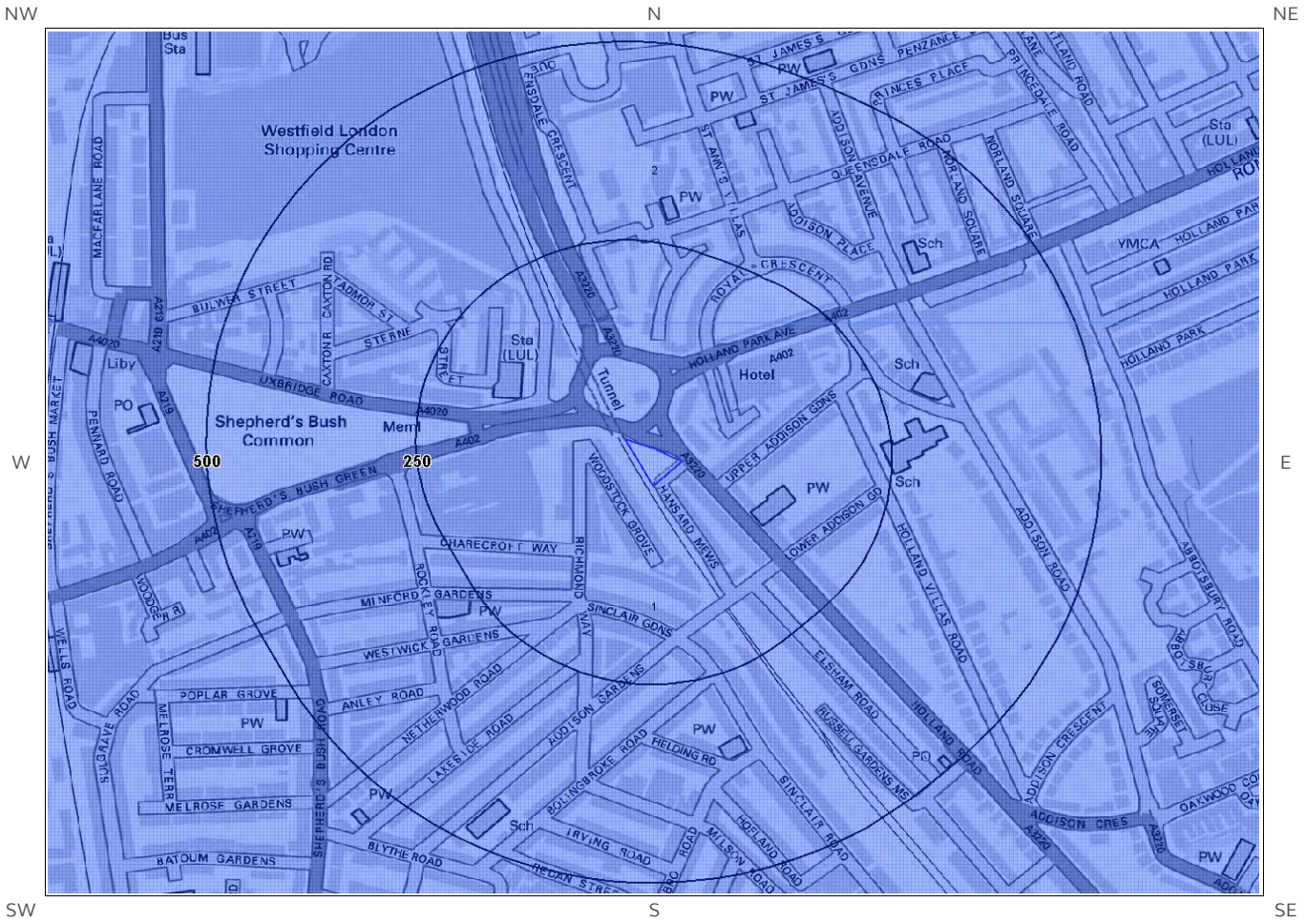
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



6b. Aquifer Within Bedrock Geology and Abstraction Licenses



Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

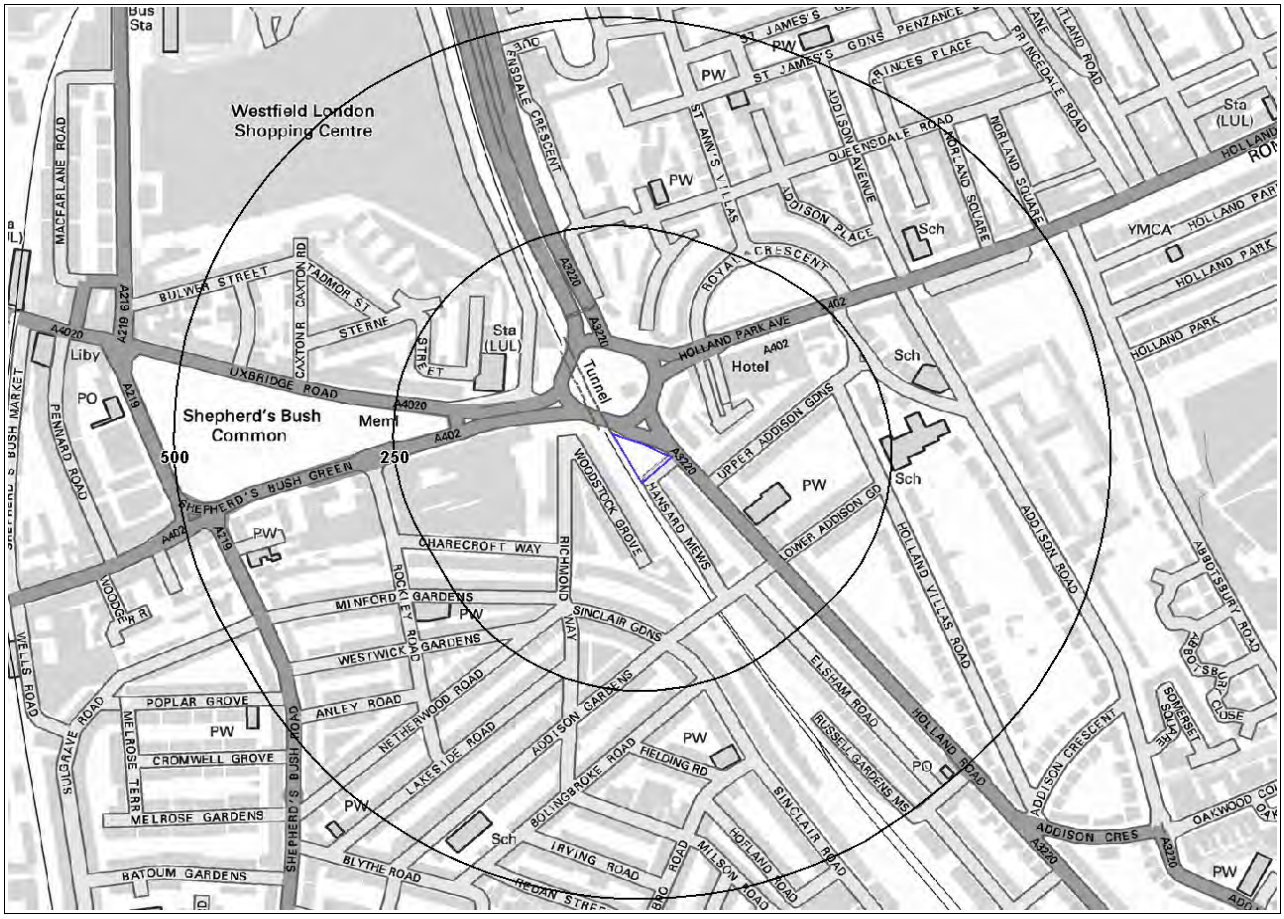
Surface Water Abstraction Licence

6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses

NW N NE

W E

SW S SE



Site Outline

250 500 Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

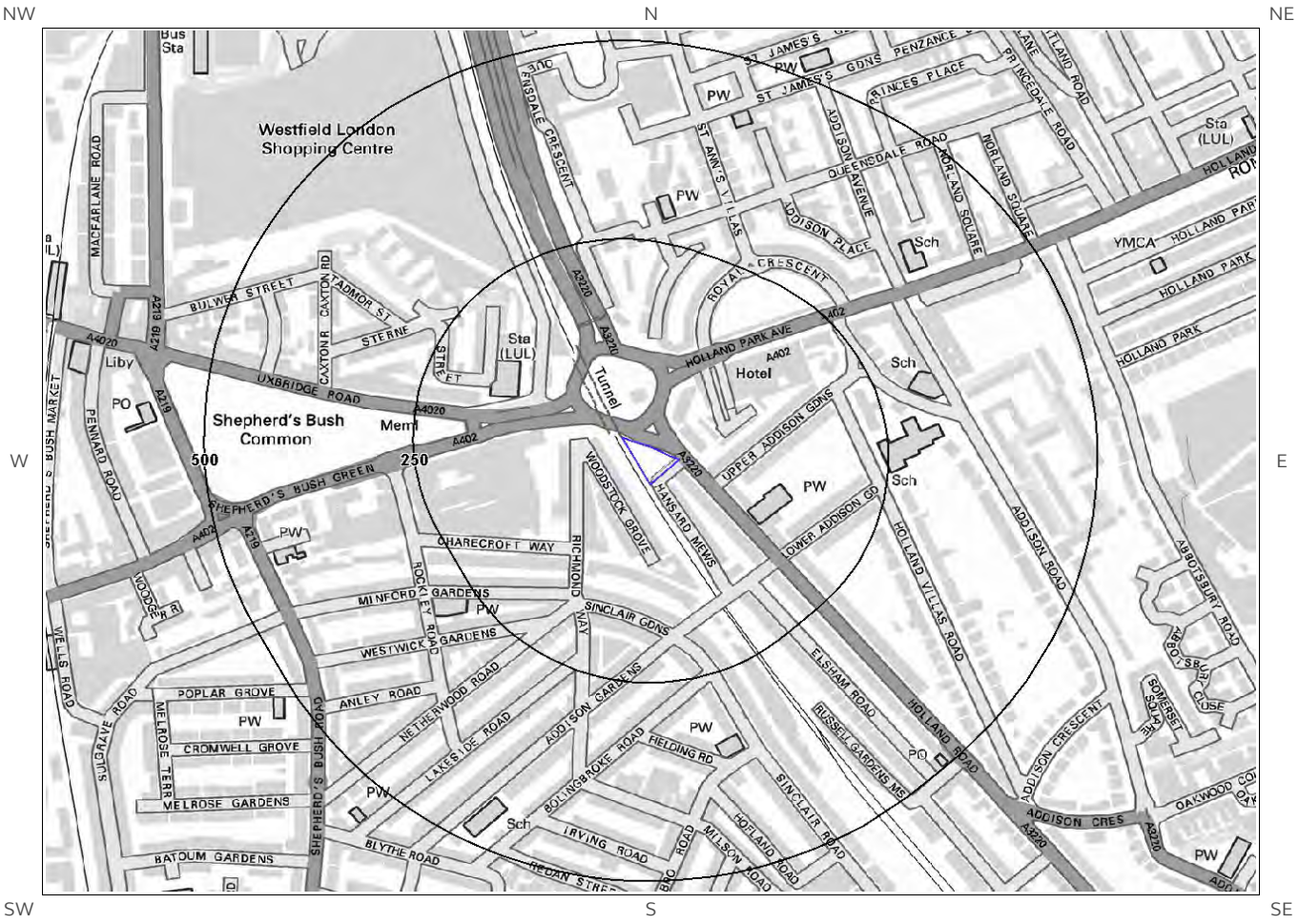
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

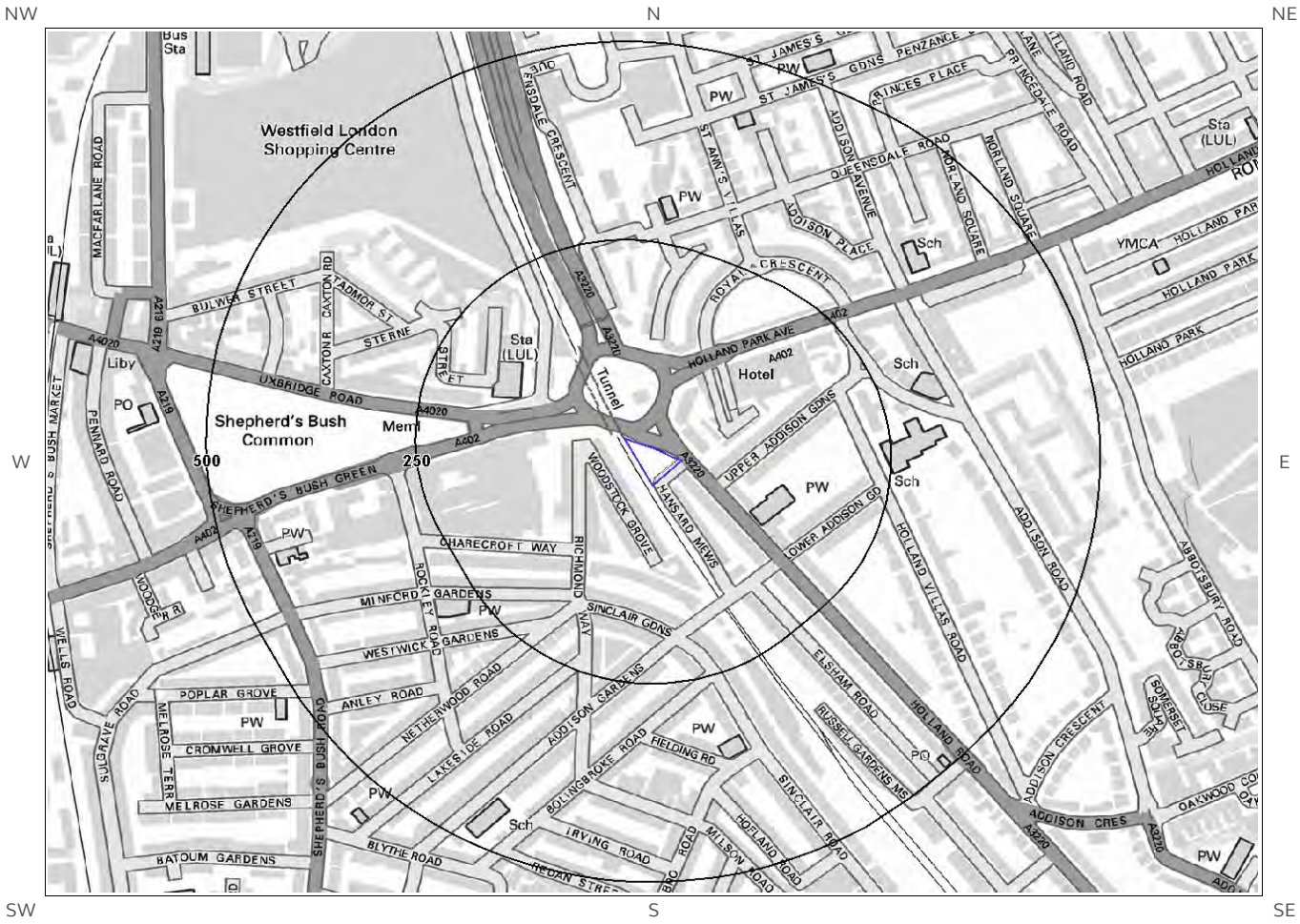
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Site Outline

Potable Water Abstraction Licence

250 — 500 — Search Buffers (m)

6e. Hydrology – Detailed River Network and River Quality



6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
7	13	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
8	146	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	146	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	764	W	523150 179600	Status: Historical Licence No: 28/39/39/0210 Details: Pollution Remediation Direct Source: Thames Groundwater Point: London United Bus Depot, Shepherds Bush- Point 'a' Data Type: Point Name: LAND CLEAN LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: WRA/N/1328 Original Start Date: 20/11/2003 Expiry Date: 31/12/2009 Issue No: 1 Version Start Date: 20/11/2003 Version End Date:
Not shown	1150	NE	524703 180685	Status: Active Licence No: TH/039/0039/024 Details: Non-Evaporative Cooling Direct Source: Thames Groundwater Point: Borehole-notting Hill London Data Type: Point Name: Cohen	Annual Volume (m^3): 73000 Max Daily Volume (m^3): 200 Original Application No: NPSWR002984 Original Start Date: 24/5/2010 Expiry Date: 31/3/2019 Issue No: 1 Version Start Date: 24/5/2010 Version End Date:
Not shown	1494	NW	523285 181229	Status: Active Licence No: TH/039/0039/083 Details: Heat Pump Direct Source: Thames Groundwater Point: Borehole At Imperial College West (block C) Data Type: Point Name: Imperial College of Science, Technology and Medicine	Annual Volume (m^3): 213442 Max Daily Volume (m^3): 2172 Original Application No: NPS/WR/013578 Original Start Date: 29/6/2016 Expiry Date: 31/3/2025 Issue No: 1 Version Start Date: 29/6/2016 Version End Date:
Not shown	1770	E	525680 180139	Status: Active Licence No: TH/039/0039/092 Details: Heat Pump Direct Source: Thames Groundwater Point: Kensington Park Gardens - Bh A Data Type: Point Name: KPG, LLC	Annual Volume (m^3): 27700 Max Daily Volume (m^3): 166 Original Application No: NPS/WR/016404 Original Start Date: 17/1/2014 Expiry Date: 31/3/2025 Issue No: 2 Version Start Date: 21/7/2014 Version End Date:
Not shown	1770	E	525680 180139	Status: Active Licence No: TH/039/0039/092 Details: Spray Irrigation - Direct Direct Source: Thames Groundwater Point: Kensington Park Gardens - Bh A Data Type: Point Name: KPG, LLC	Annual Volume (m^3): 27700 Max Daily Volume (m^3): 166 Original Application No: NPS/WR/016404 Original Start Date: 17/1/2014 Expiry Date: 31/3/2025 Issue No: 2 Version Start Date: 21/7/2014 Version End Date:
Not shown	1947	NW	522526 181262	Status: Active Licence No: TH/039/0039/033 Details: Heat Pump Direct Source: Thames Groundwater Point: Borehole At Imperial College Hammersmith Campus Data Type: Point Name: IMPERIAL COLLEGE LONDON	Annual Volume (m^3): 240451 Max Daily Volume (m^3): 951 Original Application No: NPS WR 004629 Original Start Date: 22/12/2010 Expiry Date: 31/3/2019 Issue No: 1 Version Start Date: 22/12/2010 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	HU	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.
413	NE	Minor Aquifer/High Leaching Potential	HU	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.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? No

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? No

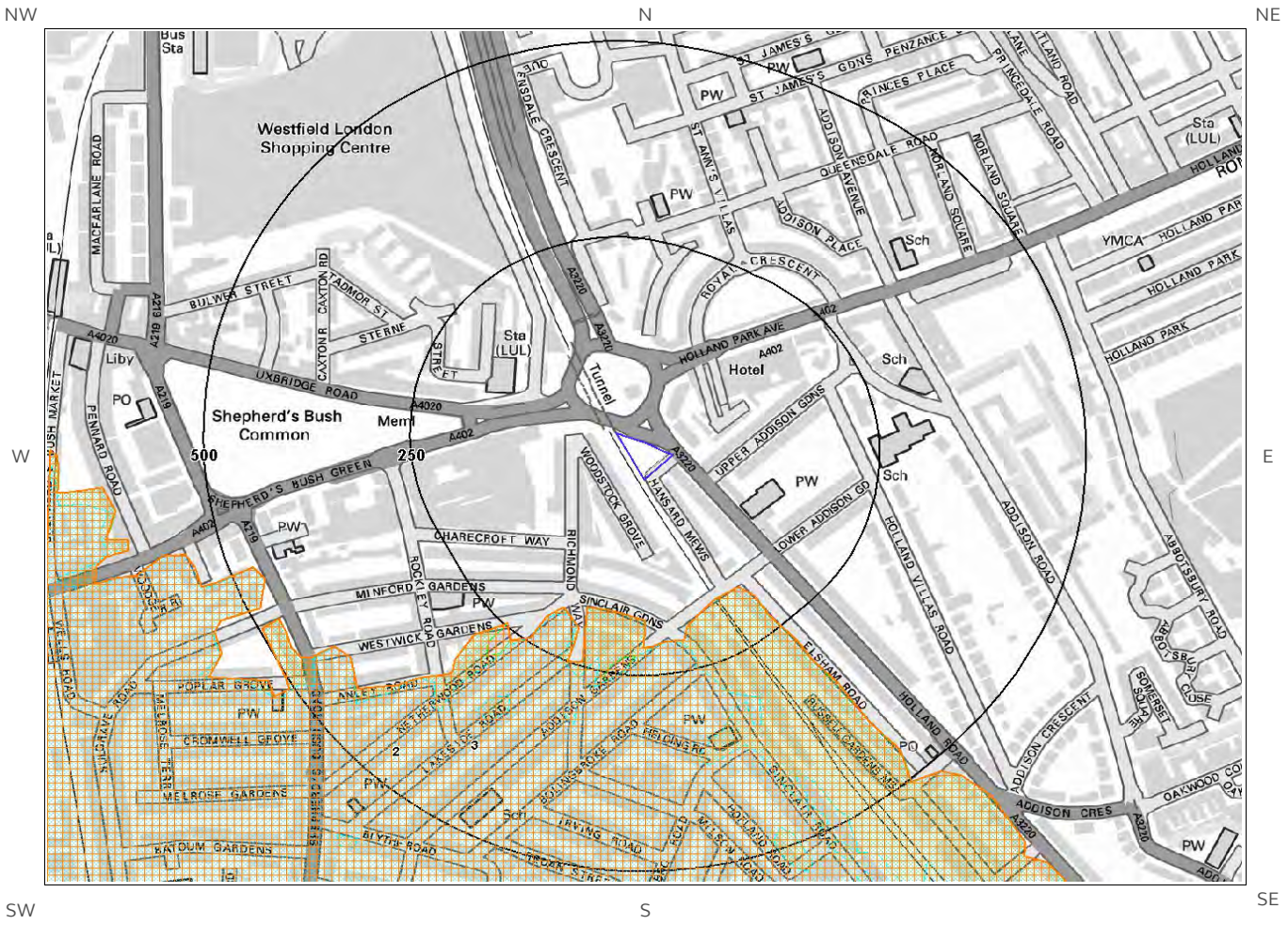
Database searched and no data found.

6.11 Surface Water Features

Are there any surface water features within 250m of the study site? No

Database searched and no data found.

