Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: County Series
Map date: 1935
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1935
Revised 1935
Edition N/A
Copyright N/A
Levelled N/A

GroundSure

Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*

Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: County Series
Map date: 1915
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1915
Revised 1915
Edition N/A
Copyright N/A
Levelled N/A

GroundSure

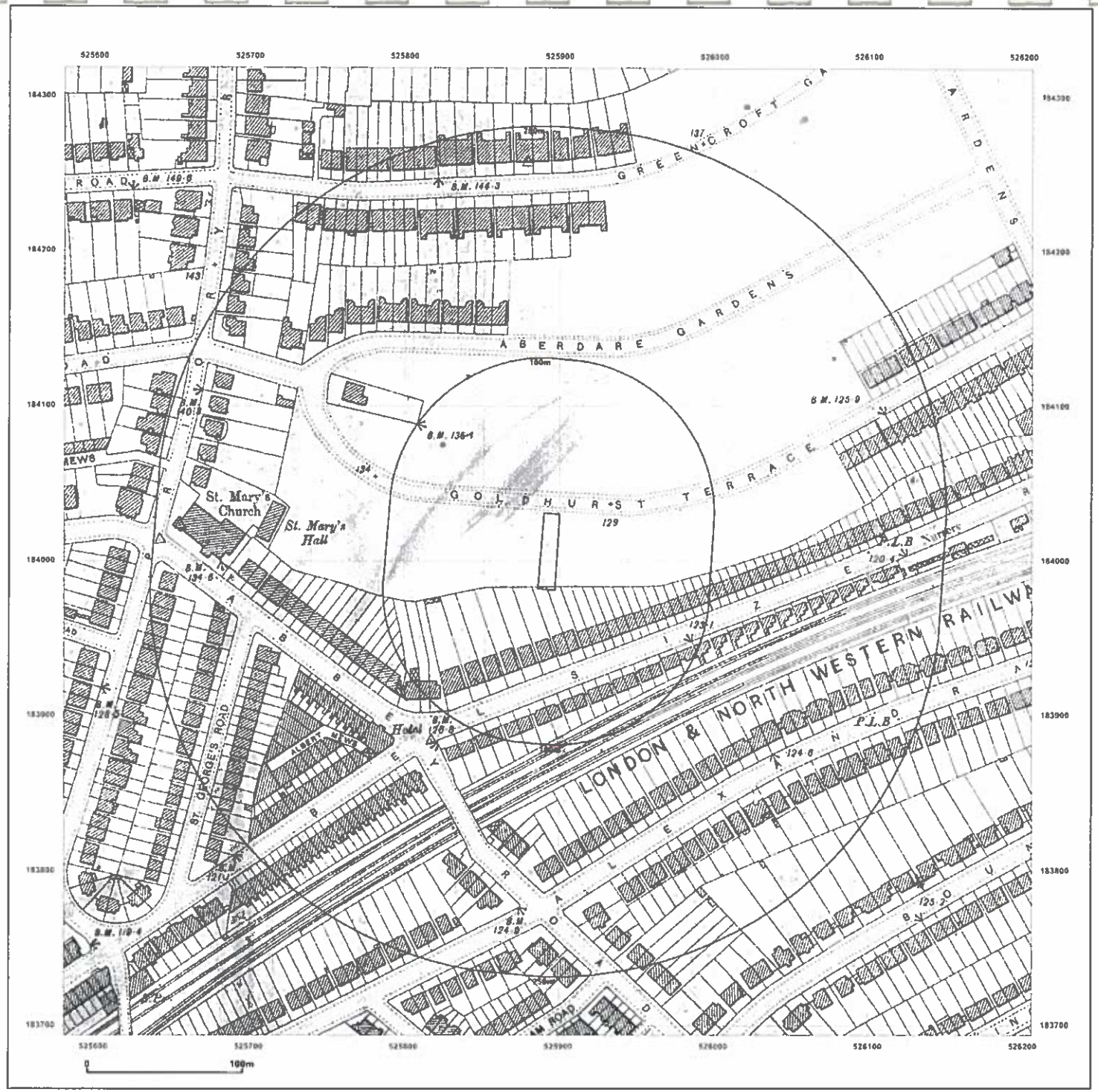
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey® Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