7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

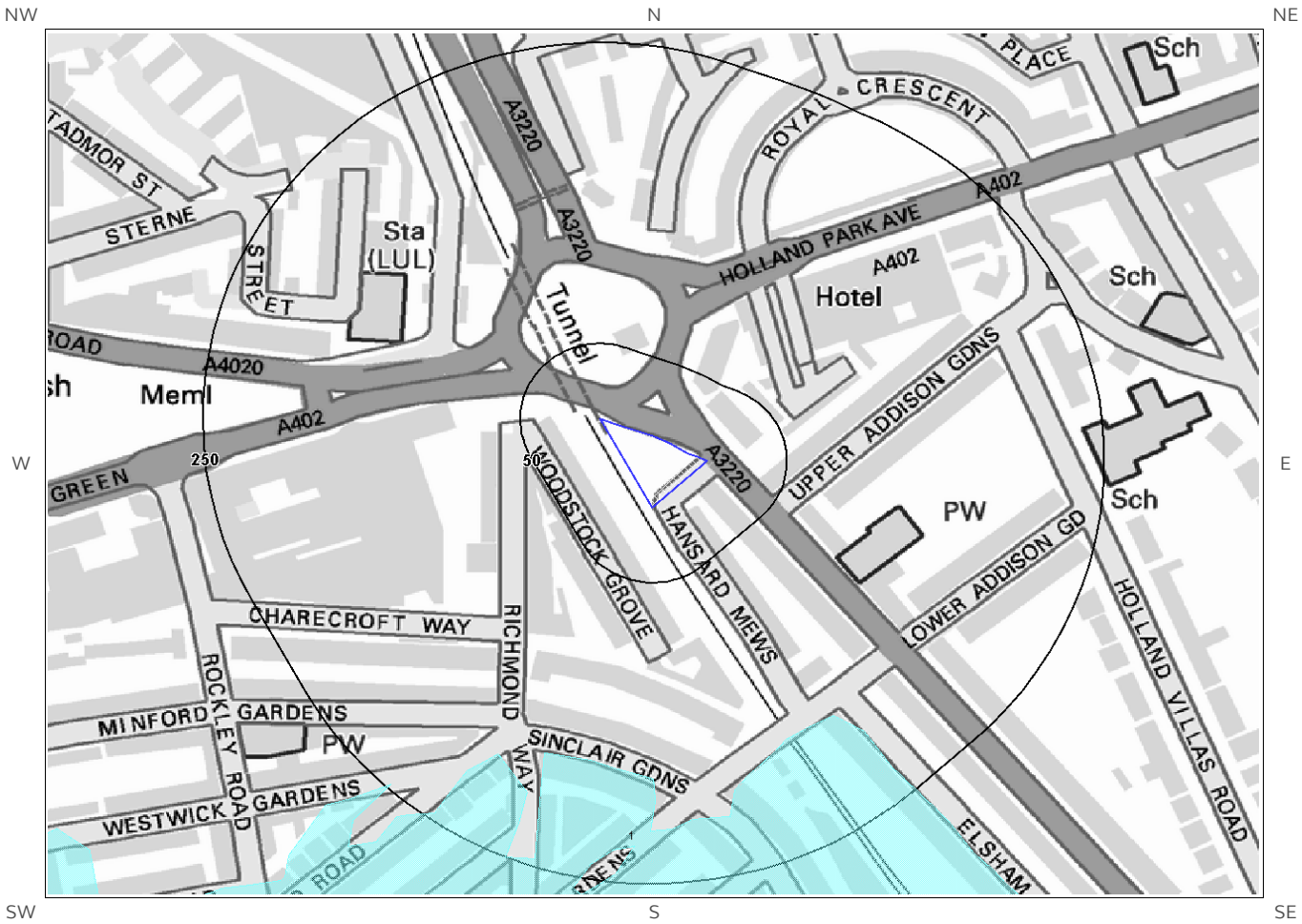
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? Yes

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	172	S	01-Feb-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? Yes

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	194	SW	01-Feb-2017	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? Yes

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? Moderate

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

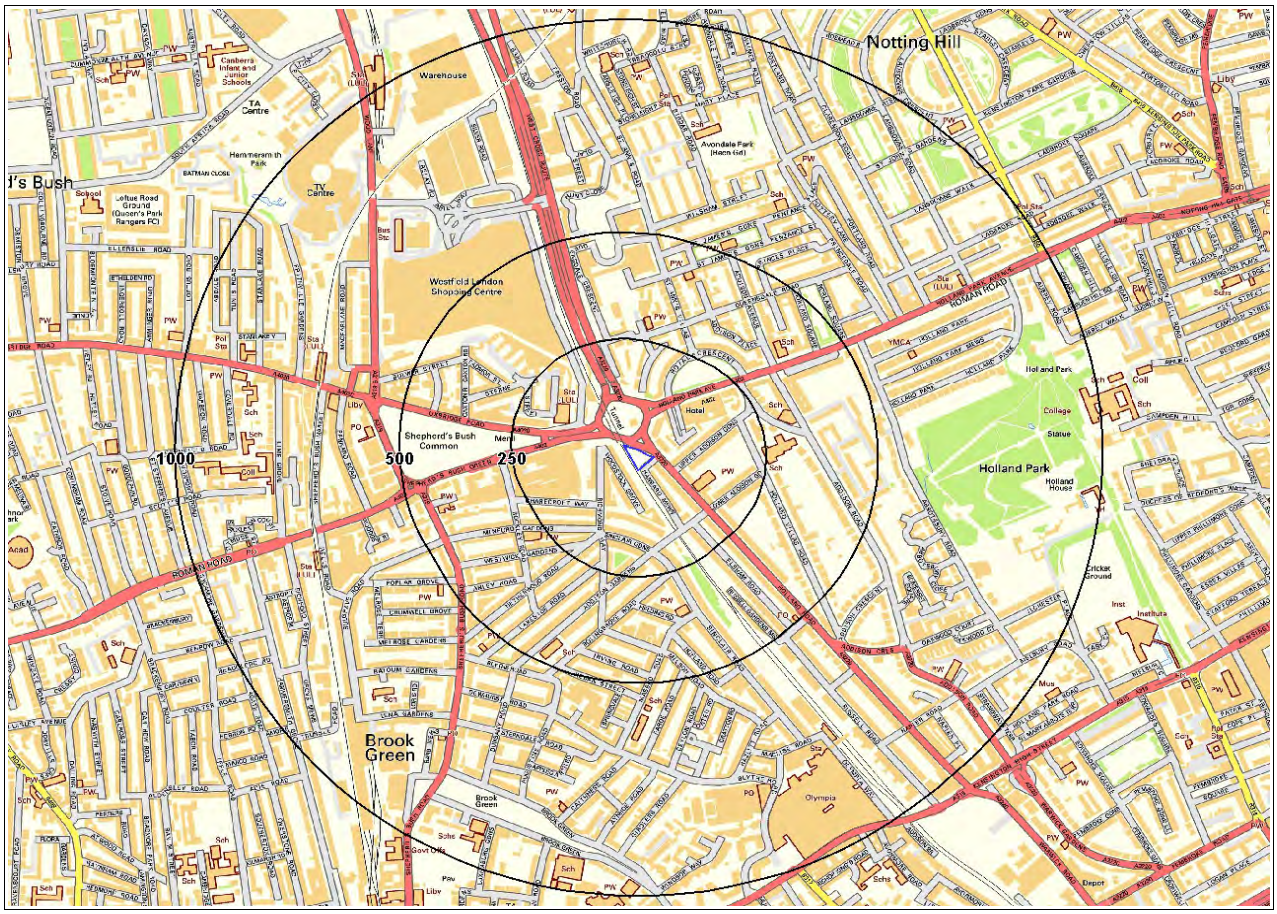
The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map

NW N NE

W E

SW S SE



Site Outline

100 250 Search Buffers (m)

AONB

National Park

SSSI

Special Protection Areas

Nitrate Vulnerable Zones

Green Belt

Environmentally Sensitive Areas

Special Areas of Conservation

World Heritage Sites

Nitrate Sensitive Areas

Ancient Woodland

National Nature Reserve

Local Nature Reserves

Ramsar Sites

8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?	Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

0

Database searched and no data found.

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

2

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
Not shown	1929	NW	Wormwood Scrubs	Natural England
Not shown	1991	NW	Wormwood Scrubs	Natural England

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

0

Database searched and no data found.

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand*[*] hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506
Web: **www.environment-agency.gov.uk**
Email: enquiries@environment-agency.gov.uk

Public Health England
Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: Royal Borough of Kensington and Chelsea
Phone: 020 7361 3000
Web: http://www.rbkc.gov.uk/
Address: The Town Hall, Hornton Street, London, W8 7NX

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016

Arcadis

Arcadis,10, MEDAWAR ROAD,
GUILDFORD, GU2 7AR

Groundsure Reference:	GS-3885771
Your Reference:	PO0067007-1
Report Date	16 May 2017
Report Delivery Method:	Email - pdf

Groundsure Geo Insight

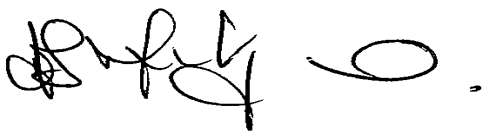
Address: 169 Holland Road, RBKC , W11 4XB

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Groundsure Geo Insight

Address:	**169 Holland Road, RBKC , W11 4XB**
Date:	**16 May 2017**
Reference:	**GS-3885771**
Client:	**Arcadis**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	07-Jun-2015
Grid Reference:	523919,179819
Site Size:	0.16ha

Groundsure
LOCATION INTELLIGENCE

Contents Page

Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	Yes
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of faults within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	No

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	4	1	16	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	3	14

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	0	0	0	0	0
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

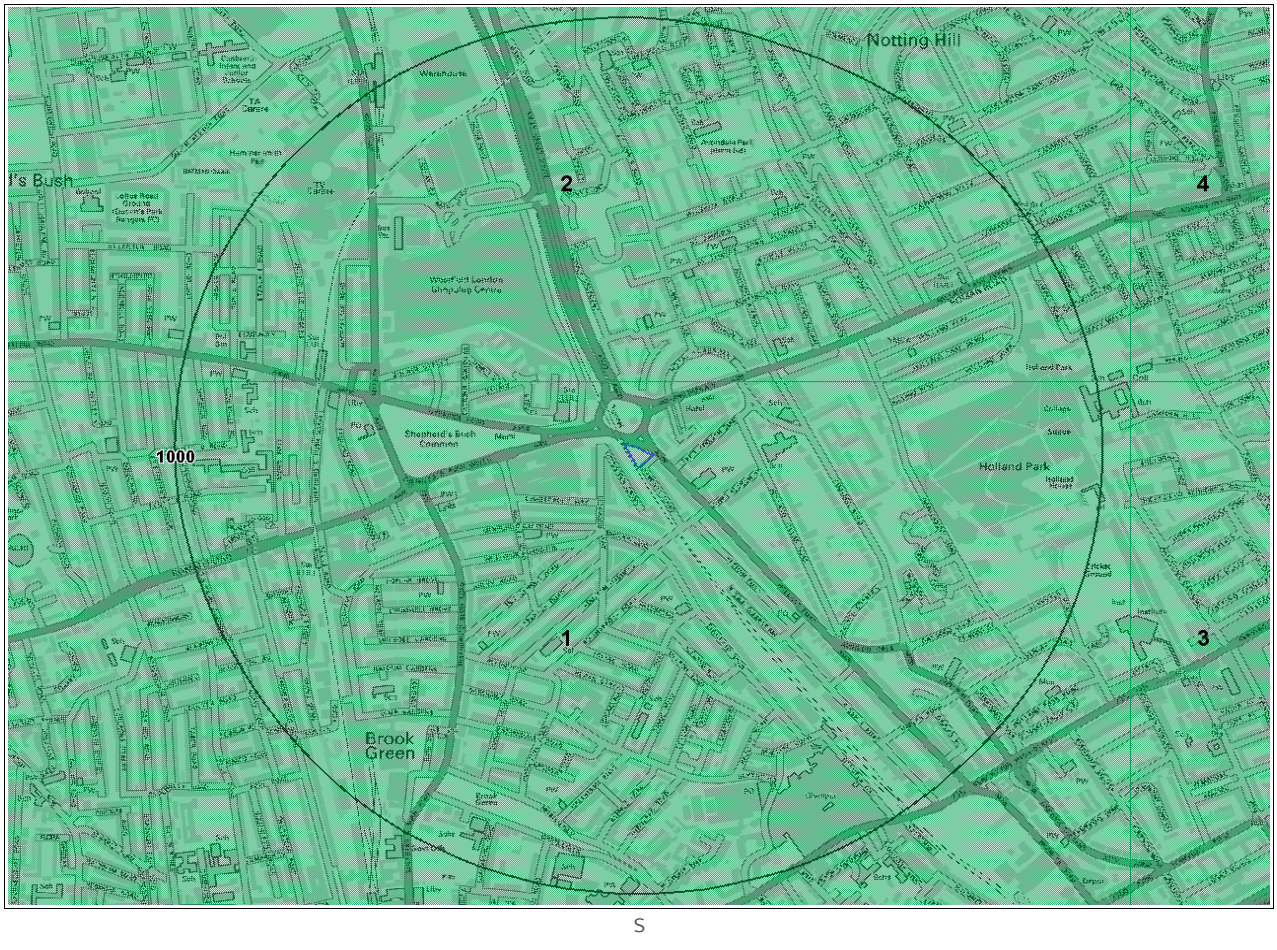
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Very Low

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	1	24

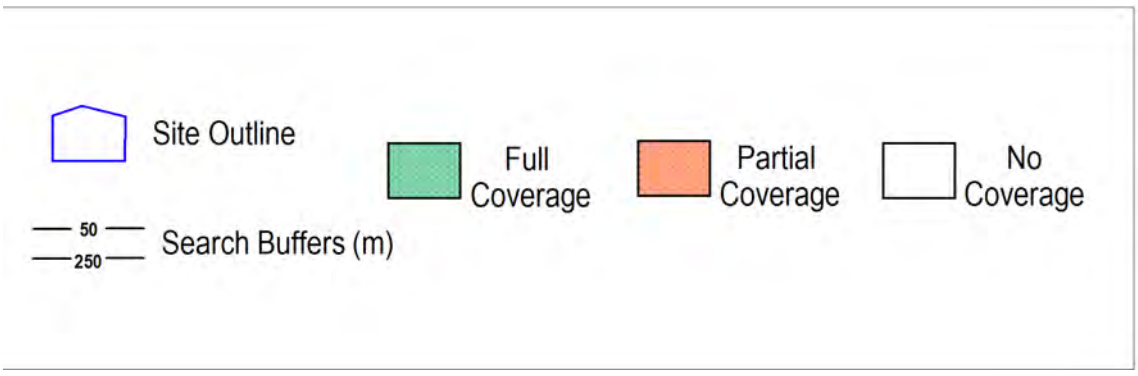
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	1	1	0

Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	1	1	Not Searched
9.2 Historical Railway and Tunnel Features	8	2	23	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	10	12	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend



Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	146.0	Some deposits are mapped	Full	Full	No coverage
3	1062.0	Some deposits are mapped	Full	Full	No coverage
4	1076.0	Some deposits are mapped	Full	Full	No coverage

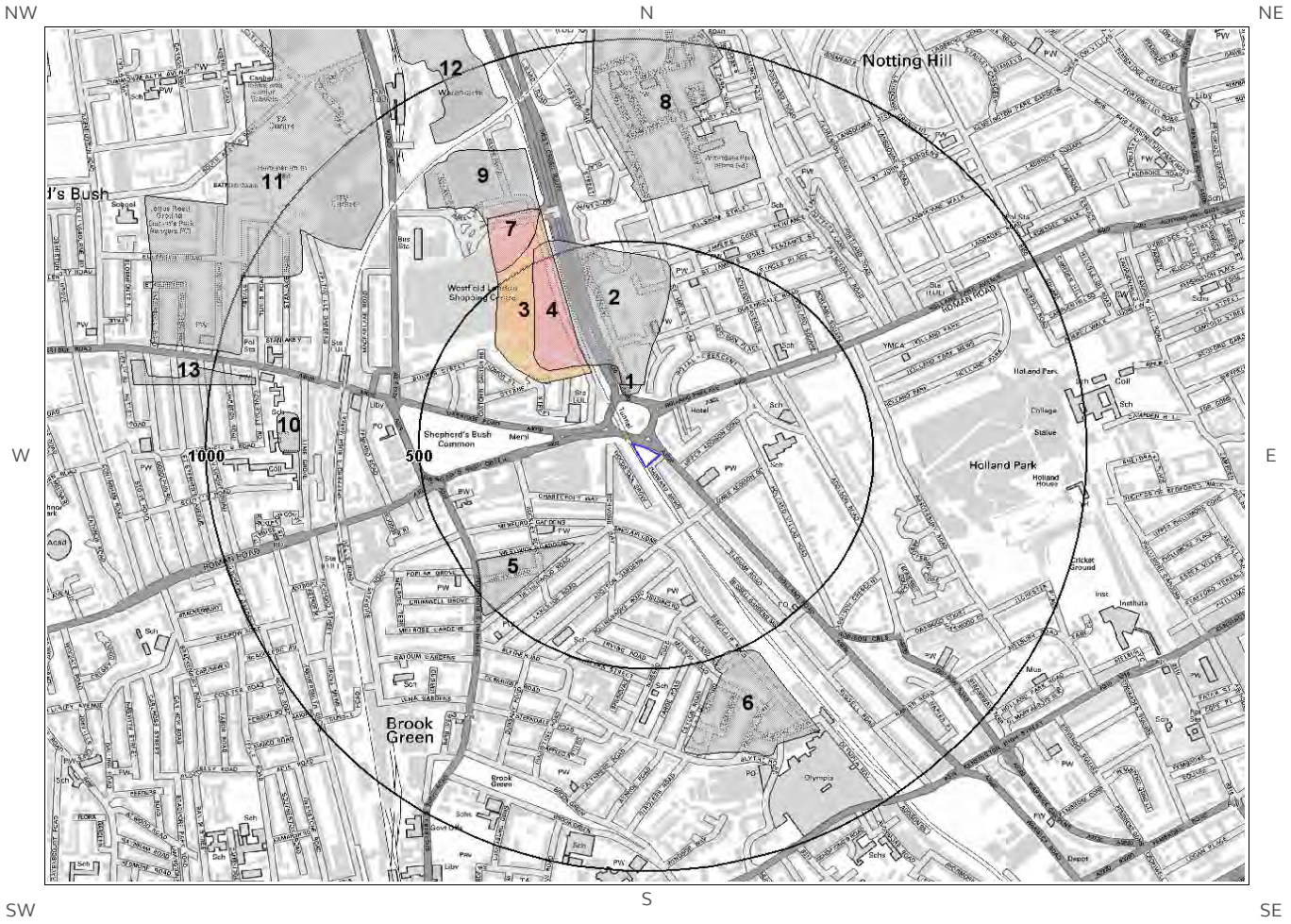
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground Map (1:10,000 scale)



Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1. Geology 1:10,000 scale

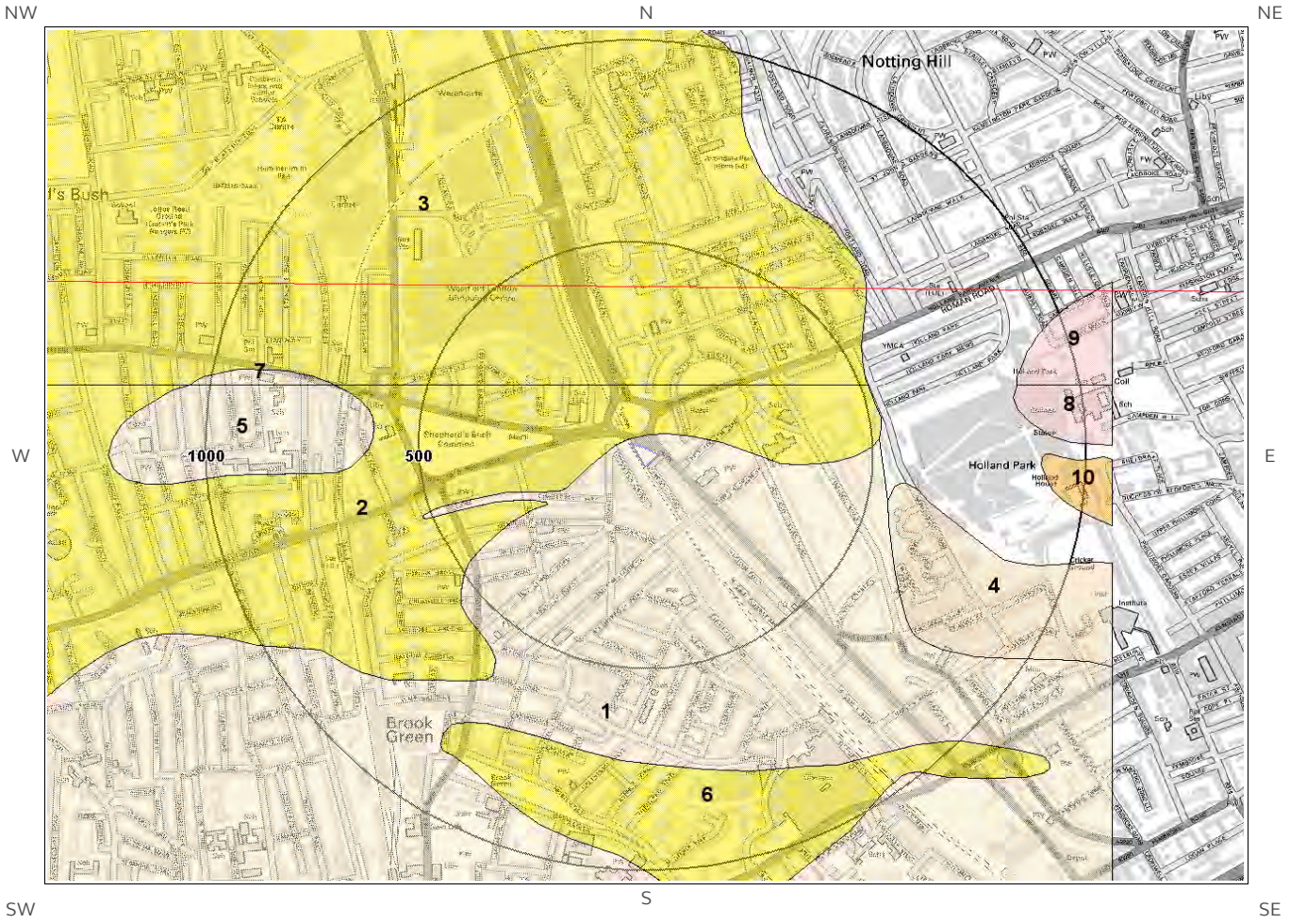
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	120.0	N	WGR-UKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry
2	146.0	N	WGR-UKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry
3	200.0	NW	MGR-UKNOWN	Made Ground (Undivided)	Unknown/unclassified Entry
4	219.0	NW	WMGR-UKNOWN	Infilled Ground	Unknown/unclassified Entry
5	252.0	SW	WGR-UKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry
6	496.0	S	WGR-UKNOWN	Worked Ground (Undivided)	Unknown/unclassified Entry

1.2 Superficial Deposits and Landslips Map (1:10,000 scale)



Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	KPGR-XSV	Kempton Park Gravel Formation - Sand And Gravel	Sand And Gravel
2	13.0	N	LASI-Z	Langley Silt Member - Silt (unlithified Deposits Coding Scheme)	Silt
3	146.0	N	LASI-Z	Langley Silt Member - Silt (unlithified Deposits Coding Scheme)	Silt

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

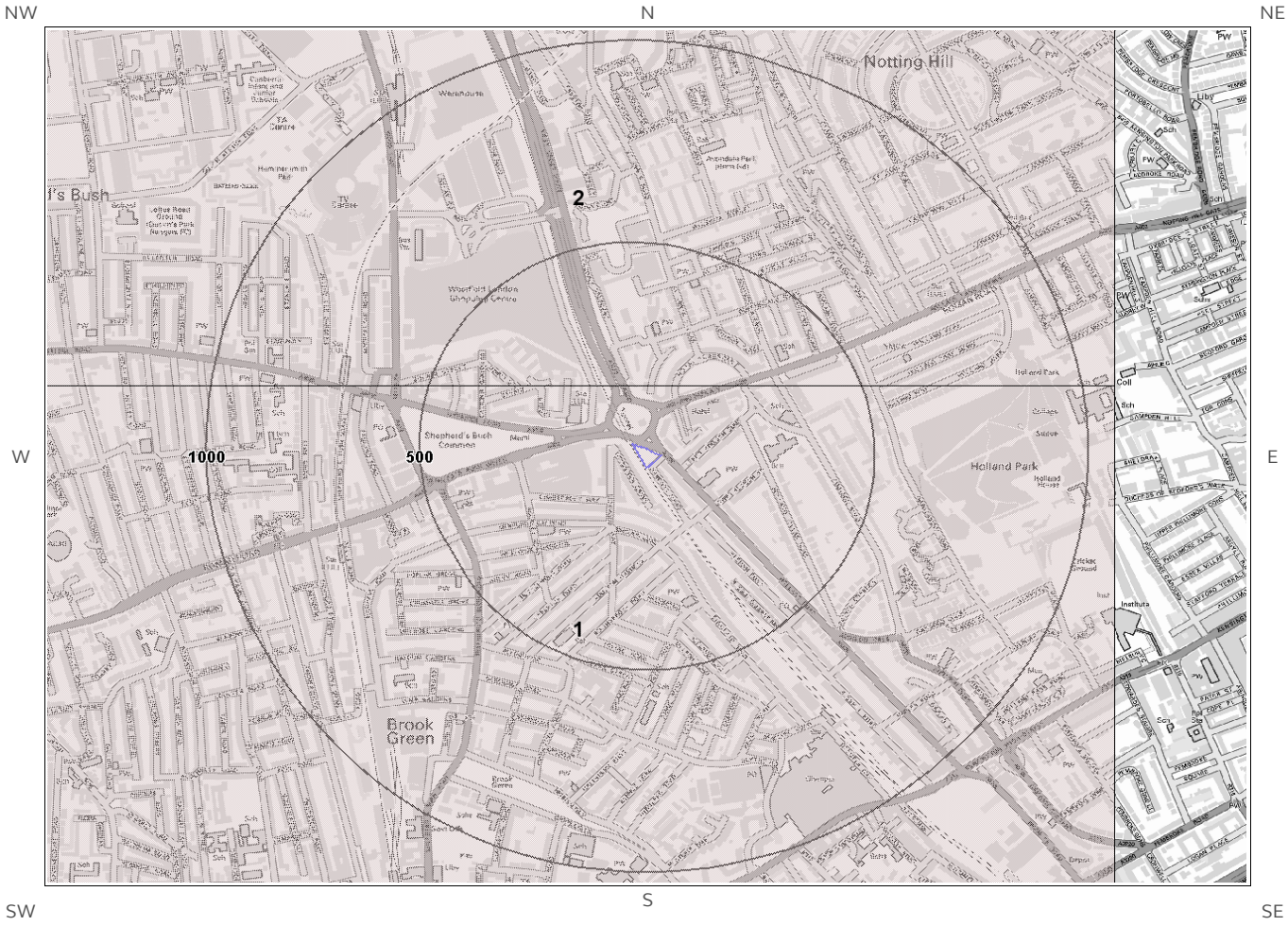
No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)



Bedrock and Faults Legend

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	LC-CLAY	London Clay Formation - Clay	Eocene Epoch
2	146.0	N	LC-CLAY	London Clay Formation - Clay	Eocene Epoch

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? No

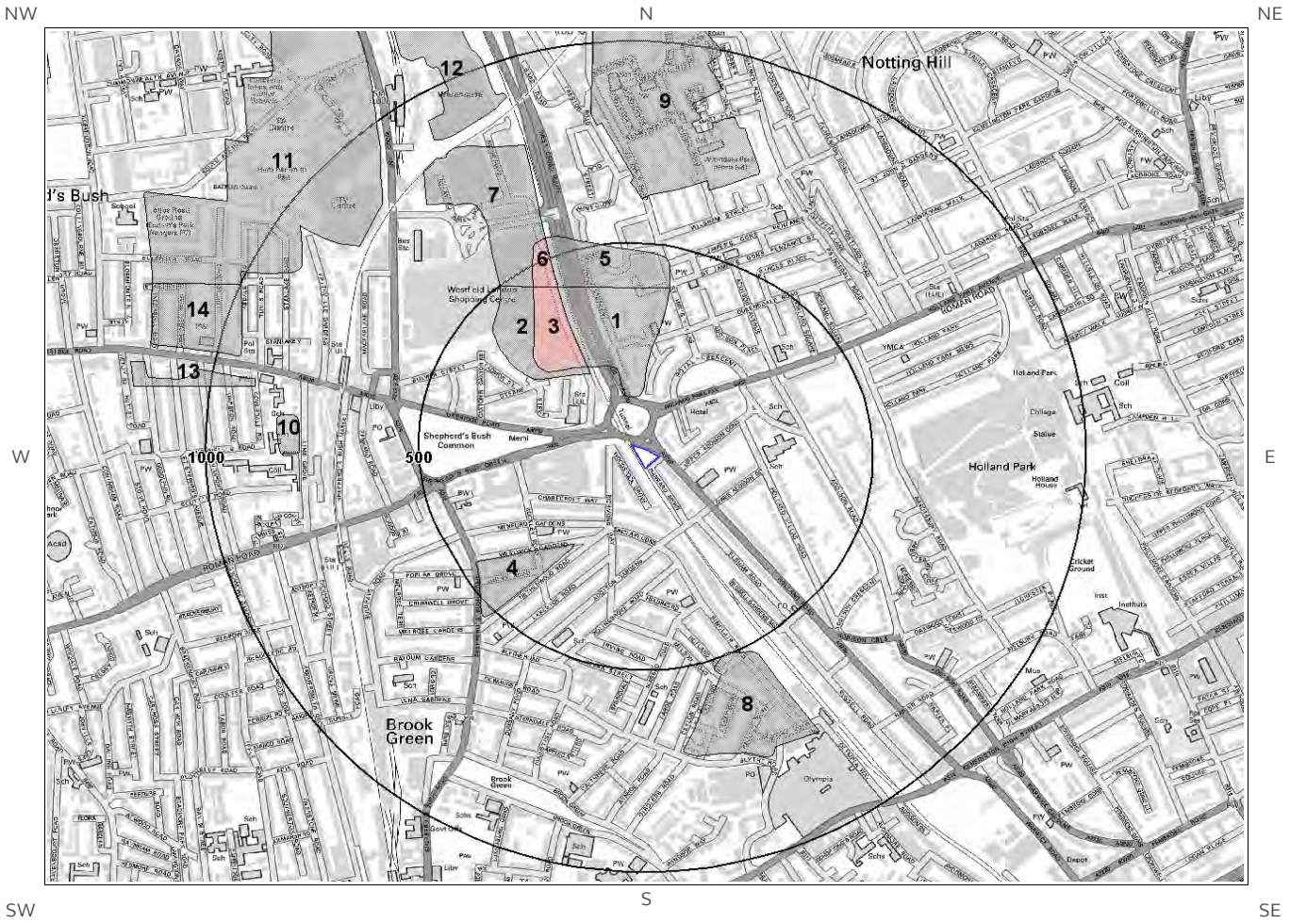
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 270

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

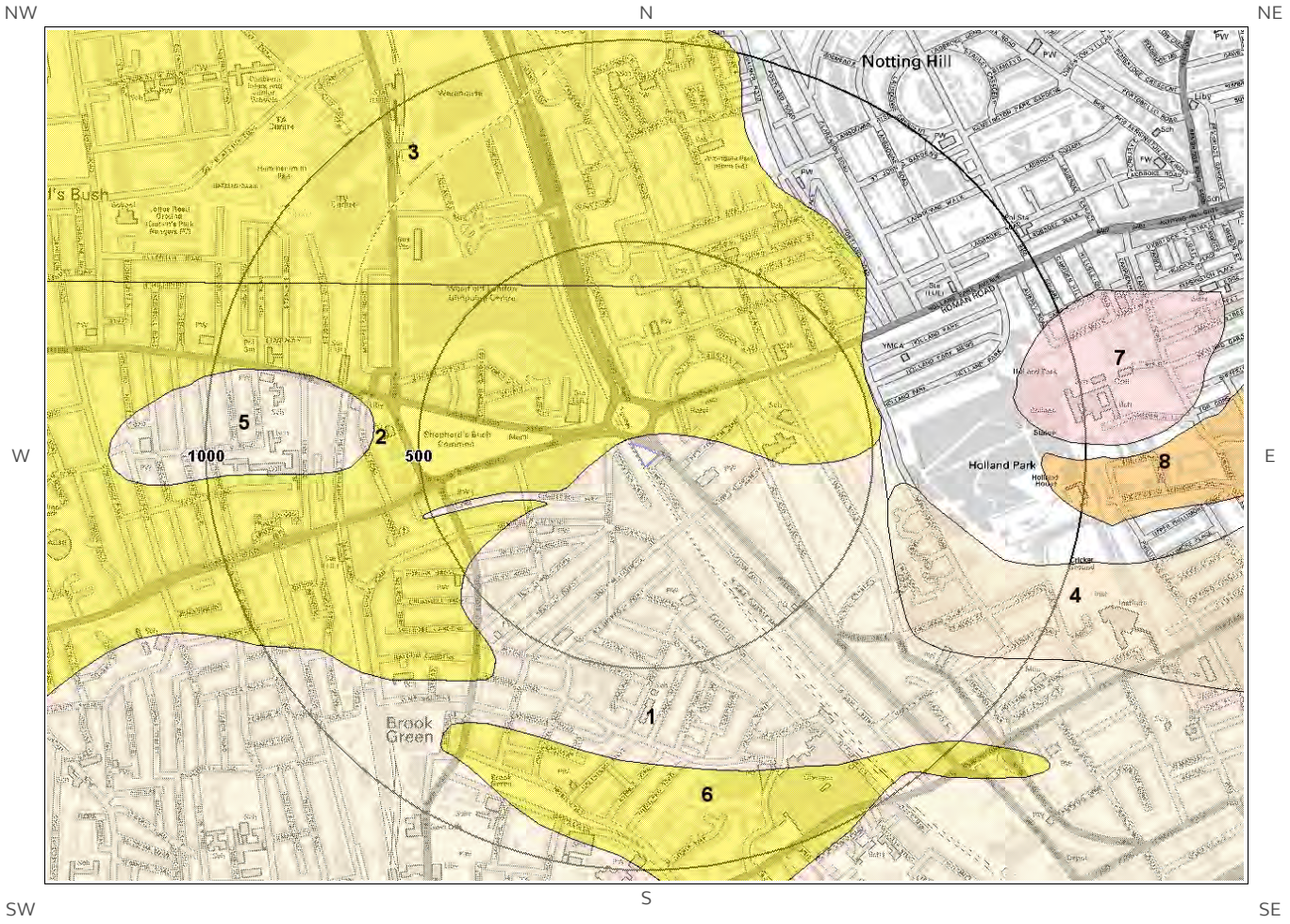
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	119.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
2	201.0	NW	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
3	219.0	NW	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
4	252.0	SW	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
5	390.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
6	429.0	NW	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
7	455.0	NW	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
8	496.0	S	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

2.2 Superficial Deposits and Landslips Map (1:50,000 scale)



Ground Workings Legend

Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	KPGR-XSV	KEMPTON PARK GRAVEL MEMBER	SAND AND GRAVEL
2	13.0	N	LASI-XCZ	LANGLEY SILT MEMBER	CLAY AND SILT
3	390.0	N	LASI-XCZ	LANGLEY SILT MEMBER	CLAY AND SILT

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High
13.0	N	Mixed	Low	Very Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

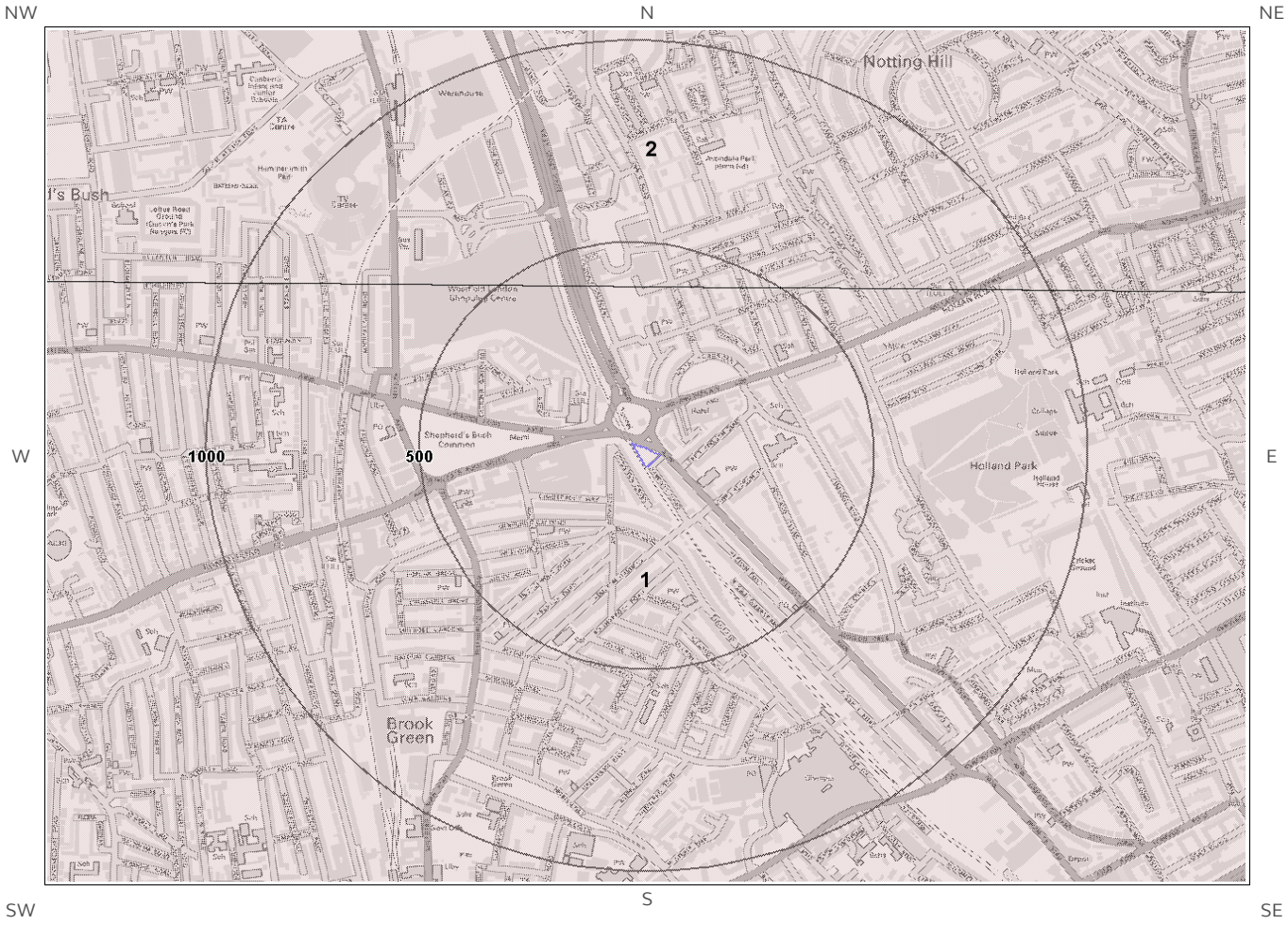
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 270

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	LC-XCZ	LONDON CLAY FORMATION - CLAY AND SILT	YPRESIAN
2	390.0	N	LC-XCZS	LONDON CLAY FORMATION - CLAY, SILT AND SAND	YPRESIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Low	Very Low

2.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

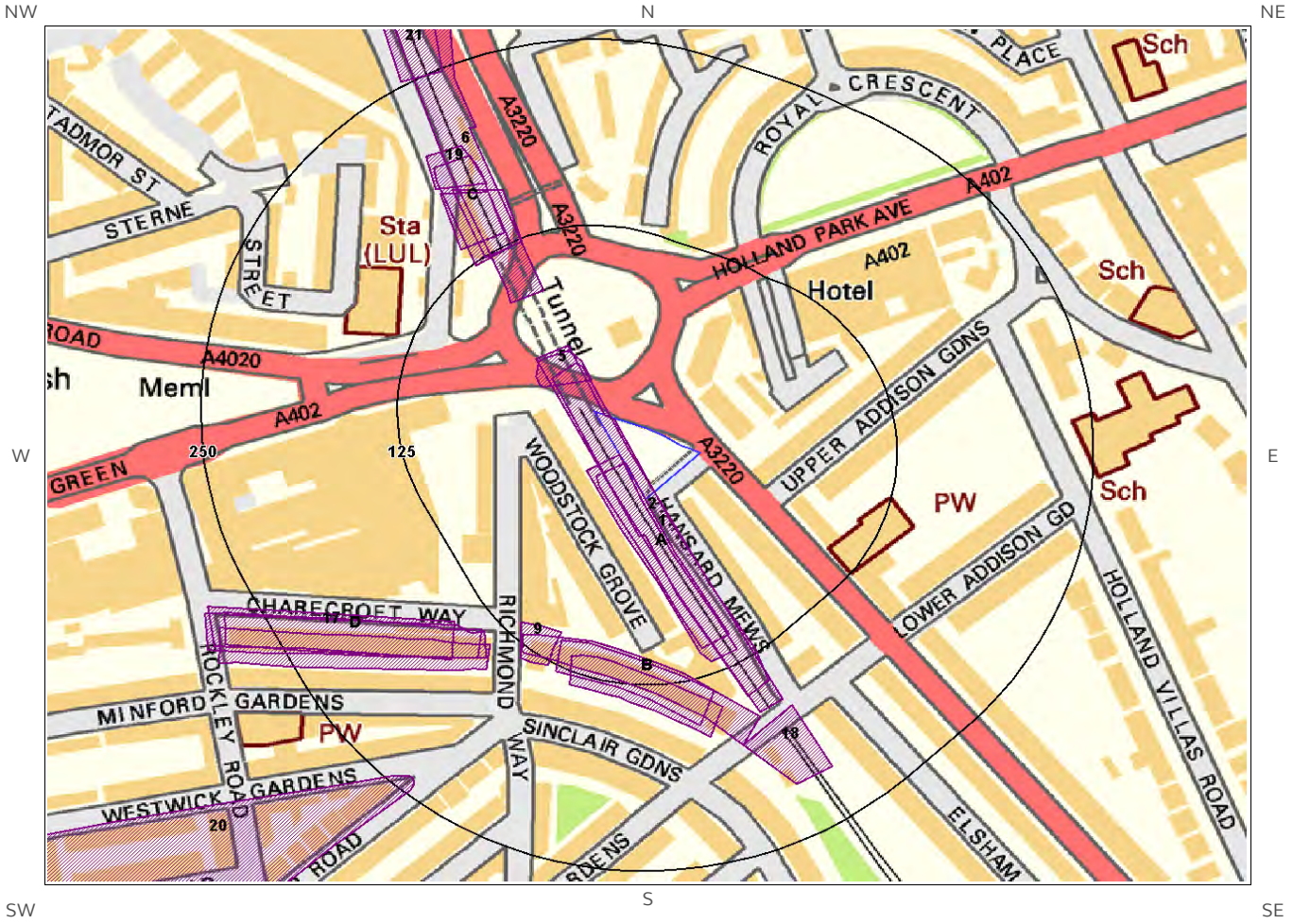
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

---

4 Ground Workings Map



Ground Workings Legend

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	0.0	On Site	523917 179769	Cuttings	1894
2	0.0	On Site	523907 179781	Cuttings	1866
3A	0.0	On Site	523914 179757	Cuttings	1920
4A	0.0	SW	523913 179755	Cuttings	1940
5	21.0	N	523851 179882	Cuttings	1958
6	87.0	N	523781 180053	Cuttings	1866
7B	101.0	S	523924 179667	Cuttings	1866
8B	103.0	S	523897 179671	Cuttings	1940
9	104.0	SW	523837 179698	Cuttings	1958
10B	110.0	S	523904 179663	Cuttings	1920
11C	122.0	NW	523793 179989	Cuttings	1920
12C	122.0	NW	523803 179980	Unspecified Pit	1958
13C	133.0	NW	523793 179982	Cuttings	1940
14D	136.0	SW	523719 179703	Cuttings	1894
15D	137.0	SW	523711 179704	Cuttings	1940
16D	139.0	SW	523718 179694	Cuttings	1920
17	147.0	SW	523703 179705	Cuttings	1866
18	167.0	SE	523994 179630	Cuttings	1866
19	168.0	NW	523783 180018	Cuttings	1940
20	239.0	SW	523632 179507	Brick Field	1866
21	248.0	NW	523748 180116	Cuttings	1920

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

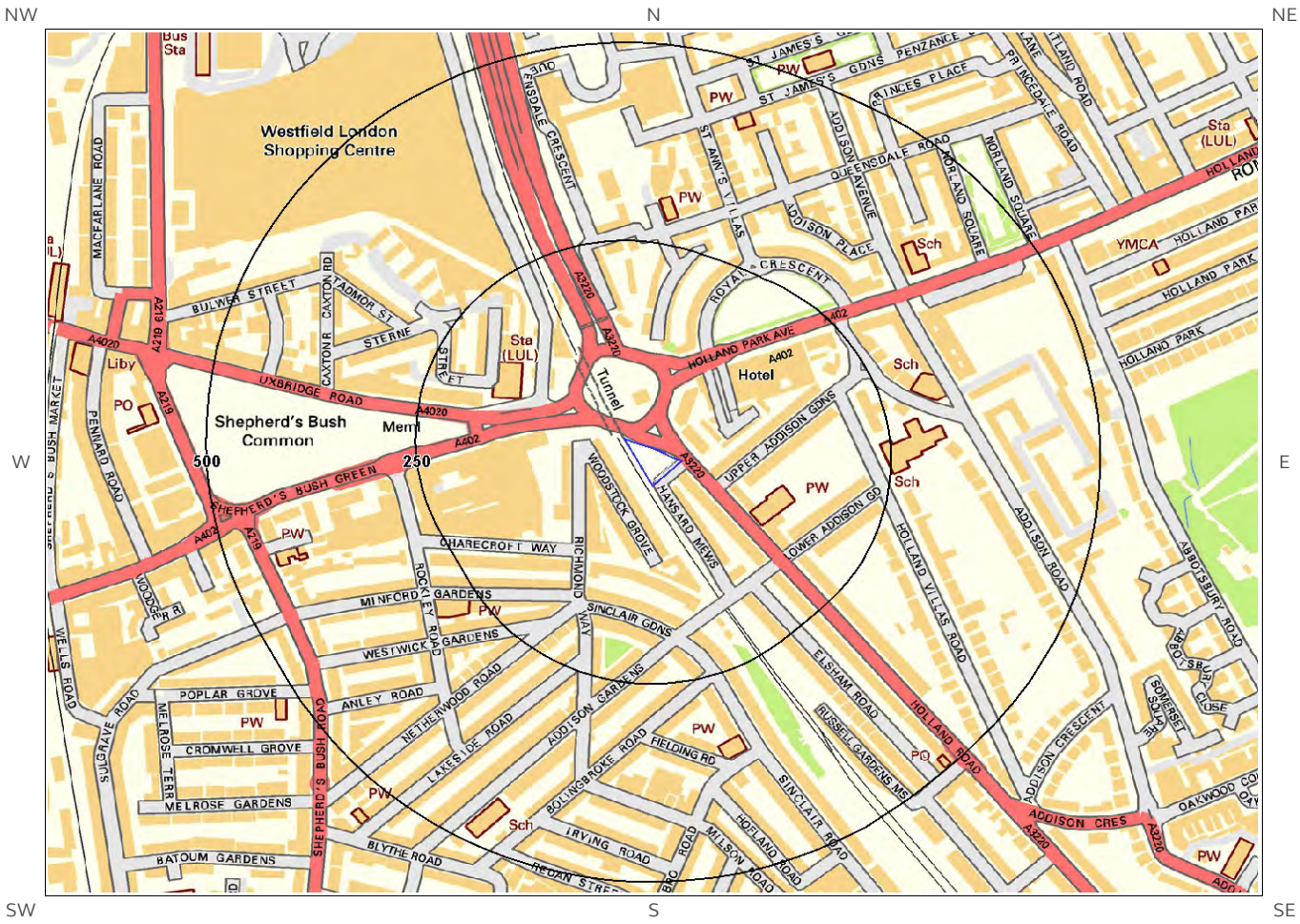
Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	346.0	N	523827 180197	Clay & Shale	Norland Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	360.0	NW	523692 180167	Clay & Shale	Eynham Farm Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	419.0	NW	523598 180172	Clay & Shale	Eynham Farm Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	585.0	NW	523588 180367	Clay & Shale	Eynham Farm Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	663.0	N	523972 180509	Clay & Shale	Notting Hill Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	727.0	N	524107 180541	Clay & Shale	Notting Hill Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	746.0	NW	523496 180499	Clay & Shale	Woodlane Farm Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	810.0	W	523061 179891	Clay & Shale	Shepherds Bush Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	823.0	N	524121 180638	Clay & Shale	Potteries Field Clay Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	834.0	N	523934 180686	Clay & Shale	Notting Hill Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	868.0	N	524067 180699	Clay & Shale	Potteries Clay Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	909.0	NW	523129 180381	Clay & Shale	Old Oak Farm Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	920.0	NW	523485 180690	Clay & Shale	Eynham Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	920.0	NW	523485 180690	Clay & Shale	Eynham Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	966.0	NW	523173 180523	Clay & Shale	Cowley Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	977.0	N	524160 180787	Clay & Shale	Potteries Clay Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	985.0	NW	523012 180337	Clay & Shale	Old Oak Farm Brick Fields	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

Site Outline

250
500
Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

Non-Coal Mining

Highly likely

Likely

Unlikely

Highly unlikely

Rare

5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

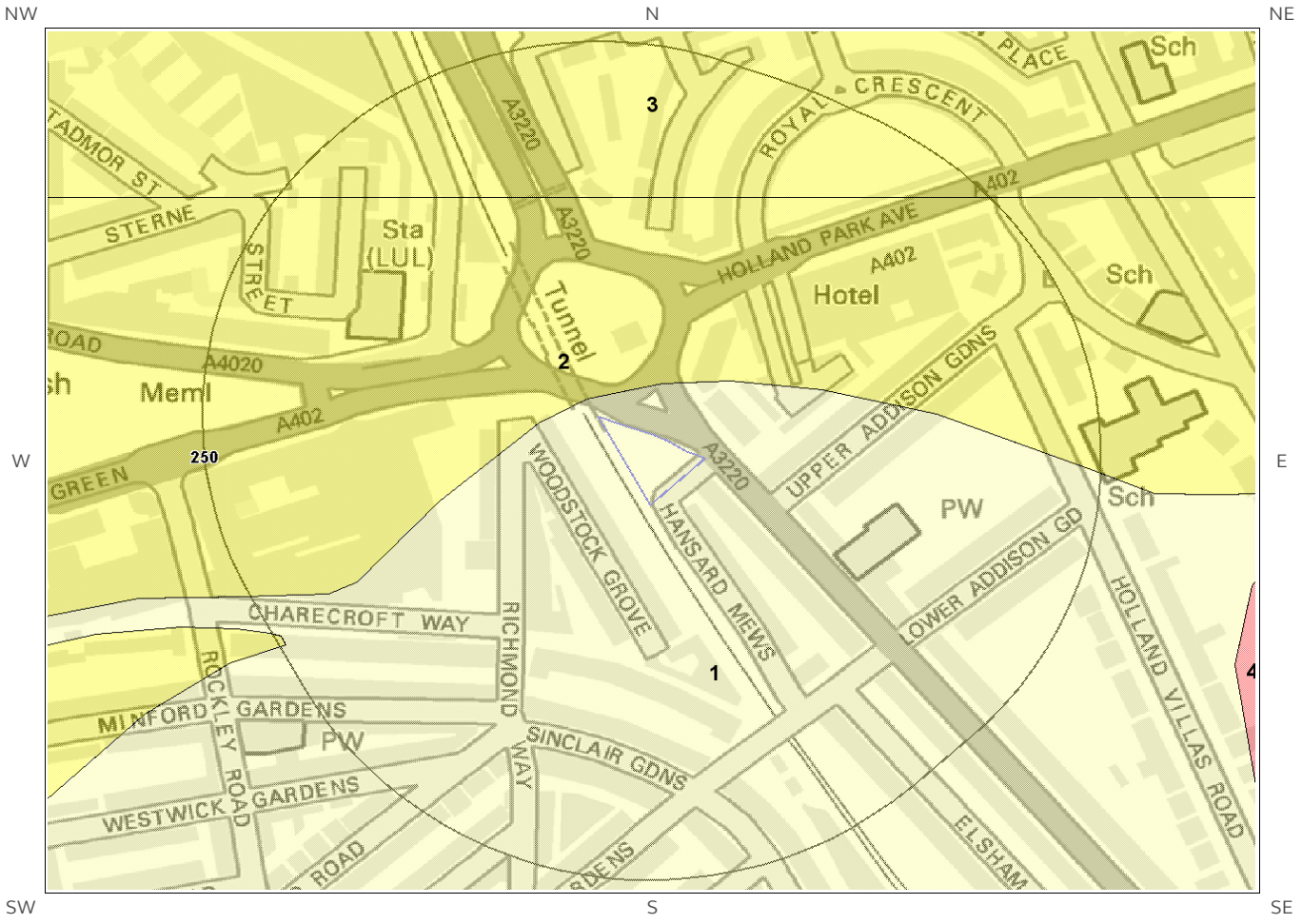
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map



Shrink Swell Clay Legend

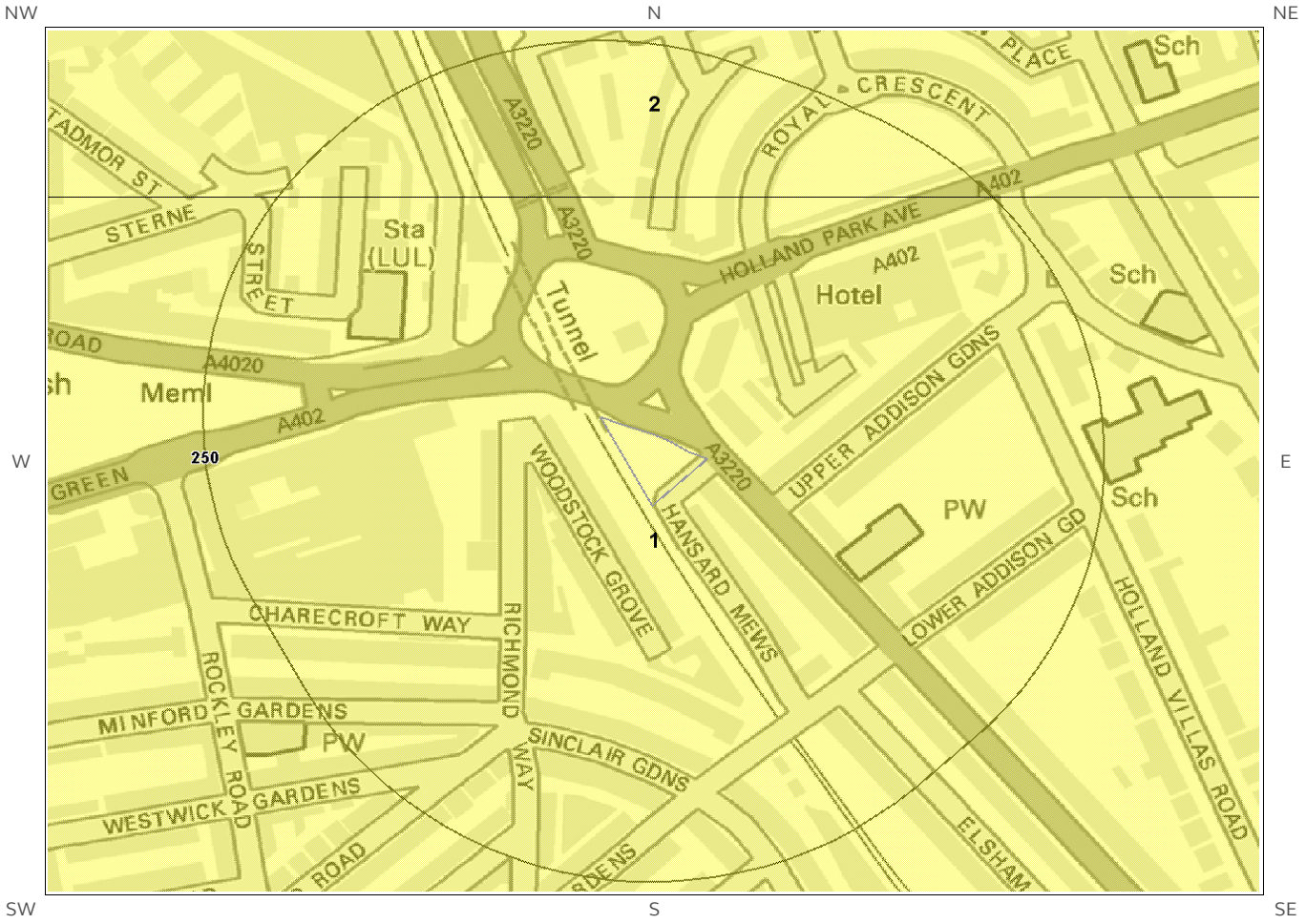
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.2 Landslides Map



Landslides Legend

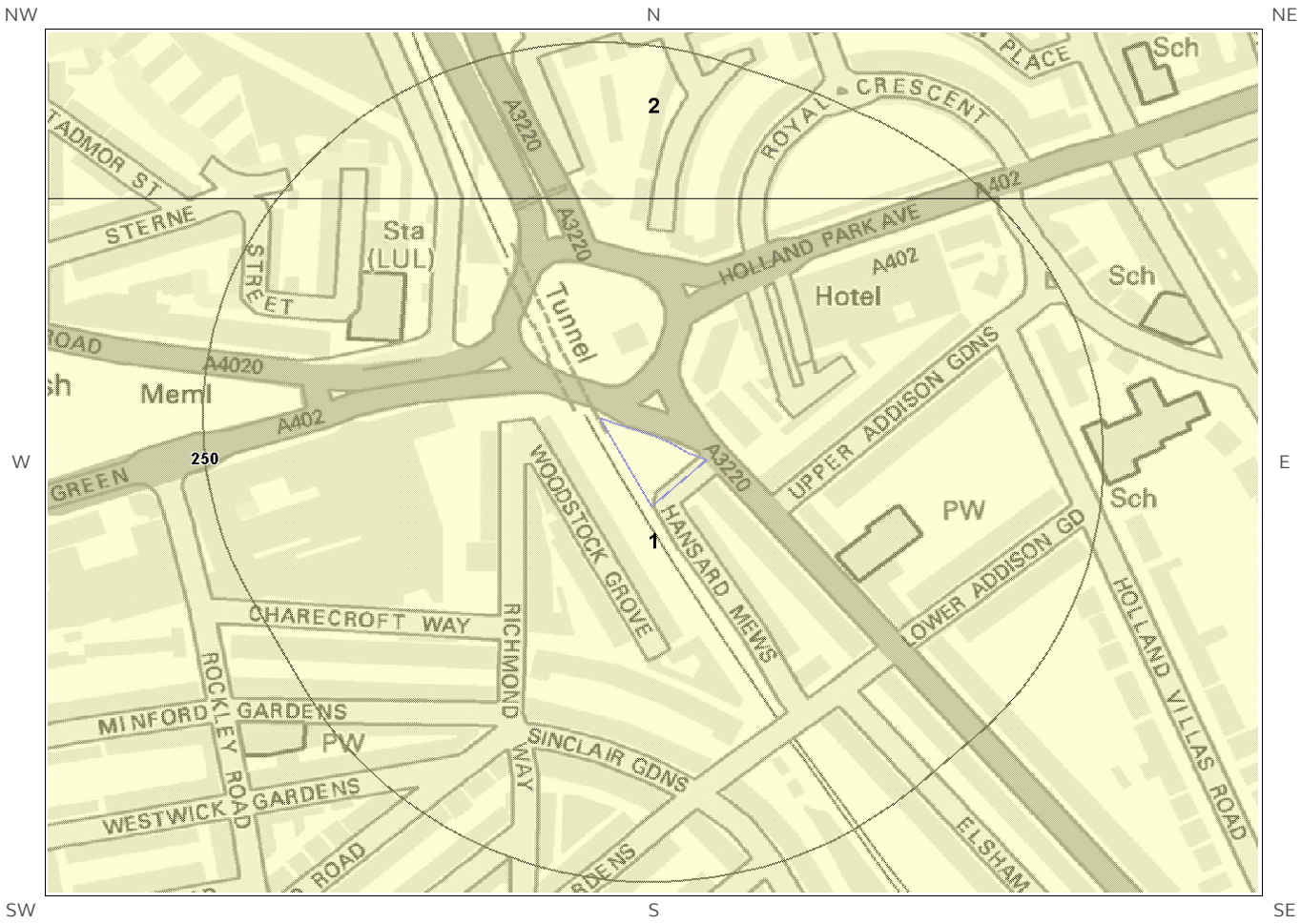
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.3 Ground Dissolution of Soluble Rocks Map



Ground Dissolution Soluble Rocks Legend

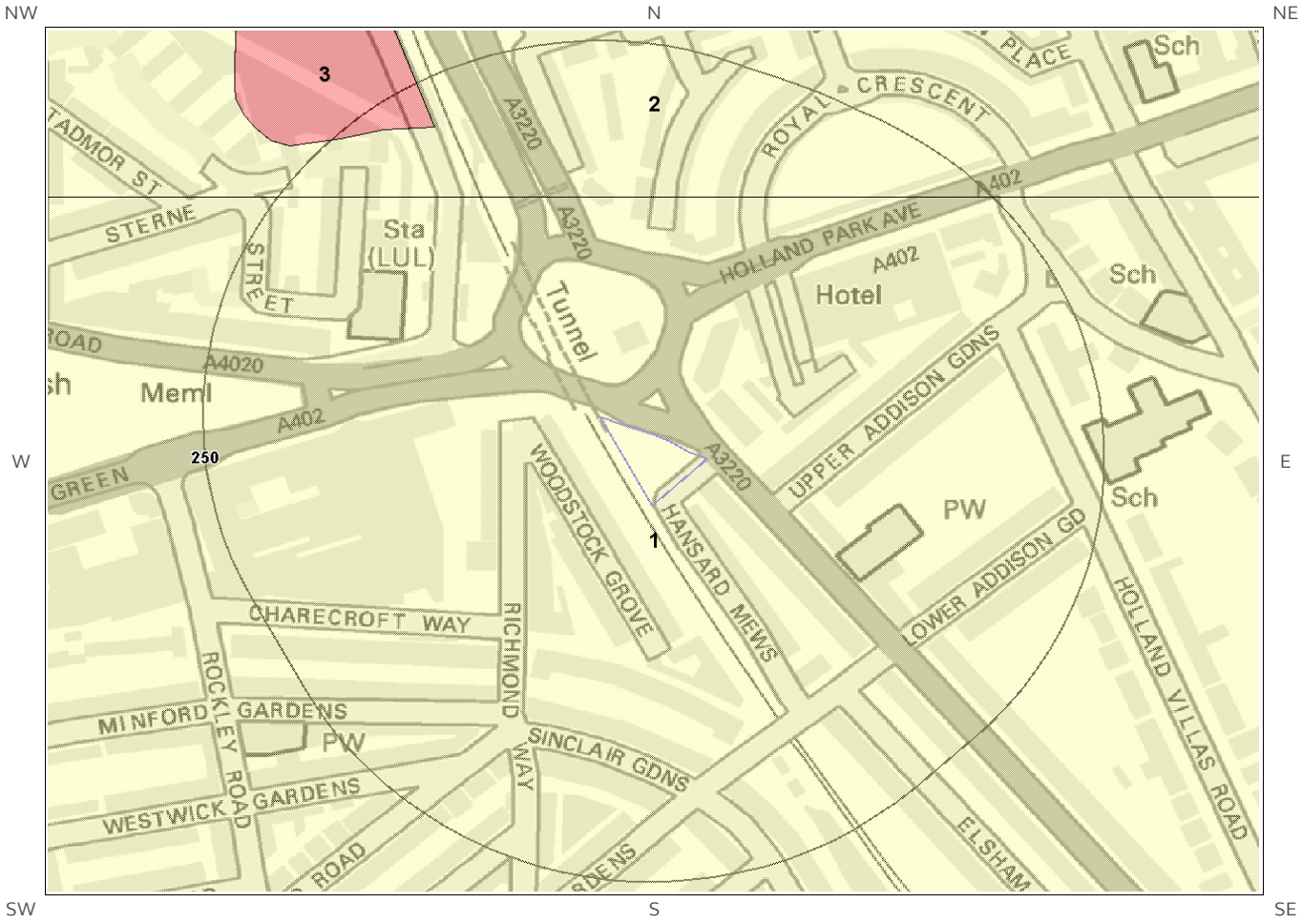
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.4 Compressible Deposits Map



Compressible Deposits Legend

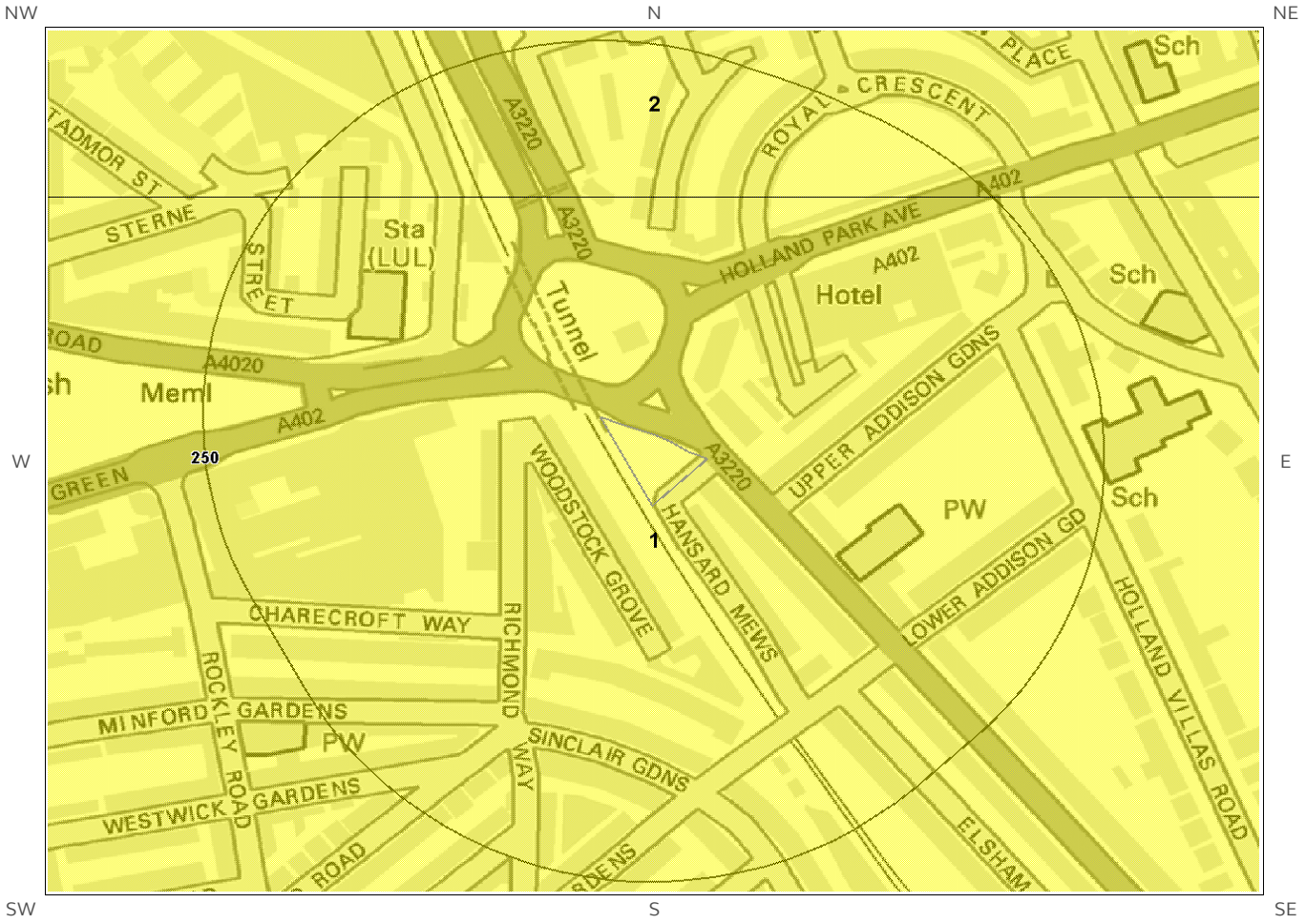
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.5 Collapsible Deposits Map



Collapsible Deposits Legend

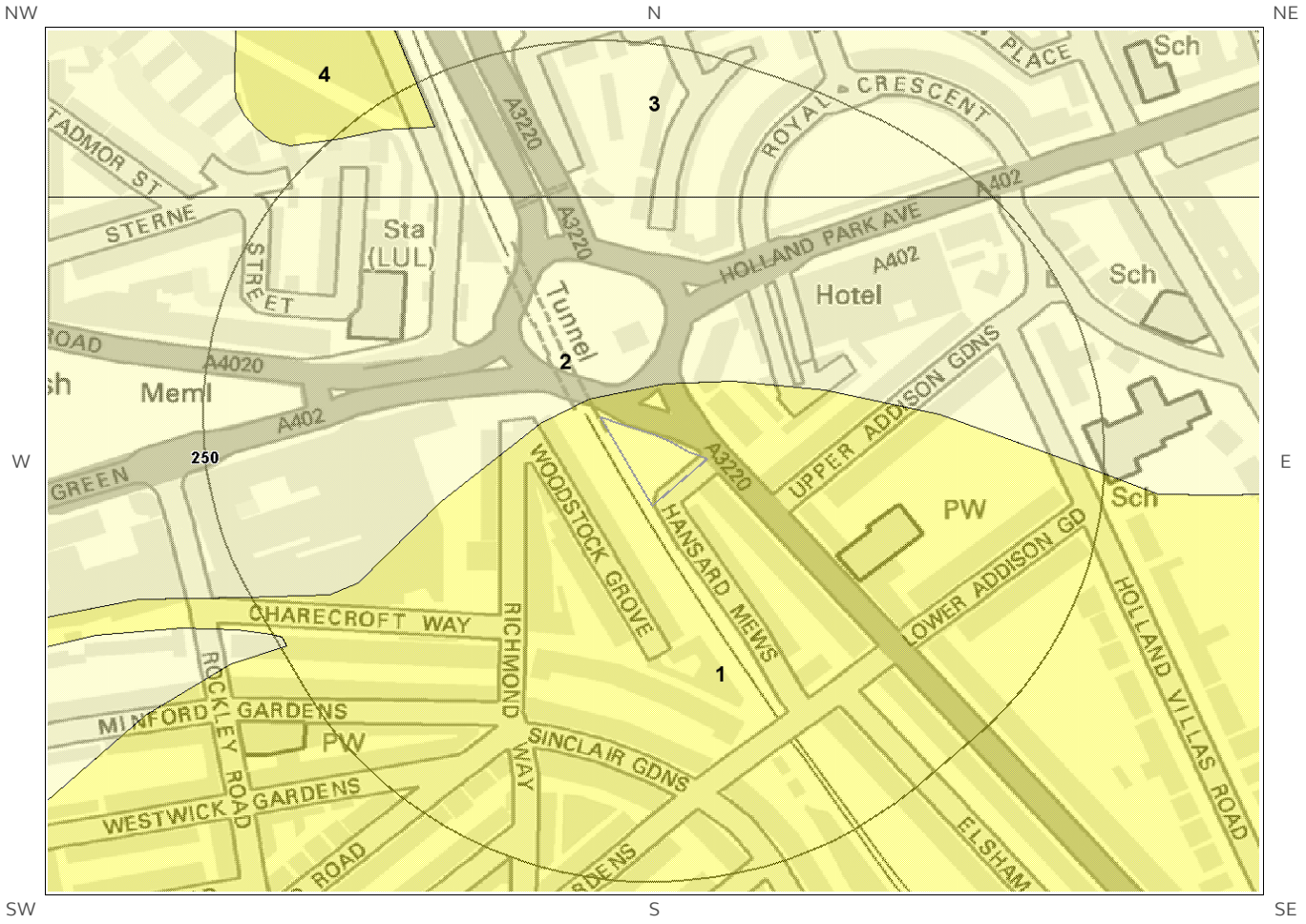
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.6 Running Sand Map



Running Sand Legend

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Very Low

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
2	13.0	N	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

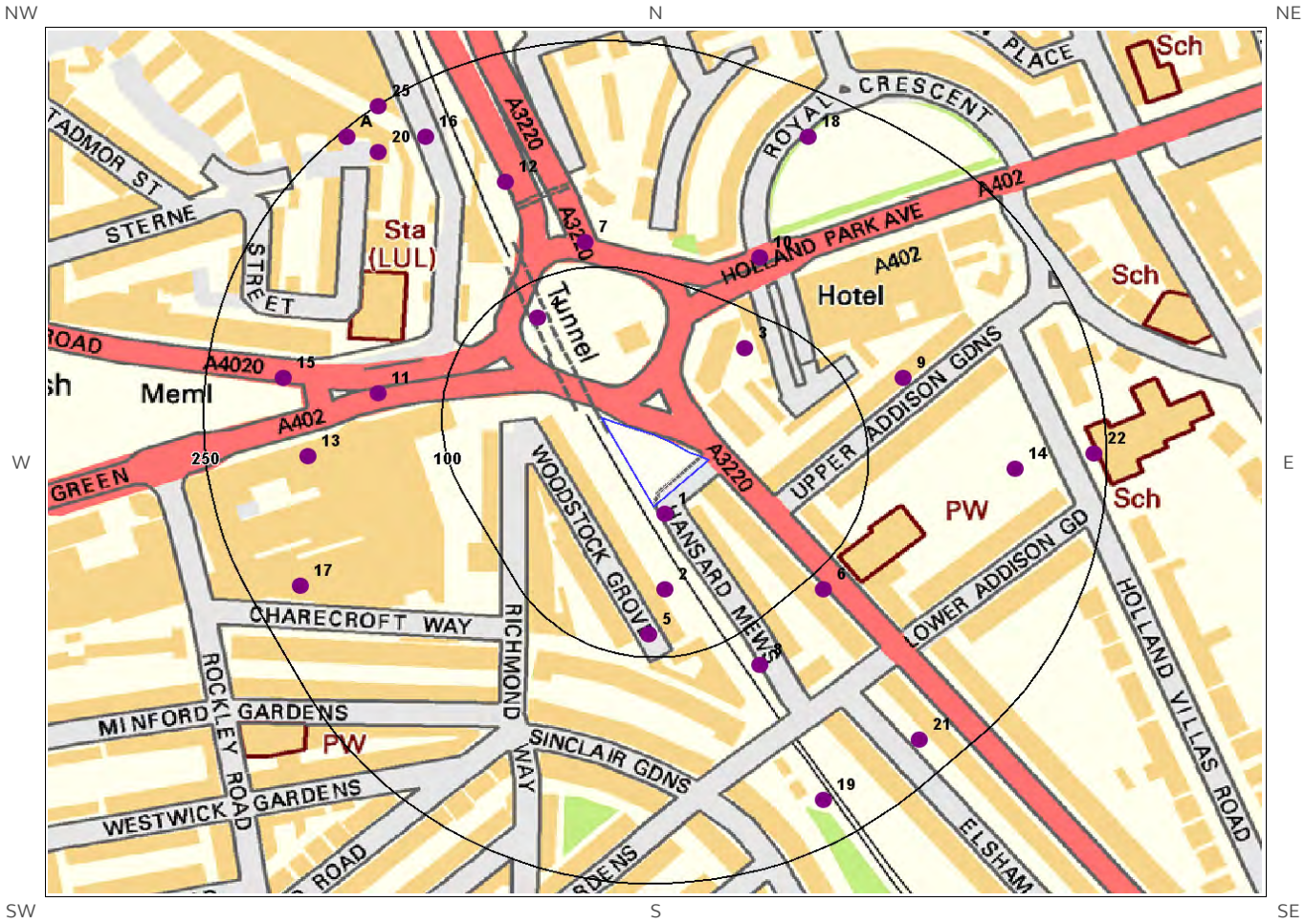
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	13.0	N	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records Map



Borehole Records Legend

Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 25

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	8.0	SE	523910 179790	TQ27NW180	30.48	WEST CROSS ROUTE (G.L.C.) BH2
2	56.0	S	523910 179740	TQ27NW181	30.48	WEST CROSS ROUTE (G.L.C.) BH3
3	77.0	N	523960 179900	TQ27NW300	15.54	WESTERN AVE EXTENSION BH9
4	77.0	NW	523830 179920	TQ27NW125	7.85	UXBRIDGE ROAD STATION H9 KENSINGTON
5	85.0	S	523900 179710	TQ27NW122	10.06	S END OF WOODSTOCK RD H144 KENSINGTON
6	112.0	SE	524010 179740	TQ27NW261	15.24	L.C.C.MAIN DRAINAGE 7
7	116.0	N	523860 179970	TQ27NW179	36.58	WEST CROSS ROUTE (G.L.C.) BH1
8	125.0	SE	523970 179690	TQ27NW182	24.38	WEST CROSS ROUTE (G.L.C.) BH4
9	133.0	NE	524060 179880	TQ27NW121	9.45	UPPER ADDISON GDNS H143 KENSINGTON
10	135.0	NE	523970 179960	TQ27NW86	9.45	WSTN END OF ROYAL CRES H15 KENSINGTON
11	141.0	W	523730 179870	TQ27NW85	7.77	CORNER OF RICHMOND GDNS H14 KENSINGTON
12	167.0	N	523810 180010	TQ28SW255	16.61	WESTERN AVENUE EXTENSION BH8
13	186.0	W	523686 179828	TQ27NW830	17.91	61-62 BROOK GREEN C
14	192.0	E	524130 179820	TQ27NW418	167.64	HOFLAND ROAD WEST KENSINGTON
15	202.0	W	523670 179880	TQ27NW84	7.01	JCTN OF GOLDHAWK RD H13 HAMMERSMITH
16	216.0	NW	523760 180040	TQ28SW423	3.0	WHITE CITY AREA C TP50
17	220.0	SW	523681 179742	TQ27NW831	24.5	61-62 BROOK GREEN D
18	220.0	NE	524000 180040	TQ28SW324	8.69	ROYAL CRESCENT KENSINGTON
19	222.0	SE	524010 179600	TQ27NW183	30.48	WEST CROSS ROUTE (G.L.C.) BH5
20	225.0	NW	523730 180030	TQ28SW723	-1.0	WHITE CITY AFFORDABLE HOMES PHASES 1 AND 2 206
21	227.0	SE	524070 179640	TQ27NW262	13.1	L.C.C.MAIN DRAINAGE 8

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
22	242.0	E	524180 179830	TQ27NW503	4.27	CARDINAL VAUGHAN SCHOOL BH1
23A	245.0	NW	523710 180040	TQ28SW717	-1.0	WHITE CITY AFFORDABLE HOMES PHASES 1 AND 2 2
24A	245.0	NW	523710 180040	TQ28SW422	3.0	WHITE CITY AREA C TP48
25	249.0	NW	523730 180060	TQ28SW416	3.0	WHITE CITY AREA C TP42

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/586766
#2: scans.bgs.ac.uk/sobi_scans/boreholes/586767
#3: scans.bgs.ac.uk/sobi_scans/boreholes/586887
#4: scans.bgs.ac.uk/sobi_scans/boreholes/586705
#5: scans.bgs.ac.uk/sobi_scans/boreholes/586702
#6: scans.bgs.ac.uk/sobi_scans/boreholes/586848
#7: scans.bgs.ac.uk/sobi_scans/boreholes/586765
#8: scans.bgs.ac.uk/sobi_scans/boreholes/586768
#9: scans.bgs.ac.uk/sobi_scans/boreholes/586701
#10: scans.bgs.ac.uk/sobi_scans/boreholes/586666
#11: scans.bgs.ac.uk/sobi_scans/boreholes/586665
#12: scans.bgs.ac.uk/sobi_scans/boreholes/591168
#13: scans.bgs.ac.uk/sobi_scans/boreholes/18208164
#14: scans.bgs.ac.uk/sobi_scans/boreholes/587013
#15: scans.bgs.ac.uk/sobi_scans/boreholes/586664
#16: scans.bgs.ac.uk/sobi_scans/boreholes/591336
#17: scans.bgs.ac.uk/sobi_scans/boreholes/18208165
#18: scans.bgs.ac.uk/sobi_scans/boreholes/591237
#19: scans.bgs.ac.uk/sobi_scans/boreholes/586769
#21: scans.bgs.ac.uk/sobi_scans/boreholes/586849
#22: scans.bgs.ac.uk/sobi_scans/boreholes/587098
#24A: scans.bgs.ac.uk/sobi_scans/boreholes/591335
#25: scans.bgs.ac.uk/sobi_scans/boreholes/591329

8 Estimated Background Soil Chemistry

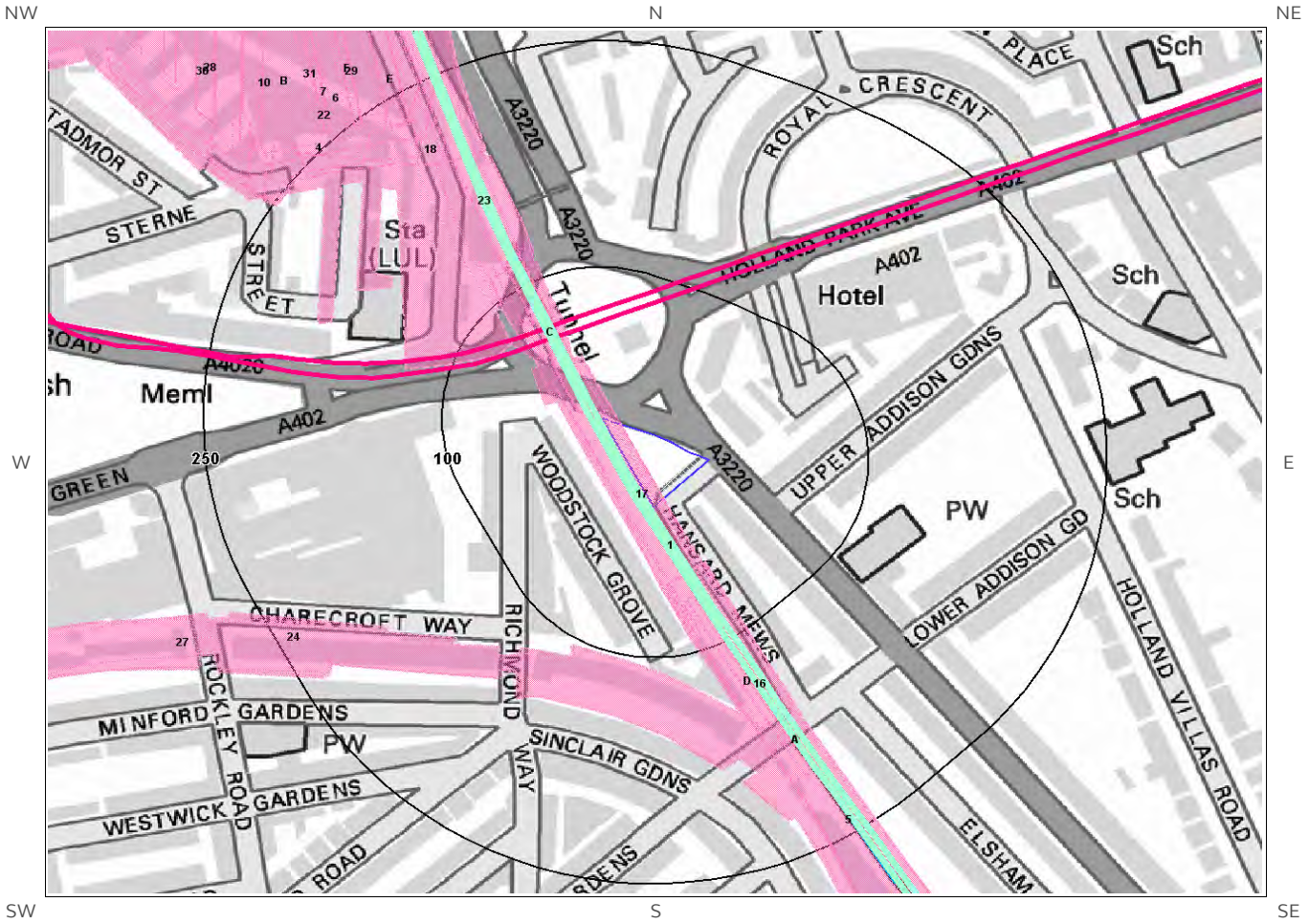
Records of background estimated soil chemistry within 250m of the study site boundary: 2

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	London	No data	No data	No data	No data	No data
13.0	N	London	No data	No data	No data	No data	No data

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map



Railways and Tunnels Legend

- Site Outline
- Search Buffers (m): 250, 500
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary?	No
Have any underground railway lines been identified within 250m of the study site boundary?	Yes

Distance (m)	Direction	Detail
60	N	London Underground - Central Line

The approximate depth value for the nearest London Underground line given in this dataset has been extrapolated from published depths of tube lines at station platforms, and assume a constant gradient between stations. Using this method, topographical variation has resulted in some parts of the line having associated depth values either shallower or deeper than the real-world situation. Depth values are for indication only and should not be relied upon for any calculation or technical purpose and are in no way a substitute for a professional survey.

Line
London Underground Line: Central Line Depth: 20mbgl Track Type: Tunnel

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary?	No
Have any other railway tunnels been identified within 250m of the site boundary?	Yes

Distance (m)	Direction	Detail
9	W	Railway Tunnel

Any records that have been identified are represented on the Railways and Tunnels Map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? Yes

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1	0	On Site	523911 179772	Railway Sidings	1967
11C	0	SW	523843 179908	Tunnel	1991
12C	0	SW	523842 179908	Tunnel	1991
13C	0	SW	523842 179908	Tunnel	1993
14	0	On Site	n/a	Railway	1895
15	0	On Site	n/a	Railway	1935
16	0	On Site	n/a	Railway	1930
17	0	On Site	n/a	Railway	1916
2A	48	SE	524159 179415	Railway Sidings	1987
3A	48	SE	524159 179415	Railway Sidings	1974
18	54	NW	n/a	Railway	1890
19D	64	SE	523962 179675	Railway Sidings	1963
20D	64	SE	523962 179675	Railway Sidings	1973
21D	65	S	523962 179675	Railway Sidings	1970
22	74	NW	n/a	Railway	1916
4	75	NW	523542 180225	Railway Sidings	1920
23	76	NW	523796 180000	Railway Sidings	1916
5	174	SE	524159 179415	Railway Sidings	1967
24	185	SW	n/a	Railway	1871
6	191	N	523712 180190	Railway Sidings	1894
7	208	NW	523700 180185	Railway Sidings	1874
8B	216	NW	523446 180623	Railway Sidings	1967
9B	216	NW	523446 180623	Railway Sidings	1957
25E	218	NW	523723 180160	Railway Sidings	1869
26E	218	NW	523723 180160	Railway Sidings	1896
27	219	SW	n/a	Railway	1916
10	226	NW	523537 180551	Railway Sidings	1951

ID	Distance (m)	Direction	NGR	Details	Date
28	229	NW	523590 180266	Railway Sidings	1953
29	229	NW	523591 180266	Railway Sidings	1968
30	229	NW	523601 180518	Railway Sidings	1967
31	245	NW	523692 180157	Railway Sidings	1916
32F	246	NW	523641 180457	Railway Sidings	1953
33F	246	NW	523641 180457	Railway Sidings	1953

Any records that have been identified are represented on the Railways and Tunnels Map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
2	SW	West London Line	Rail
2	SW	West London Line	Rail
2	SW	West London Line	Rail
2	SW	West London Line	Rail
6	SW	West London Line	Rail
6	SW	Not given	Multi Track
6	SW	Not given	Multi Track
6	SW	West London Line	Rail
9	NW	West London Line	Rail
9	NW	West London Line	Rail
87	SE	Not given	Multi Track
87	SE	Not given	Multi Track
87	SE	Not given	Multi Track
87	SE	Not given	Multi Track

Distance (m)	Direction	Name	Type
121	NW	West London Line	Rail
121	NW	West London Line	Rail
123	NW	Not given	Multi Track
123	NW	Not given	Multi Track
125	NW	West London Line	Rail
125	NW	West London Line	Rail
169	SE	Not given	Multi Track
169	SE	Not given	Multi Track

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? Yes

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

Contact Details

Groundsure Helpline

Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

Johnson Poole & Bloomer Limited

Harris and Pearson Building, Brettel Lane
Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS

Tel: 08456 050505
Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

Peter Brett Associates
Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016/

APPENDIX C

Zetica UXO Maps

REGIONAL UNEXPLODED BOMB RISK

LONDON – South

NUMBER OF BOMBS PER BOROUGH

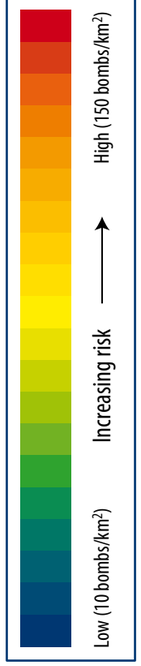
Borough	High Explosive	Parachute mines	Incendiary*
Beckenham	750	12	83
Bromley	744	13	55
Caterham & Warlington	272	0	20
Coulsdon & Purley	724	1	102
Croydon	1240	11	150
Orpington	1277	27	61
Penge	145	0	14

London and its approaches are renowned for the heavy bombing inflicted on them during WWII. This is reflected in the number of UXB found since the war and so it is accepted that a significant risk from UXB exists across the London area. On average, less than 10% of high explosive and 50% of incendiary bombs failed to explode. This map shows the relative increase in this risk based on bombing densities.

*Larger incendiary devices only. This figure does not include the numerous smaller incendiary devices (eg. 1kg devices).

The information in this UXB risk map is derived from a number of sources and should be read in conjunction with the 'Users' Guide' attached. The often inaccessible nature and changing ground conditions in estuaries and riverbeds (eg. movement of silt that may contain ordnance) means that historical bombing records of these areas may be poor or inaccurate, and further assessment of the bomb risk may be required as part of a site specific study. Zetica cannot guarantee the accuracy or completeness of the information or data.

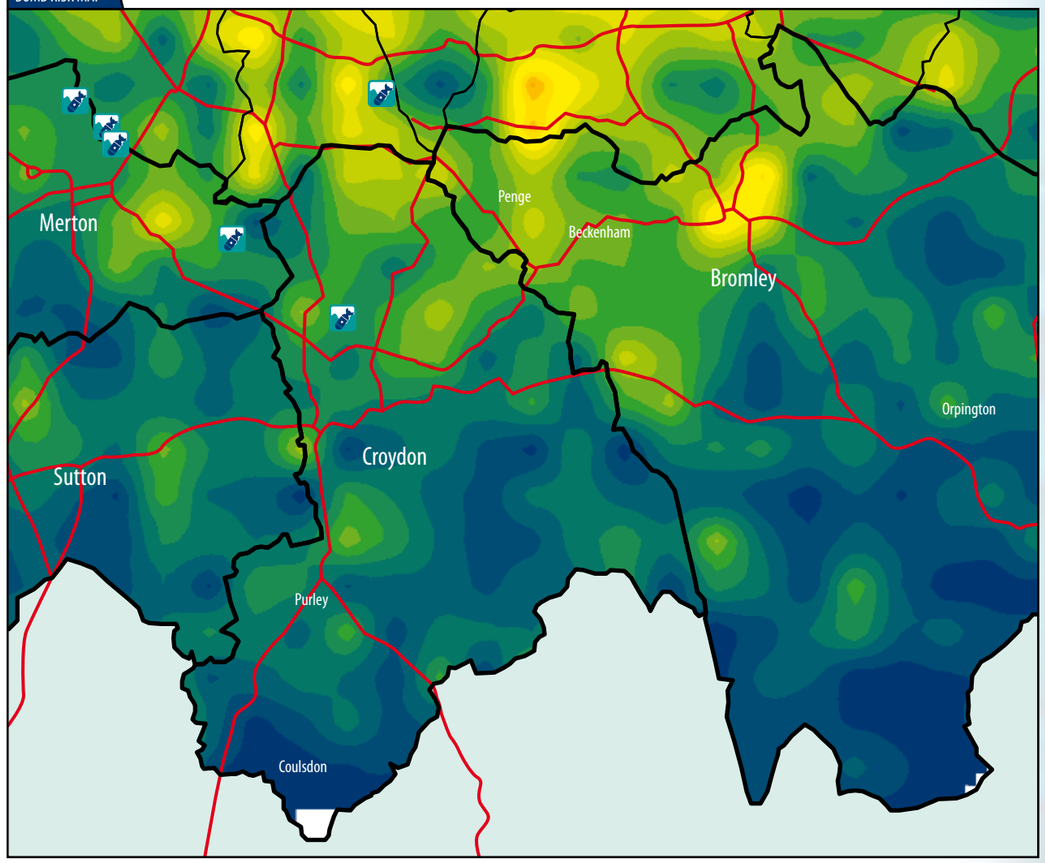
BOMB RISK



KEYPOINTS

Abandoned bombs

BOMB RISK MAP



UXB hazard map

This map can be used as part of a preliminary risk assessment in line with CIRIA guidance (C681).

A FOUR-STEP PROCESS

- Risk assessment and method statement from a qualified explosive ordnance clearance (EOC) operative.
- Surface geophysical survey to allow shallow groundwork.
- MAGCONE detects UXBs and obstructions on piling layout to the no-risk depth.
- Detected UXBs can be dealt with by our EOC engineers and a Clearance Certificate issued for the site.

zetica

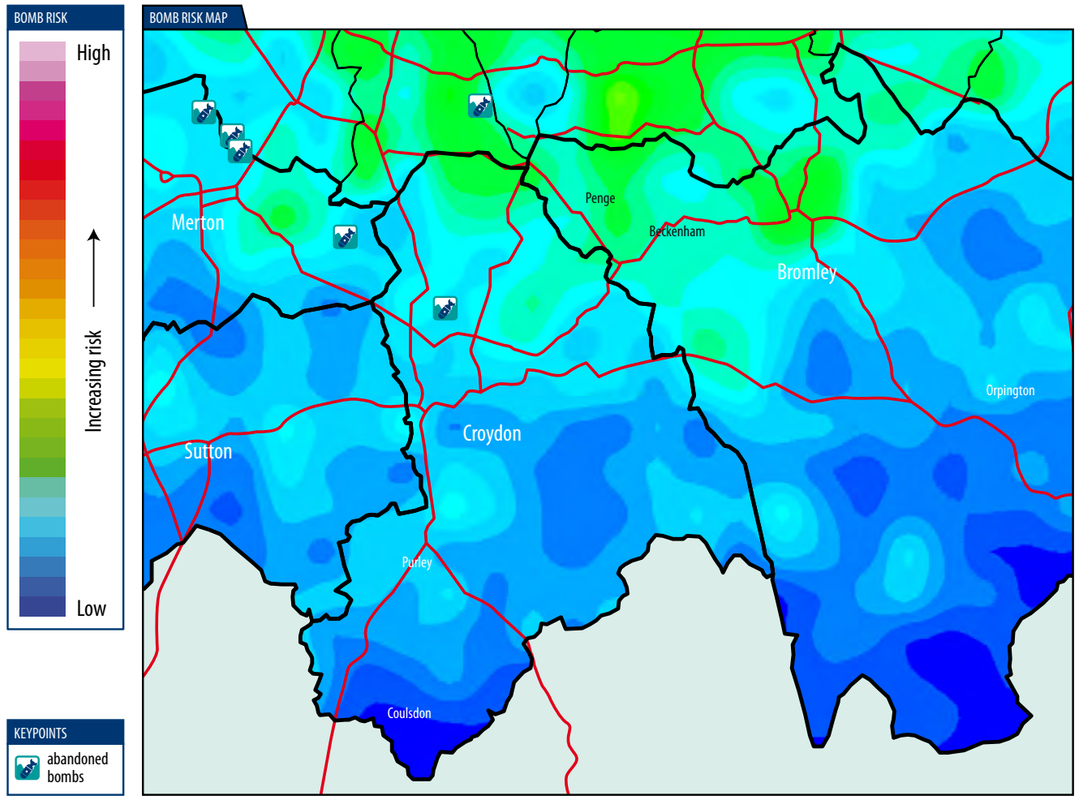
For more details on this and related services, telephone: +44 (0) 1993 886682 or visit our website: www.zetica.com

RISK MITIGATION AND INVESTIGATION

LONDON – South

Risk mitigation map

This map is based on Zetica's bomb risk map and can be used as a guide to the relative risk of intrusive activities such as piling, drilling or deep bulk excavation, and the likelihood that some form of risk mitigation may be recommended. However, this map is a guide only and, in practice, a detailed desk study may conclude that extensive risk mitigation is not required even in a high risk area.

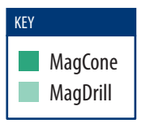


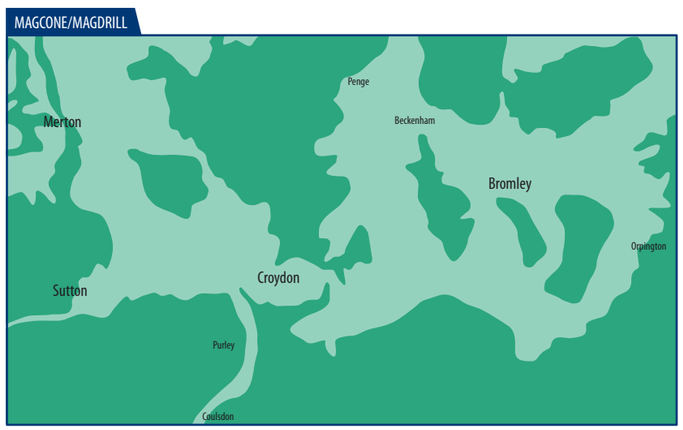
Investigation options

The unexploded bomb (UXB) risk for intrusive site works, such as drilling or piling that usually extend to depths greater than can be mapped from surface, can be effectively managed by clearing borehole or pile locations using MagCone or MagDrill techniques.

For the London area, the geology is extremely complex with a complicated succession that includes several units that are unsuitable for MagCone techniques. To give a first order approximation as to which technique might be appropriate for a site, a simplified map has been produced. This map has been compiled from the BGS Solid and Drift map sheets 256, 257, 270 and 271. The complex geology has been reduced to three areas coloured grey, green and pink. Areas that involve units that are probably only suitable for MagDrill, which include gravels, are shown in pink. Areas that involve units probably suitable for MagCone, such as London Clay or alluvium, are coloured green. Where chalk crops out at surface or there is negligible soil cover over chalk, it is shown in grey.

This map is for indicative purposes only and specific site geology needs to be taken in to account, especially close to the boundaries shown on the map.





MagCone/MagDrill map

This map compilation provides a guide to appropriate intrusive UXB detection methods.

The map is based on British Geological Survey maps at 1:50,000 scale. Soft, compressible alluvial materials can typically be investigated using MagCone (CPT-based) methods whereas sands and dense gravels from River Terrace deposits are typically investigated using MagDrill (drilling-based) methods.

The use of an inappropriate method could result in insufficient depth of detection or a less cost effective technique being used.

BOMB MAP USERS' GUIDE

Sources of information and explanation of bomb risk

Why?

Unexploded bombs (UXB) still present a risk to construction projects long after the end of the Second World War (WWII). UXBs often entered the ground unnoticed at high velocity and penetrated to a depth of several metres. Here they remain – vulnerable to disturbances from construction work. Beyond the depth of shallow excavation work, the greatest risk is to piling, drilling and probing crews. A piling rig could repeatedly hit a UXBs with considerable force before the crew realises an obstruction has been impacted. It could then be up to 72 hours before the detonator activates.

Who?

The responsibility for avoiding UXB risk usually lies with construction companies or house builders particularly those who are redeveloping urban sites. In addition, project engineering or environmental consultants are expected to advise their clients of a site's history. Other interested parties include those organisations whose employees are physically at most risk from intrusive works, normally piling companies, drillers or probing operators.

How?

UXB risk should be assessed for every site, but especially those in known heavily bombed areas or those situated near war-time strategic installations that were priority targets for enemy aircraft, for example, airfields. Zetica's regional bomb risk map is therefore a first point of reference from which the relative, potential abundance of UXBs can be judged. Consultants then advise their clients that an ordnance-risk desk study is required, which they may obtain from external sources. Construction companies or house builders who assess their own risk could choose to come direct to Zetica.

When?

Do not wait for the piling or drilling company to be on site before thinking about UXB risk – it will inevitably cause delays and higher costs. Request the regional bomb risk map from Zetica as soon as a site is being considered, and then use it to help you or your clients to decide if an ordnance-risk desk study is required.

Where?

Maps can be obtained for any county in England, Scotland, Wales or Northern Ireland – or for any London borough. They can help determine the areas that were most heavily bombed – but no part of the country should be considered 100% safe from UXB risk. Even remote rural areas can have a high risk if, for example, they were locations for decoy airfields or beacons that were lit to fool enemy pilots into thinking they had located a burning city that had been successfully hit by others in the raid.

How to use this regional map of London

This map is designed to give you an indication of the potential risk from UXBs in your area. If you are conducting work that involves excavation, piling or other disturbance of the ground, then you should use the map to identify the category of risk for your site.

The risk boundaries are a guide, compiled from data based on the political areas for which records are held; being just outside a high-risk area does not mean there is no UXB risk. You should use the map to assist in your decision of whether to investigate the UXB risk further.

Information on the regional risk remaining from UXBs in the UK

Zetica has built the largest UXB database of its kind in the UK. It includes a unique digital library of bomb census data, and maps showing key strategic points and bombing densities from the First and Second World Wars. The main sources of information include records from central government (Public Records Office), the Ministry of Defence, and the German Luftwaffe.

Using information from this database, Zetica has published maps of UXB risk on a regional, county and borough scale. The maps indicate relative degrees of UXB risk based on available records for bombing densities and known targeted areas for regions within the UK. The risk is broken down into individual boroughs, towns or cities. The data are based on the historical boroughs and are then overlaid onto the modern map. It is important to note that more-detailed research may be required for individual sites, particularly where proximity to a potential WWII target means the local risk may be higher.

Relative UXB risk across London

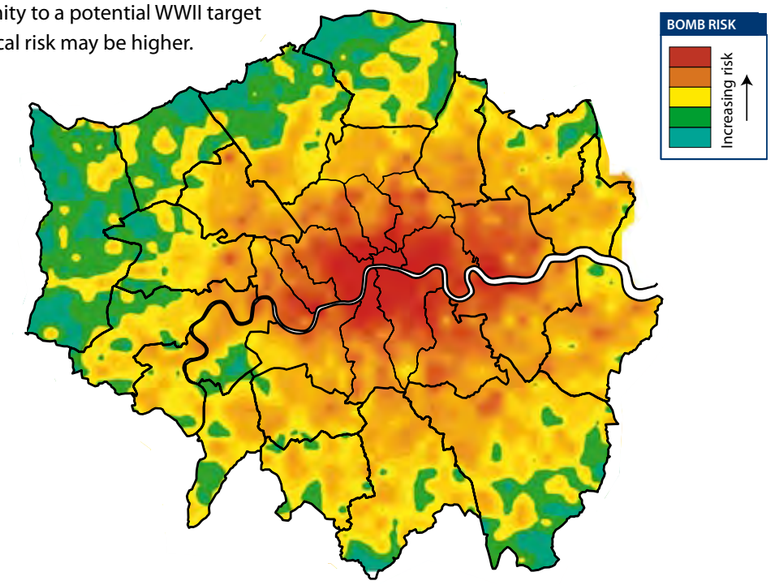
The relative risk for the London area is established by plotting the recorded bombing densities. These are represented as counts of high explosive bombs in km^2 area.

The areas coloured green represent a record of less than 10 bombs per km^2. Compared to other areas of the UK, this still represents a signficant risk.

However, this is much lower than parts of Central London, where the red colouration indicates in excess of 150 bombs falling per km^2, representing a very significant UXB risk.

Other WWII targets

Other regions with the risk of UXBs are key strategic points as defined by the government during WWII as representing potential enemy targets. Where these exist outside areas mapped as high, moderate or low risk, a site-specific assessment of the UXB risk may be required.



What to do if…

…you have a site that has a potential UXB risk

In the absence of current legislation requiring you to address the risk from UXBs, your responsibilities under health and safety legislation and regulations such as construction design and management require that you address all identified risks. The first stage is to request further advice from a professional adviser such as Zetica, or to gain more site-specific information by commissioning an ordnance-risk desk study. Then a strategy to deal with the risk can be established that is tailored to your proposed work.

…you find a suspect item or require advice

If during site works you find a suspect (ordnance-related) item, it is very important that you do not touch or move it (even if it has already been moved by an excavator). If it is clearly ordnance related, then dial 999 and ask for the police. Ensure that the area around the item is kept as clear as possible without placing yourself at risk. If you are unsure and do not wish to cause undue alarm, or you just require some advice, then you can call Zetica. We have experienced qualified UXB specialists on hand who can offer support and advice during any site works.

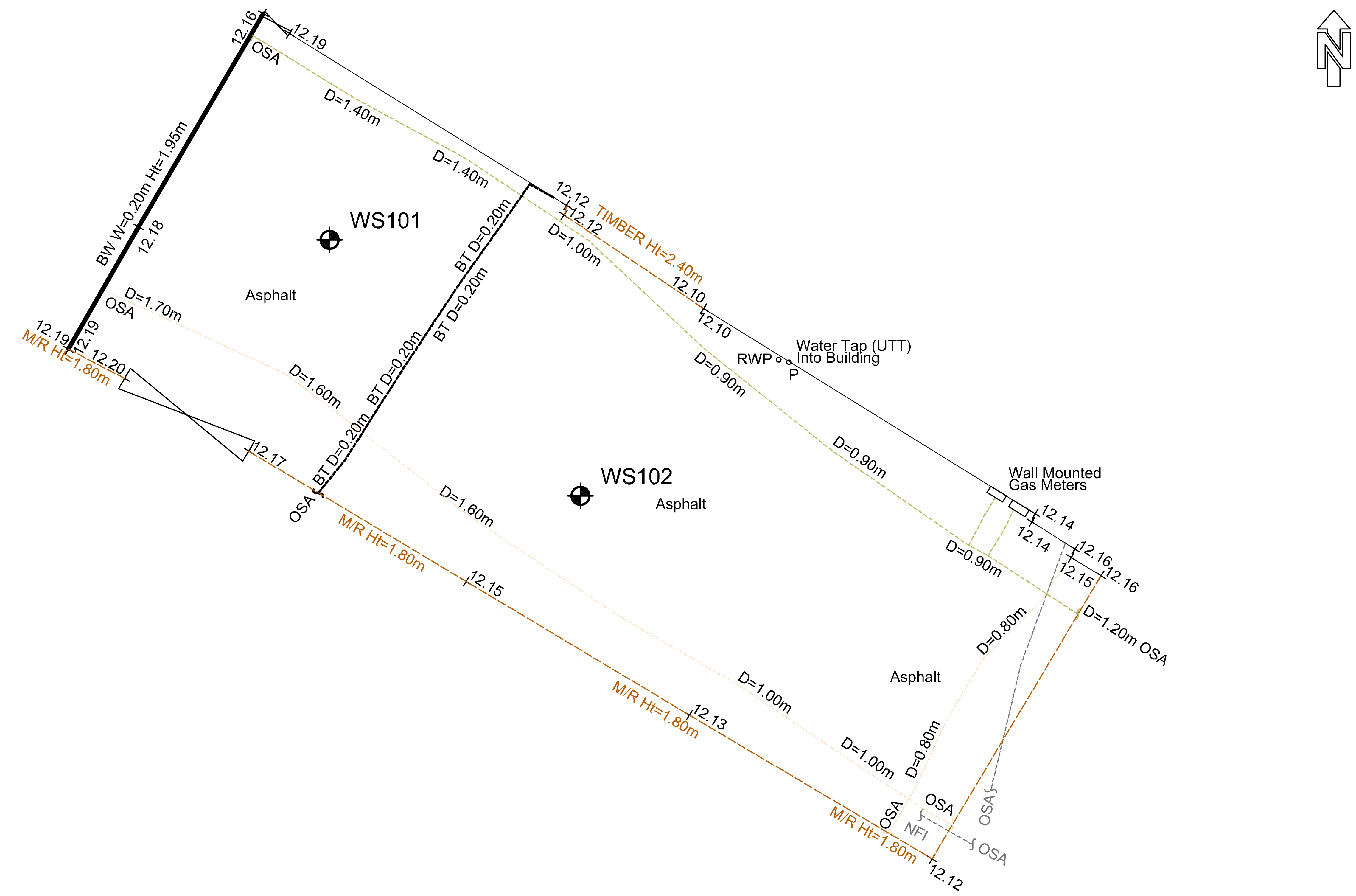
More-detailed procedures should be established in advance if you are in an area where the risk of finding a UXB is shown to be significant (moderate to high).

Site-specific desktop studies

Zetica is able to provide high-quality, site-specific UXB risk information for any residential, industrial or commercial property in the UK. These desktop studies provide details of the bombing density within an area and for the site itself, in order to indicate the risks of UXBs still being present. A risk assessment is provided to facilitate informed decision making on whether any further risk mitigation measures are required.

APPENDIX D

Site Investigation Data



NOTES:

SUBSURFACE UTILITIES FROM 40SEVEN SURVEY DRAWING NO. 2546 COLLIERS WOOD REV A MAY 2017

BOREHOLE POSITIONS ARE NOT SURVEYED AND ARE APPROXIMATE

REV	DATE	DESCRIPTION	DRN	CHK	APP
Rev	Date	Description	Drawn	Check	Approv

Client

TRANSPORT FOR LONDON

Address

Phone
Fax

Suitability Description: AB
AS BUILT

Designed	J. RAVEN	Date 27JUN17	Signed
Drawn	J. RAVEN	Date 27JUN17	Signed
Checked	J. DONNELLY	Date 30JUN17	Signed
Approved	J. DONNELLY	Date 30JUN17	Signed
Scale:	As shown	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	AB	Project Number:	UA009686

PROJECT:
TfL PSF 9131 SITE INVESTIGATIONS

TITLE:
SITE OPPOSITE COLLIERS WOOD STATION
BOREHOLE LOCATION PLAN

ARCADIS Design & Consultancy for natural and built assets

Registered office:
Arcadis House
34 York Way
London
N1 9AB

Coordinating office:
The Surrey Research Park
10 Medaware Road
Guildford GU2 7AR
Tel: 44 (0)1483 803 000

www.arcadis.com

Drawing Number: 0001-UA009686

Revision: 01

50mm on Original

Print Date: 2017-06-27 15:31:15

Key to Exploratory Hole Symbols and Abbreviations

SAMPLE TYPES

B	Bulk disturbed sample	ES	Environmental soil sample	U	Undisturbed sample
C	Core sample	EW	Environmental water sample	UT	Undisturbed thin wall sample
CBR-D	Disturbed sample from CBR test area	G	Gas sample	W	Water sample
CBR-U	Undisturbed sample from CBR test area	L	Liner sample		
D	Small disturbed sample	SPT	SPT split spoon sample		

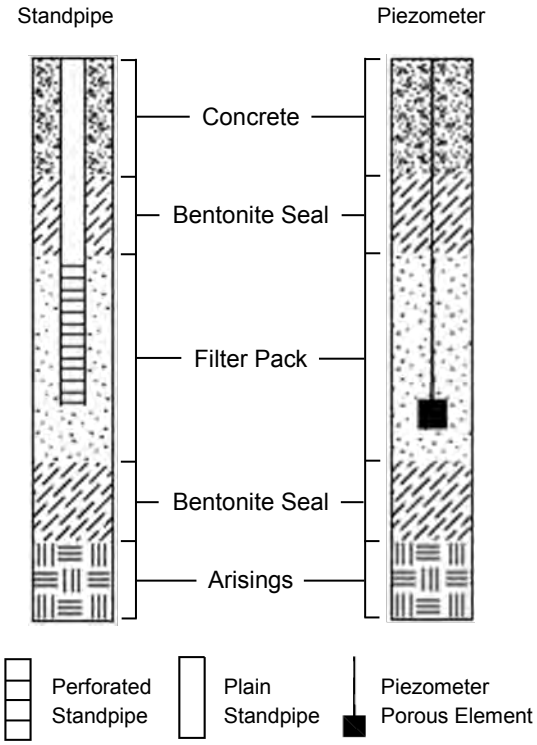
IN-SITU TESTING

SPTs	Standard Penetration Test (using a split spoon sampler)
SPTc	Standard Penetration Test (using a solid 60 degree cone)
N	Recorded SPT 'N' Value *
-/-	Blows/Penetration (mm) after seating blows totalling 150 mm
MX	Mexi Probe Test (records CBR as %)
HV	Hand Shear Vane Test (undrained shear strength quoted in kPa)
PP	Pocket Penetrometer Test (kg/m^3)
( )	Denotes residual test value
PID	Photo Ionisation Detector (ppm) *
Kf/Kr	Permeability Test (f = falling head, r = rising head quoted in ms^{-1})
HPD	High Pressure Dilatometer Test (pressure meter)
PKR	Packer / Lugeon Permeability Test
CBR	California Bearing Ratio Test

ROTARY CORE DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation (% of intact core >100 mm)
FI	Fracture Spacing (average fracture spacing; in mm, over indicated length of core) * *
NI	Non-Intact Core
AZCL	Assumed Zone of Core Loss

INSTALLATION & BACKFILL DETAILS



GROUNDWATER

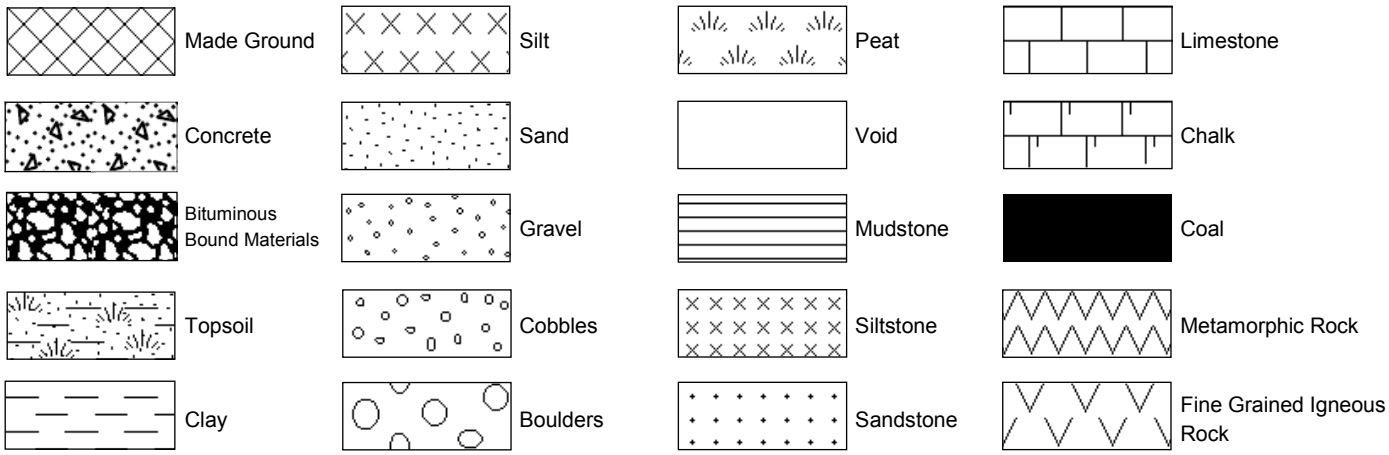
Groundwater strike

Standing water level after 20 minutes; 1st, 2nd etc (number denotes level order)

STRATUM BOUNDARIES

Unit boundary

STRATA LEGENDS - Note: Composite strata types are shown by combining symbols



* Where a single value is quoted this is the uncorrected 'N' value for a full 300 mm test drive following a seating drive of 150mm. Where the full test drive penetration is not achieved the number of blows is quoted for the penetration below the test total of 300mm, e.g.: 50/75.

* * The minimum, average and maximum are shown e.g. 5/45/125.

ARCADIS Dynamic Sample Log

WS101

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
TFL - Site opposite Colliers Wood Station	**UA009686-01**	**12.18**	**07/06/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Transport for London	**526746.00**	**170371.00**	**07/06/2017**	**Sheet 1 of 1**

SAMPLES Depth	SAMPLES Type/ No.	TESTS Depth	TESTS Type/ No.	TESTS Results	Water Strikes	STRATA Description	STRATA Legend	Depth (Thickness)	Level	Install/ Backfill
						Black BITUMOUS BOUND MATERIAL		0.05	12.13	
						CONCRETE		0.12	12.06	
0.30	ES1					MADE GROUND: Dark brown slightly clayey gravelly SAND with rare fragments of metal and glass. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of brick, flint and ceramic.				
0.50	ES2							(1.28)		
						entire brick at 0.8m bgl				
1.00	D3									
		1.20	SPT(S)	N=5 (1 for 150mm/1,1,2,1)	DRY					
1.50 - 2.00	B6					Soft greyish brown slightly sandy CLAY with frequent shell fragments. Sand is fine. [ALLUVIUM]		1.40	10.78	
1.60	ES4							(0.60)		
1.70	D5									
		2.00	SPT(S)	N=1 (0 for 150mm/1 for 300mm)	DRY	Very loose yellowish brown slightly glauconitic very silty SAND. Sand is fine to medium. One coarse gravel sized pocket of brown clay. [ALLUVIUM]		2.00	10.18	
2.20	D7							(0.60)		
2.40	ES9				▼	becoming sandy CLAY				
2.60	D8					Light grey slightly clayey SAND with rare shell fragments. Sand is medium to coarse. [ALLUVIUM]		2.60	9.58	
		3.00	SPT(S)	N=7 (2,3/2,2,1,2)	2.5	becoming grey with abundant shell fragments		(0.70)		
3.20 - 3.40	D10					becoming yellow				
						Loose yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is subangular to well rounded, fine to medium flint. [ALLUVIUM]		3.30	8.88	
								(0.50)		
3.80 - 4.00	D11					Loose yellowish brown very sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to well rounded, fine to medium flint. [ALLUVIUM]		3.80	8.38	
		4.00	SPT(S)	N=5 (1,2/2,1,1,1)		subangular cobble of flint.		(1.00)		
4.20	D12									
4.50 - 4.80	D13					sand is coarse				
4.80 - 5.00	D14					Stiff extremely closely fissured dark grey CLAY. [LONDON CLAY]		4.80	7.38	
		5.00	SPT(S)	N=12 (3,3/4,4,4 for 150mm)				(0.65)		
								5.45	6.73	

DRILLING TECHNIQUE

From	To	Technique
0.00	1.20	Inspection Pit
1.20	5.45	Dynamic Sample

WATER OBSERVATIONS

Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed
07/06/2017 00:00	2.40			2.00	

HOLE/CASING DIAMETER

Hole Dia.	Depth	Casing Dia.	Depth
100	5.00	101	2.00

BACKFILL

Top	Base	Backfill
0.00	0.05	Concrete
0.05	1.00	Bentonite
1.00	4.00	Sand
4.00	5.45	Arisings

Remarks

Consistency description may be affected by softening due to drilling disturbance.
Hole terminated on engineer's instruction.
Hole collapsed from 5.45m back to 4.0m bgl.
Location coordinates and levels are approximate.

Termination Depth: 5.45m

HCL House
St Mellons
Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis**	**JR**	**JD**

ARCADIS Dynamic Sample Log

WS102

Project	Project No.	Ground Level (mAOD)	Start Date	Scale
TFL - Site opposite Colliers Wood Station	**UA009686-01**	**12.13**	**07/06/2017**	**1:50**
Client	Easting (OS mE)	Northing (OS mN)	End Date	
Transport for London	**526752.00**	**170366.00**	**07/06/2017**	**Sheet 1 of 1**

SAMPLES		TESTS			Water Strikes	STRATA				
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend	Depth (Thickness)	Level	Install/ Backfill
						BITUMOUS BOUND MATERIAL		0.03	12.10	
						CONCRETE		0.12	12.01	
0.30	ES1					MADE GROUND: Dark brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse of flint, brick and concrete. Occasional fragments of glass and ceramics including half a glass bottle.				
0.50	ES2							(1.08)		
1.00	ES3					becoming very clayey				
1.20	D4	1.20	SPT(S)	N=1 (0 for 150mm/1 for 300mm)	DRY			1.20	10.93	
1.20 - 1.65	D5					Very soft to soft greyish brown slightly sandy CLAY with frequent small pockets of orange fine sand (burrows). Sand is fine to medium. [ALLUVIUM]		(0.40)		
1.30	ES6							1.60	10.53	
						Mottled grey and yellowish brown very clayey SAND with abundant shell fragments. Sand is fine to medium. [ALLUVIUM]		(0.40)		
2.00 - 2.45	D7	2.00	SPT(S)	N=1 (0 for 150mm/1 for 300mm)	DRY	Probably soft light grey mottled black slightly sandy CLAY. Sand is fine. [ALLUVIUM]		2.00	10.13	
								(0.80)		
2.80 - 3.00	ES8							2.80	9.33	
						Grey mottled black slightly silty SAND. Sand is fine. [ALLUVIUM]		(0.20)		
3.00 - 3.45	D9	3.00	SPT(S)	N=16 (3,5/3,5,5,3)	2.8			3.00	9.13	
						Medium dense grey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to well rounded fine to coarse flint. [ALLUVIUM]		(0.80)		
						subangular COBBLE of flint becoming yellowish brown				
								3.80	8.33	
		4.00	SPT(S)	N=3 (1 for 150mm/1 for 150mm,1,1)		Stiff extremely closely fissured dark grey CLAY. [LONDON CLAY]				
								(1.65)		
4.80 - 5.00	D10									
		5.00	SPT(S)	N=10 (2,2/2,2,2,4)						
								5.45	6.68	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit	07/06/2017 00:00	2.80			2.00		100	5.00	101	2.00	0.00	0.05	Concrete
1.20	5.45	Dynamic Sample											0.05	1.00	Bentonite
													1.00	3.50	Sand
													3.50	5.45	Arisings

Remarks

Consistency description may be affected by softening due to drilling disturbance.
Hole terminated on engineer's instruction.
Hole collapsed from 5.45m back to 3.50m bgl.
Location coordinates and levels are approximate.

Termination Depth: 5.45m

HCL House
St Mellons
Business Park
Cardiff
CF3 0EY

Unless otherwise stated:
Depth (m), Diameter(mm),Time (hhmm), Thickness (m), Level (mOD).

Equipment Used	Contractor	Logged By	Checked By
Dando Terrier	**Arcadis**	**JR**	**JD**

Jon Raven
Arcadis Consulting (UK) Ltd
10 Medawar Road
The Surrey Research Park
Guildford
Surrey
GU2 7AR

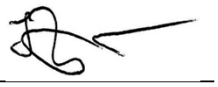
t: 0870 000 3005
f: 0870 000 3905
e: jonathan.raven@arcadis.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 17-51148

Project / Site name:	TFL - Site opposite Colliers Wood Station	**Samples received on:**	08/06/2017
Your job number:	UA009686-01	**Samples instructed on:**	12/06/2017
Your order number:	PO0067396	**Analysis completed by:**	20/06/2017
Report Issue Number:	1	**Report issued on:**	20/06/2017
Samples Analysed:	5 soil samples		

Signed: 

Dr Irma Doyle
Senior Account Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 17-51148

Project / Site name: TFL - Site opposite Colliers Wood Station
Your Order No: PO0067396

Lab Sample Number				764776	764777	764778	764779	764780
Sample Reference				WS101	WS101	WS102	WS102	WS102
Sample Number				1	4	2	3	8
Depth (m)				0.30	1.60	0.50	1.00	2.80
Date Sampled				07/06/2017	07/06/2017	07/06/2017	07/06/2017	07/06/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	26	16	16	14
Total mass of sample received	kg	0.001	NONE	1.7	1.6	2.0	1.6	2.0
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile- Loose fibrous debris	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	-	Not-detected	Not-detected	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	7.9	7.9	7.9	8.3
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.41	0.17	0.14	0.13	0.24
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.69	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	1.1	< 0.05	0.27	0.16	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.37	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.98	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	5.0	< 0.05	1.2	0.48	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.6	< 0.05	0.35	0.10	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	10	< 0.05	3.3	1.4	< 0.05
Pyrene	mg/kg	0.05	MCERTS	12	< 0.05	2.9	1.1	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.3	< 0.05	1.6	0.93	< 0.05
Chrysene	mg/kg	0.05	MCERTS	6.4	< 0.05	1.8	0.69	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	8.1	< 0.05	2.2	0.94	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	4.5	< 0.05	0.99	0.41	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.8	< 0.05	1.8	0.77	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.7	< 0.05	1.0	0.40	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.32	0.09	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.6	< 0.05	1.2	0.44	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	74.8	< 0.80	18.9	7.93	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	37	12	46	42	5.2
Boron (water soluble)	mg/kg	0.2	MCERTS	7.6	7.8	6.2	4.7	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	8.8	0.3	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	76	35	21	23	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	690	32	300	980	10
Lead (aqua regia extractable)	mg/kg	1	MCERTS	2300	48	880	640	10
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.2	< 0.3	1.7	1.1	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	76	25	33	27	8.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	1600	69	440	340	22

Analytical Report Number : 17-51148

Project / Site name: TFL - Site opposite Colliers Wood Station

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
764776	WS101	1	0.30	Black gravelly loam with rubble.
764777	WS101	4	1.60	Brown clay with gravel.
764778	WS102	2	0.50	Brown clay and loam with gravel.
764779	WS102	3	1.00	Brown clay and gravel.
764780	WS102	8	2.80	Light brown sandy clay.

Analytical Report Number : 17-51148

Project / Site name: TFL - Site opposite Colliers Wood Station

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2:1990: Clause 3.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client:	Arcadis Consulting (UK) Ltd	Client Reference:	UA009686-01
Client Address:	10 Medawar Road The Surrey Research Park Guildford Surrey GU2 7AR	Job Number:	17-51059
		Date Sampled:	07/06/2017
		Date Received:	08/06/2017
Contact:	Jon Raven	Date Tested:	19/06/2017
Site Name:	TFL - Site opposite Colliers Wood Station	Sampled By:	Not Given
Site Address:	Not Given		

Test results

Laboratory Reference	Sample Reference	Location	Depth Top [m]	Depth Base [m]	Sample Type	Description	Moisture Content [%]
764363	6	WS101	1.5	2	B	Greyish brown slightly gravelly slightly sandy CLAY	48
764366	14	WS101	4.8	5	D	Dark brown slightly gravelly slightly sandy CLAY	26
764367	7	WS102	2	2.45	D	Mottled brown sandy CLAY	25
764368	10	WS102	4.8	5	D	Dark brown slightly gravelly slightly sandy CLAY	26

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 23/06/2017

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

Client:	Arcadis Consulting (UK) Ltd	Client Reference:	UA009686-01
Client Address:	10 Medawar Road The Surrey Research Park Guildford Surrey GU2 7AR	Job Number:	17-51059
		Date Sampled:	07/06/2017
		Date Received:	08/06/2017
Contact:	Jon Raven	Date Tested:	19/06/2017
Site Name:	TFL - Site opposite Colliers Wood Station	Sampled By:	Not Given
Site Address:	Not Given		

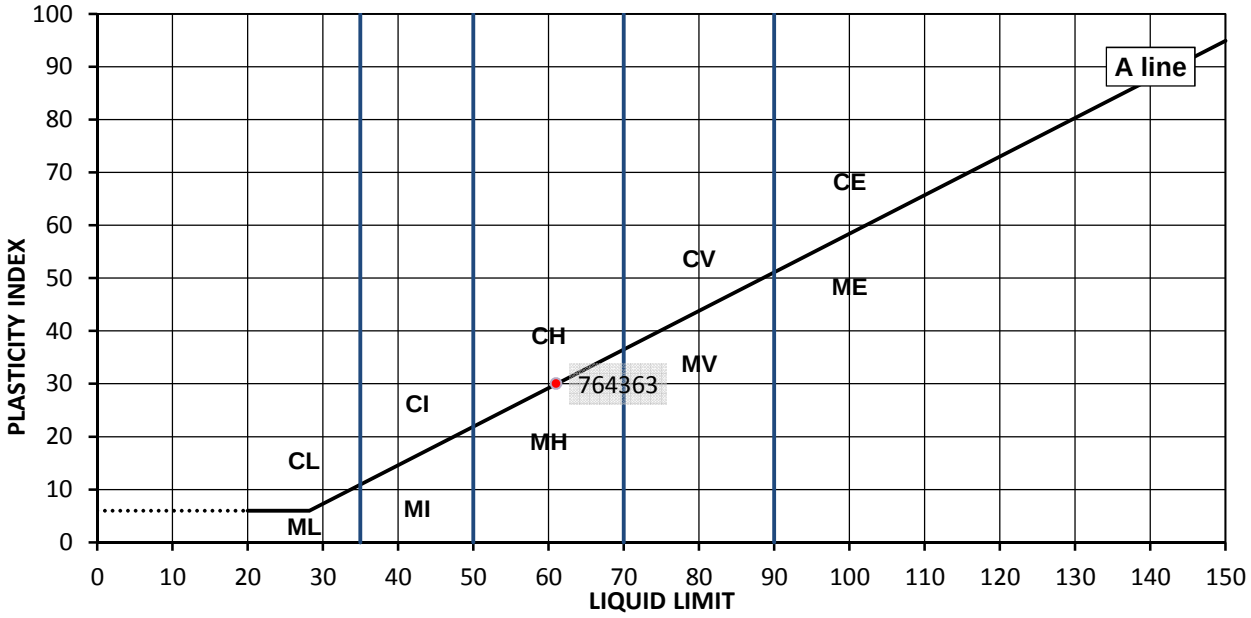
TEST RESULTS

Laboratory Reference: 764363
Sample Reference: 6

Description: Greyish brown slightly gravelly slightly sandy CLAY
Location: WS101
Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 1.5
Depth Base [m]: 2

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
48	61	31	30	99



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 23/06/2017

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

Client:	Arcadis Consulting (UK) Ltd	Client Reference:	UA009686-01
Client Address:	10 Medawar Road The Surrey Research Park Guildford Surrey GU2 7AR	Job Number:	17-51059
		Date Sampled:	07/06/2017
		Date Received:	08/06/2017
Contact:	Jon Raven	Date Tested:	19/06/2017
Site Name:	TFL - Site opposite Colliers Wood Station	Sampled By:	Not Given
Site Address:	Not Given		

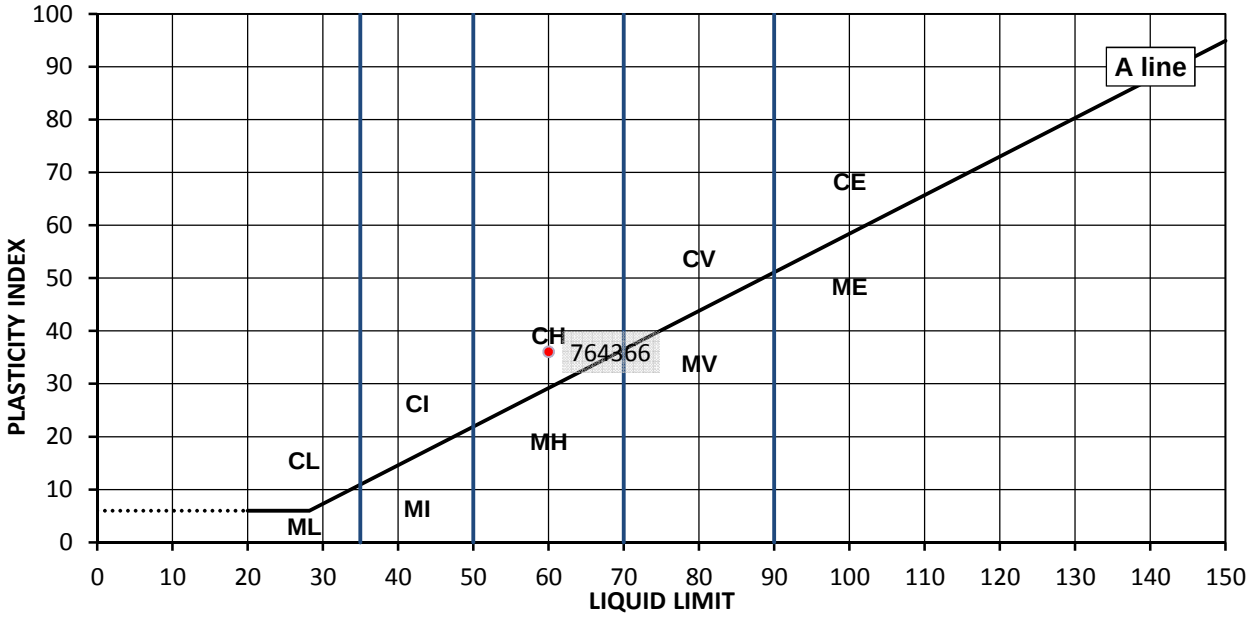
TEST RESULTS

Laboratory Reference: 764366
Sample Reference: 14

Description: Dark brown slightly gravelly slightly sandy CLAY
Location: WS101
Sample Preparation: Tested after >425um removed by hand

Sample Type: D
Depth Top [m]: 4.8
Depth Base [m]: 5

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	60	24	36	82



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 23/06/2017

for and on behalf of i2 Analytical Ltd

GF 106.11

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377-2: 1990: Clause 4.3 & 5: Definitive Method

Client:	Arcadis Consulting (UK) Ltd	Client Reference:	UA009686-01
Client Address:	10 Medawar Road The Surrey Research Park Guildford Surrey GU2 7AR	Job Number:	17-51059
		Date Sampled:	07/06/2017
		Date Received:	08/06/2017
Contact:	Jon Raven	Date Tested:	19/06/2017
Site Name:	TFL - Site opposite Colliers Wood Station	Sampled By:	Not Given
Site Address:	Not Given		

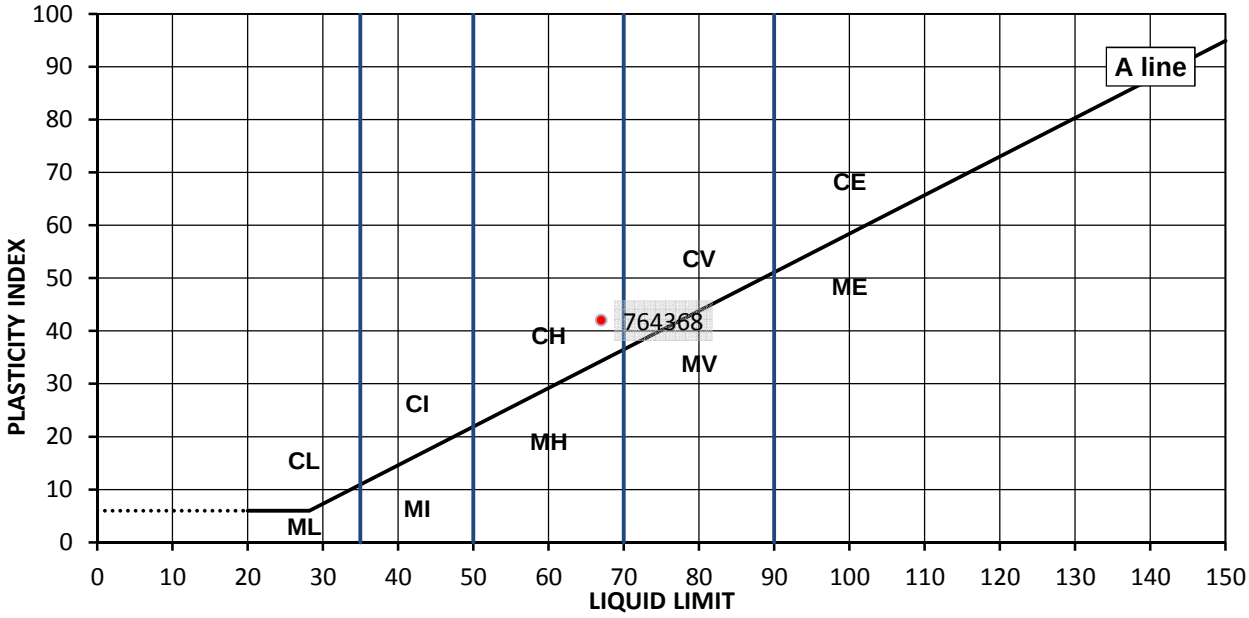
TEST RESULTS

Laboratory Reference: 764368
Sample Reference: 10

Description: Dark brown slightly gravelly slightly sandy CLAY
Location: WS102
Sample Preparation: Tested after >425um removed by hand

Sample Type: D
Depth Top [m]: 4.8
Depth Base [m]: 5

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	67	25	42	99



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 23/06/2017

for and on behalf of i2 Analytical Ltd

GF 106.11

TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client: Arcadis Consulting (UK) Ltd
Client Address: 10 Medawar Road
The Surrey Research Park
Guildford
Surrey
GU2 7AR
Contact: Jon Raven
Site Name: TFL - Site opposite Colliers Wood Station
Site Address: Not Given

Client Reference: UA009686-01
Job Number: 17-51059
Date Sampled: 07/06/2017
Date Received: 08/06/2017
Date Tested: 19/06/2017
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk Mg/m3	dry Mg/m3	%	% Passing 425um %	LL %	PL %	PI %	Mg/m3
764363	WS101	6	1.50	2.00	B	Greyish brown slightly gravelly slightly sandy CLAY			48	99	61	31	30	
764366	WS101	14	4.80	5.00	D	Dark brown slightly gravelly slightly sandy CLAY			26	82	60	24	36	
764368	WS102	10	4.80	5.00	D	Dark brown slightly gravelly slightly sandy CLAY			26	99	67	25	42	

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 23/06/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

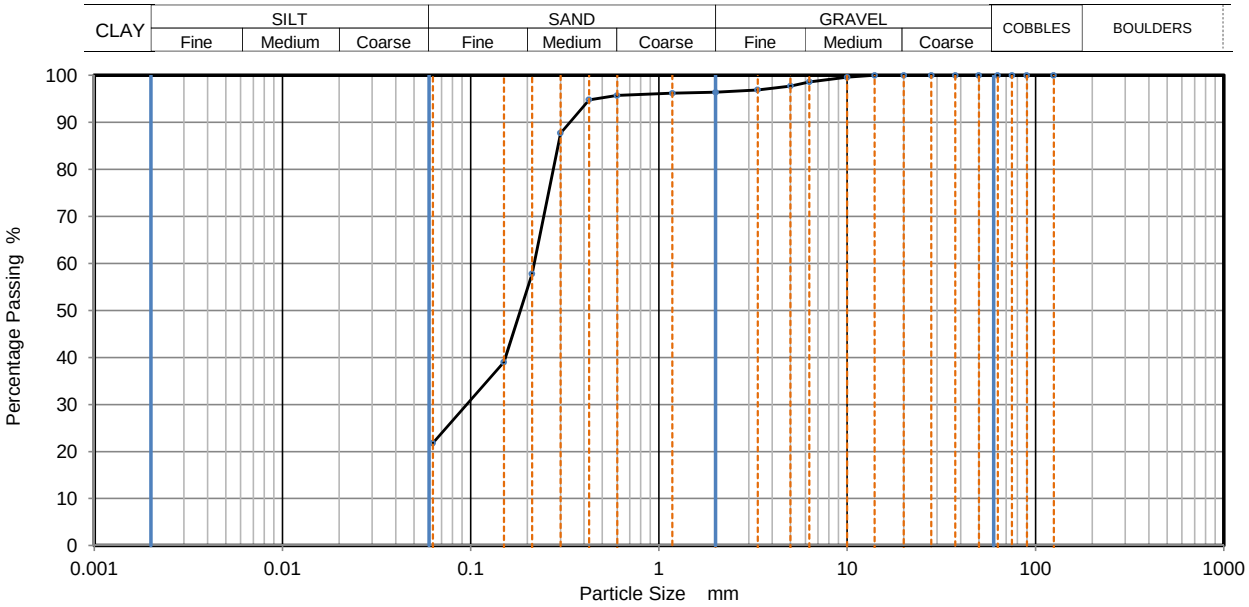
Client:	Arcadis Consulting (UK) Ltd	Client Reference:	UA009686-01
Client Address:	10 Medawar Road The Surrey Research Park Guildford Surrey GU2 7AR	Job Number:	17-51059
		Date Sampled:	07/06/2017
		Date Received:	08/06/2017
Contact:	Jon Raven	Date Tested:	19/06/2017
Site Name:	TFL - Site opposite Colliers Wood Station	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 764364 Sample Reference: 7

Sample description: Yellowish brown slightly gravelly very clayey SAND Sample Type: D

Location: WS101 Depth Top [m]: 2.2

Supplier: Not Given Depth Base [m]: Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	98		
3.35	97		
2	96		
1.18	96		
0.6	96		
0.425	95		
0.3	88		
0.212	58		
0.15	39		
0.063	22		

Dry Mass of sample [g]: 217

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	3.60
Sand	74.70
Fines <0.063mm	21.80

Grading Analysis		
D100	mm	14
D60	mm	0.218
D30	mm	0.0952
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 23/06/2017

for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

Determination of Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

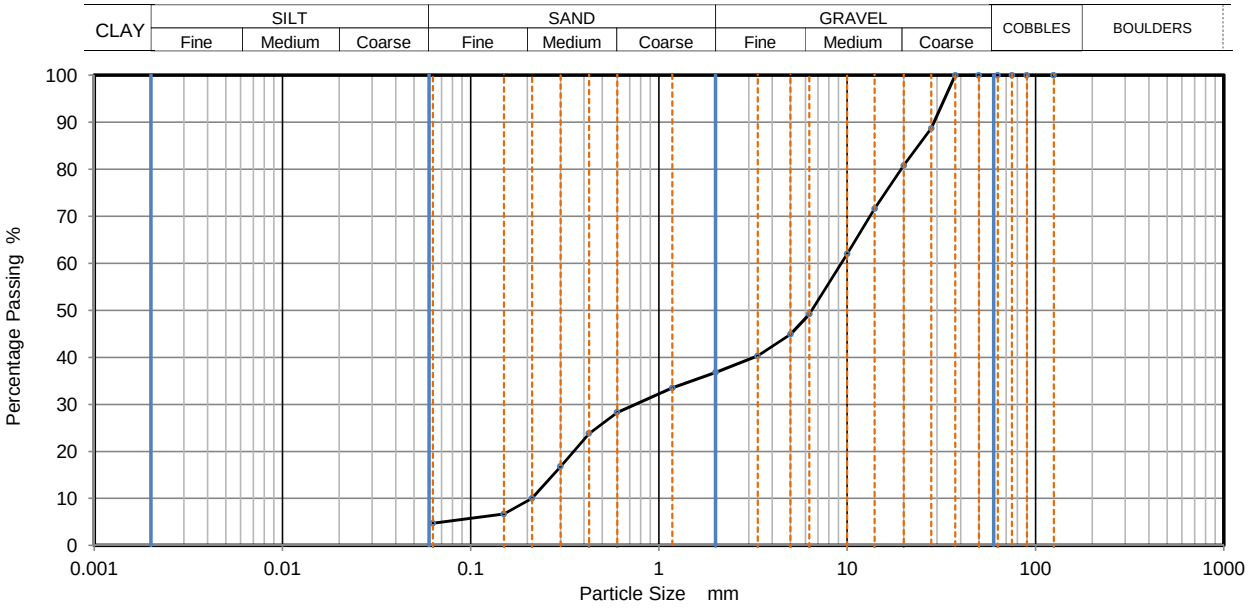
Client:	Arcadis Consulting (UK) Ltd	Client Reference:	UA009686-01
Client Address:	10 Medawar Road The Surrey Research Park Guildford Surrey GU2 7AR	Job Number:	17-51059
		Date Sampled:	07/06/2017
		Date Received:	08/06/2017
Contact:	Jon Raven	Date Tested:	19/06/2017
Site Name:	TFL - Site opposite Colliers Wood Station	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 764365 Sample Reference: 12

Sample description: Mottled brown slightly clayey very sandy GRAVEL Sample Type: D

Location: WS101 Depth Top [m]: 4.2

Supplier: Not Given Depth Base [m]: Not Given



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	89		
20	81		
14	72		
10	62		
6.3	49		
5	45		
3.35	40		
2	37		
1.18	34		
0.6	28		
0.425	24		
0.3	17		
0.212	10		
0.15	7		
0.063	5		

Dry Mass of sample [g]: 1690

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	63.20
Sand	32.10
Fines <0.063mm	4.70

Grading Analysis		
D100	mm	37.5
D60	mm	9.29
D30	mm	0.749
D10	mm	0.212
Uniformity Coefficient		44
Curvature Coefficient		0.29

Remarks

Preparation and testing in accordance with BS1377 unless noted below
The material submitted, fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 23/06/2017

for and on behalf of i2 Analytical Ltd

ARCADIS

HazWasteOnline™

Waste Classification Report

FCPCA-NQSGZ-UDAM3

Job name

TFL - Colliers Wood

Description/Comments

Project

Site

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:
Ross Scammell
Date:
05/07/2017 13:36:41 UTC
Telephone:
0292 092 6725

Company:
Arcadis Consulting (UK) Ltd
St Mellons Business Park
Fortran Road, St Mellons
Cardiff
CF3 0EY

Report

Created by: Ross Scammell
Created date: 05/07/2017 13:36 UTC

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	WS101	0.30	Hazardous	HP 7, HP 14	2
2	WS101[1]	1.60	Non Hazardous		4
3	WS102	0.50	Non Hazardous		6
4	WS102[1]	1.00	Non Hazardous		8
5	WS102[2]	2.80	Non Hazardous		10

Classification of sample: WS101

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

Sample details

Sample Name:	LoW Code:	
WS101	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.30 m	Entry:	17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

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

Hazard Statements hit:

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

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 0.23%)

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

Risk phrases hit:

R50/53 "Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment"

Because of determinands:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 0.23%)
zinc sulphate: (compound conc.: 0.395%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		37 mg/kg	1.32	48.852 mg/kg	0.00489 %		
2	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		7.6 mg/kg	3.22	24.471 mg/kg	0.00245 %		
3	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		8.8 mg/kg	1.142	10.052 mg/kg	0.00101 %		
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		76 mg/kg	1.462	111.078 mg/kg	0.0111 %		
5	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<4 mg/kg	1.923	<7.692 mg/kg	<0.000769 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		690 mg/kg	1.126	776.863 mg/kg	0.0777 %		
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	2300 mg/kg		2300 mg/kg	0.23 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
8		mercury { mercury dichloride }				1.2	mg/kg	1.353	1.624	mg/kg	0.000162 %		
		080-010-00-X	231-299-8	7487-94-7									
9		nickel { nickel chromate }				76	mg/kg	2.976	226.196	mg/kg	0.0226 %		
		028-035-00-7	238-766-5	14721-18-7									
10		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		**<LOD**
		034-002-00-8											
11		zinc { zinc sulphate }				1600	mg/kg	2.469	3950.874	mg/kg	0.395 %		
		030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
12		pH				8.1	pH		8.1	pH	8.1 pH		
				PH									
13		naphthalene				0.69	mg/kg		0.69	mg/kg	0.000069 %		
		601-052-00-2	202-049-5	91-20-3									
14		acenaphthylene				1.1	mg/kg		1.1	mg/kg	0.00011 %		
			205-917-1	208-96-8									
15		acenaphthene				0.37	mg/kg		0.37	mg/kg	0.000037 %		
			201-469-6	83-32-9									
16		fluorene				0.98	mg/kg		0.98	mg/kg	0.000098 %		
			201-695-5	86-73-7									
17		phenanthrene				5	mg/kg		5	mg/kg	0.0005 %		
			201-581-5	85-01-8									
18		anthracene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
			204-371-1	120-12-7									
19		fluoranthene				10	mg/kg		10	mg/kg	0.001 %		
			205-912-4	206-44-0									
20		pyrene				12	mg/kg		12	mg/kg	0.0012 %		
			204-927-3	129-00-0									
21		benzo[a]anthracene				6.3	mg/kg		6.3	mg/kg	0.00063 %		
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				6.4	mg/kg		6.4	mg/kg	0.00064 %		
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				8.1	mg/kg		8.1	mg/kg	0.00081 %		
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				4.5	mg/kg		4.5	mg/kg	0.00045 %		
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				5.8	mg/kg		5.8	mg/kg	0.00058 %		
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				4.7	mg/kg		4.7	mg/kg	0.00047 %		
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				5.6	mg/kg		5.6	mg/kg	0.00056 %		
			205-883-8	191-24-2									
										Total:	0.753 %		

Key

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

Classification of sample: WS101[1]

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

Sample details

Sample Name:
WS101[1]
Sample Depth:
1.60 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
2	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		7.8	mg/kg	3.22	25.115	mg/kg	0.00251 %		
3	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.3	mg/kg	1.142	0.343	mg/kg	0.0000343 %		
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		35	mg/kg	1.462	51.154	mg/kg	0.00512 %		
5	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<4	mg/kg	1.923	<7.692	mg/kg	<0.000769 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		32	mg/kg	1.126	36.028	mg/kg	0.0036 %		
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	48	mg/kg		48	mg/kg	0.0048 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<**LOD**
9	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		25	mg/kg	2.976	74.407	mg/kg	0.00744 %		
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
11	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		69	mg/kg	2.469	170.381	mg/kg	0.017 %		
12	pH			PH		7.9	pH		7.9	pH	7.9 pH		
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-917-1	208-96-8									
15		acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-883-8	191-24-2									
										Total:	0.0433 %		

Key

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

Classification of sample: WS102

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

Sample details

Sample Name:
WS102
Sample Depth:
0.50 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		46	mg/kg	1.32	60.735	mg/kg	0.00607 %		
2	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		6.2	mg/kg	3.22	19.963	mg/kg	0.002 %		
3	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		21	mg/kg	1.462	30.693	mg/kg	0.00307 %		
5	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<4	mg/kg	1.923	<7.692	mg/kg	<0.000769 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		300	mg/kg	1.126	337.766	mg/kg	0.0338 %		
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	880	mg/kg		880	mg/kg	0.088 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.7	mg/kg	1.353	2.301	mg/kg	0.00023 %		
9	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		33	mg/kg	2.976	98.217	mg/kg	0.00982 %		
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
11	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		440	mg/kg	2.469	1086.49	mg/kg	0.109 %		
12	pH			PH		7.9	pH		7.9	pH	7.9 pH		
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				0.27	mg/kg		0.27	mg/kg	0.000027 %		
			205-917-1	208-96-8									
15		acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
			201-581-5	85-01-8									
18		anthracene				0.35	mg/kg		0.35	mg/kg	0.000035 %		
			204-371-1	120-12-7									
19		fluoranthene				3.3	mg/kg		3.3	mg/kg	0.00033 %		
			205-912-4	206-44-0									
20		pyrene				2.9	mg/kg		2.9	mg/kg	0.00029 %		
			204-927-3	129-00-0									
21		benzo[a]anthracene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				1.8	mg/kg		1.8	mg/kg	0.00018 %		
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				2.2	mg/kg		2.2	mg/kg	0.00022 %		
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				0.99	mg/kg		0.99	mg/kg	0.000099 %		
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				1.8	mg/kg		1.8	mg/kg	0.00018 %		
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				1	mg/kg		1	mg/kg	0.0001 %		
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				0.32	mg/kg		0.32	mg/kg	0.000032 %		
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
			205-883-8	191-24-2									
										Total:	0.255 %		

Key

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

Classification of sample: WS102[1]

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

Sample details

Sample Name:
WS102[1]
Sample Depth:
1.00 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		42	mg/kg	1.32	55.454	mg/kg	0.00555 %		
2	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		4.7	mg/kg	3.22	15.133	mg/kg	0.00151 %		
3	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		23	mg/kg	1.462	33.616	mg/kg	0.00336 %		
5	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<4	mg/kg	1.923	<7.692	mg/kg	<0.000769 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		980	mg/kg	1.126	1103.371	mg/kg	0.11 %		
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	640	mg/kg		640	mg/kg	0.064 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.1	mg/kg	1.353	1.489	mg/kg	0.000149 %		
9	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		27	mg/kg	2.976	80.359	mg/kg	0.00804 %		
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
11	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		340	mg/kg	2.469	839.561	mg/kg	0.084 %		
12	pH			PH		7.9	pH		7.9	pH	7.9 pH		
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				0.16	mg/kg		0.16	mg/kg	0.000016 %		
			205-917-1	208-96-8									
15		acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				0.48	mg/kg		0.48	mg/kg	0.000048 %		
			201-581-5	85-01-8									
18		anthracene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
			204-371-1	120-12-7									
19		fluoranthene				1.4	mg/kg		1.4	mg/kg	0.00014 %		
			205-912-4	206-44-0									
20		pyrene				1.1	mg/kg		1.1	mg/kg	0.00011 %		
			204-927-3	129-00-0									
21		benzo[a]anthracene				0.93	mg/kg		0.93	mg/kg	0.000093 %		
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				0.69	mg/kg		0.69	mg/kg	0.000069 %		
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				0.94	mg/kg		0.94	mg/kg	0.000094 %		
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				0.41	mg/kg		0.41	mg/kg	0.000041 %		
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				0.77	mg/kg		0.77	mg/kg	0.000077 %		
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				0.4	mg/kg		0.4	mg/kg	0.00004 %		
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				0.44	mg/kg		0.44	mg/kg	0.000044 %		
			205-883-8	191-24-2									
										Total:	0.279 %		

Key

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

Classification of sample: WS102[2]

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

Sample details

Sample Name:
WS102[2]
Sample Depth:
2.80 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.2	mg/kg	1.32	6.866	mg/kg	0.000687 %		
2	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.4	mg/kg	3.22	1.288	mg/kg	0.000129 %		
3	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
5	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<4	mg/kg	1.923	<7.692	mg/kg	<0.000769 %		<**LOD**
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		10	mg/kg	1.126	11.259	mg/kg	0.00113 %		
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	10	mg/kg		10	mg/kg	0.001 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<**LOD**
9	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		8.4	mg/kg	2.976	25.001	mg/kg	0.0025 %		
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
11	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		22	mg/kg	2.469	54.325	mg/kg	0.00543 %		
12	pH			PH		8.3	pH		8.3	pH	8.3 pH		
13	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-917-1	208-96-8									
15		acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-469-6	83-32-9									
16		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-695-5	86-73-7									
17		phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			201-581-5	85-01-8									
18		anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-371-1	120-12-7									
19		fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-912-4	206-44-0									
20		pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			204-927-3	129-00-0									
21		benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
22		chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
23		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
24		benzo[k]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
25		benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
26		indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-893-2	193-39-5									
27		dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
28		benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-883-8	191-24-2									
										Total:	0.0144 %		

Key

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

Appendix A: Classifier defined and non CLP determinands

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

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R20 , R22 , R36 , R37 , R38 , R42 , R43 , R50/53 , R60 , R61
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

dicopper oxide; copper (I) oxide (EC Number: 215-270-7, CAS Number: 1317-39-1)

CLP index number: 029-002-00-X
Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)
Additional Risk Phrases: N R50/53 , N R50/53 >= 0.25 %
Additional Hazard Statement(s): None.
Reason for additional Hazards Statement(s)/Risk Phrase(s):
10/10/2016 - N R50/53 risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases
10/10/2016 - N R50/53 >= 0.25 % risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

CLP index number: 082-001-00-6
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Risk Phrases: None.
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s)/Risk Phrase(s):
03/06/2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25/05/2015
Risk Phrases: None.
Hazard Statements: None.

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R22 , R26 , R27 , R36 , R37 , R38
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R36 , R37 , R38 , N R50/53 , N R51/53
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Risk Phrases: N R50/53
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Risk Phrases: R22 , R36 , R37 , R38 , R40 , R43 , N R50/53
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R36 , R37 , R38 , R43 , N R50/53
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21/08/2015
Risk Phrases: Xn R22 , N R50/53
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21/08/2015
Risk Phrases: Xi R36/37/38 , N R50/53
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Risk Phrases: R40
Hazard Statements: Carc. 2 H351

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23/07/2015
Risk Phrases: N R50/53
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

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

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

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

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

no Chromium VI

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc sulphate}

No chromium VI

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015
HazWasteOnline Classification Engine Version: 2017.180.3351.6750 (29 Jun 2017)
HazWasteOnline Database: 2017.180.3351.6750 (29 Jun 2017)

This classification utilises the following guidance and legislation:
WM3 - Waste Classification - May 2015
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

eterminand (laboratory concentration)	Unit	WS101	WS101[1]	WS102	WS102[1]	WS102[2]
Classification Result		Hazardous	Non Hazardous	Hazardous	Non Hazardous	Non Hazardous
Depth	m	0.30	1.60	0.50	1.00	2.80
Asbestos		Present	None	None	None	None
Hazardous Properties		HP7Carcinogenic, HP14 Ecotoxic		HP7 Carcinogenic		
Arcadis Assessment				HP7 Carcinogenic, disregarded see notes below.		
Arcadis Classification		**Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**
moisture {no correction}	%					
antimony {antimony trioxide}	mg/kg					
arsenic {arsenic trioxide}	mg/kg	37	12	46	42	5.2
beryllium {beryllium oxide}	mg/kg					
boron {diboron trioxide; boric oxide}	mg/kg	7.6	7.8	6.2	4.7	0.4
cadmium {cadmium oxide}	mg/kg	8.8	0.3	<0.2	<0.2	<0.2
chromium in chromium(III) compounds {chromium(III) oxide}	mg/kg	76	35	21	23	16
chromium in chromium(VI) compounds {chromium(VI) oxide}	mg/kg	<4	<4	<4	<4	<4
copper {dicopper oxide; copper (I) oxide}	mg/kg	690	32	300	980	10
lead {lead chromate}	mg/kg	2300	48	880	640	10
manganese {manganese sulphate}	mg/kg					
mercury {mercury dichloride}	mg/kg	1.2	<0.3	1.7	1.1	<0.3
molybdenum {molybdenum(VI) oxide}	mg/kg					
nickel {nickel chromate}	mg/kg	76	25	33	27	8.4
selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}	mg/kg	<1	<1	<1	<1	<1
zinc {zinc chromate}	mg/kg	1600	69	440	340	22
TPH (C6 to C40) petroleum group	mg/kg					
confirm TPH has NOT arisen from diesel or petrol	n/a					
tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	mg/kg					
benzene	mg/kg					
toluene	mg/kg					
ethylbenzene	mg/kg					
xylene	mg/kg					
cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}	mg/kg					
pH	pH	8.1	7.9	7.9	7.9	8.3
naphthalene	mg/kg	0.69	<0.05	<0.05	<0.05	<0.05
acenaphthylene	mg/kg	1.1	<0.05	0.27	0.16	<0.05
acenaphthene	mg/kg	0.37	<0.05	<0.05	<0.05	<0.05
fluorene	mg/kg	0.98	<0.05	<0.05	<0.05	<0.05
phenanthrene	mg/kg	5	<0.05	1.2	0.48	<0.05
anthracene	mg/kg	1.6	<0.05	0.35	0.1	<0.05
fluoranthene	mg/kg	10	<0.05	3.3	1.4	<0.05
pyrene	mg/kg	12	<0.05	2.9	1.1	<0.05
benzo[a]anthracene	mg/kg	6.3	<0.05	1.6	0.93	<0.05
chrysene	mg/kg	6.4	<0.05	1.8	0.69	<0.05
benzo[b]fluoranthene	mg/kg	8.1	<0.05	2.2	0.94	<0.05
benzo[k]fluoranthene	mg/kg	4.5	<0.05	0.99	0.41	<0.05
benzo[a]pyrene; benzo[def]chrysene	mg/kg	5.8	<0.05	1.8	0.77	<0.05
indeno[123-cd]pyrene	mg/kg	4.7	<0.05	1	0.4	<0.05
dibenz[a,h]anthracene	mg/kg	1.2	<0.05	0.32	0.09	<0.05
benzo[ghi]perylene	mg/kg	5.6	<0.05	1.2	0.44	<0.05
phenol	mg/kg					

Asbestos

Testing found the presence of asbestos within WS101 (0.30 m bgl).
When WAC testing is undertaken prior to removal by the waste carrier, if greater than 0.1% loose asbestos fibres found then hazardous classification stands. However large pieces of asbestos tiles found must be assessed separately therefore deemed potentially hazardous from asbestos. However WS101 (0.30 m bgl) classified as hazardous due to elevated lead and zinc.

HP7 Carcinogenic, HP14 Ecotoxic.

Levels of lead and zinc were found to be above the threshold and are therefore deemed to be hazardous.

APPENDIX E

Risk Assessment Information

Risk Assessment Information

Based on information presented in

- CIRIA C552 (2001) Contaminated Land Risk Assessment: A guide to good practice, and
- NHBC / EA/ CIEH (2008) R&D Publication 66: (Volume 1) Guidance for the Safe Development of Housing on Land Affected by Contamination

Risk assessment considers the identified sources, the potential receptors and the pathways linking them together.

The designation of risk is based upon the consideration of both:

a. the **severity of the potential consequence**
(this takes into account both the potential severity of the hazard and the sensitivity of the receptor)

b. the **magnitude of probability** (ie likelihood)
(this takes into account both the presence of the hazard and receptor and the integrity of the pathway)

Severity (consequence) can be defined as the adverse effects (or harm)arising from a defined hazard, which impairs the quality of human health or the environment in the short or longer term. Definitions of different categories of severity are detailed in Table 1 below.

Probability can be defined as the chance of a particular event occurring in a given period of time. Definitions of different categories of probability are detailed in Table 2 below.

A pollutant linkage must first be established before tests for probability and consequence are applied. If there is no pollutant linkage then there is no potential risk.

Table 1 - Classification of Potential Consequence (Severity)

Classification	Human Health	Controlled Water	Built Environment	Ecosystems
Severe	Irreversible damage to human health. Short term (acute) risk to human health. Concentrations present likely to result in "significant harm" as defined by Part 2a.	Substantial pollution of sensitive water resources.	Catastrophic damage to buildings, structures or the environment.	Major damage to aquatic or other ecosystem, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest.
Medium	Chronic damage to human health. Concentrations present that could result in significant harm.	Pollution of sensitive water resources or small scale pollution of sensitive water resources	Significant damage to buildings, structures or the environment	Significant damage to aquatic or other ecosystems.
Mild	Slight short term health effects to humans. Exposure to human health unlikely to lead to significant harm.	Pollution to non-sensitive water resources	Minor damage to sensitive buildings, structures services or the environment.	Minor or short lived damage to aquatic or other ecosystems.
Minor	Non permanent health effects to human health (easily prevented by means such as personal protective clothing etc)	Insubstantial pollution to non-sensitive water resources	Easily repairable effects of damage to buildings or structures	Harm (although not necessarily significant harm which may result in financial loss or expenditure to resolve. eg loss of plants in a landscape scheme).

Table 2 Classification of probability

(only applies if there is a possibility of a pollutant linkage being present)

High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an even will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an even could occur. However it is by no means certain that even over a longer period such an event would take place and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Classification of Risk

Once the severity and probability have been classified for a pollutant linkage they can be compared to produce a risk category from very high risk to very low risk as shown in the matrix below.

Potential Consequence				
Severe	Moderate/Low	Moderate	High	**Very High**
Medium	Low	Moderate/Low	Moderate	High
Mild	Very Low	Low	Moderate/Low	Moderate
Minor	Very Low	Very Low	Low	Moderate/Low
Likelihood	**Unlikely**	**Low**	**Likely**	**High**

Table below describes the risk classifications

Risk Term	**Description**
Very High Risk	There is a high probability that significant harm could arise to a designated receptor from an identified hazard at the site without appropriate remedial action or there is evidence that significant harm to a designated receptor is already occurring.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However it is either relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that such harm would be relatively mild. Some remediation work may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely, at worst, that this harm if realised would normally be mild. Any subsequent remediation works are likely to be relatively limited.
Very Low Risk	It is a low possibility that harm could arise to a receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.

Arcadis Consulting (UK) Limited

Arcadis House
34 York Way
London N1 9AB
United Kingdom

T: +44 (0)20 7812 2000

arcadis.com