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

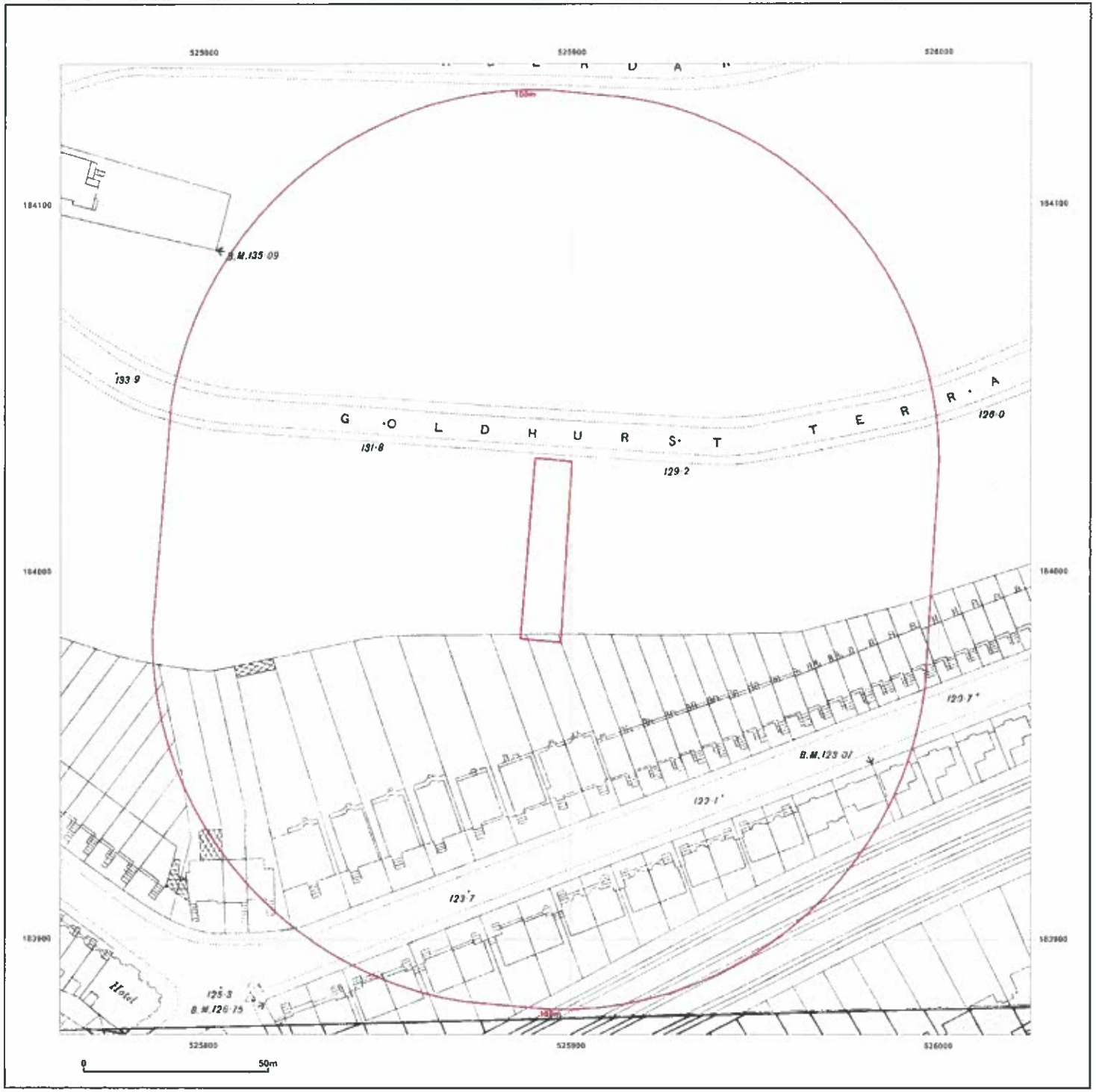
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: 1056 Scale Town Plan
Map date: 1893
Scale: 1:1,056
Printed at: 1:1,056

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

GroundSure

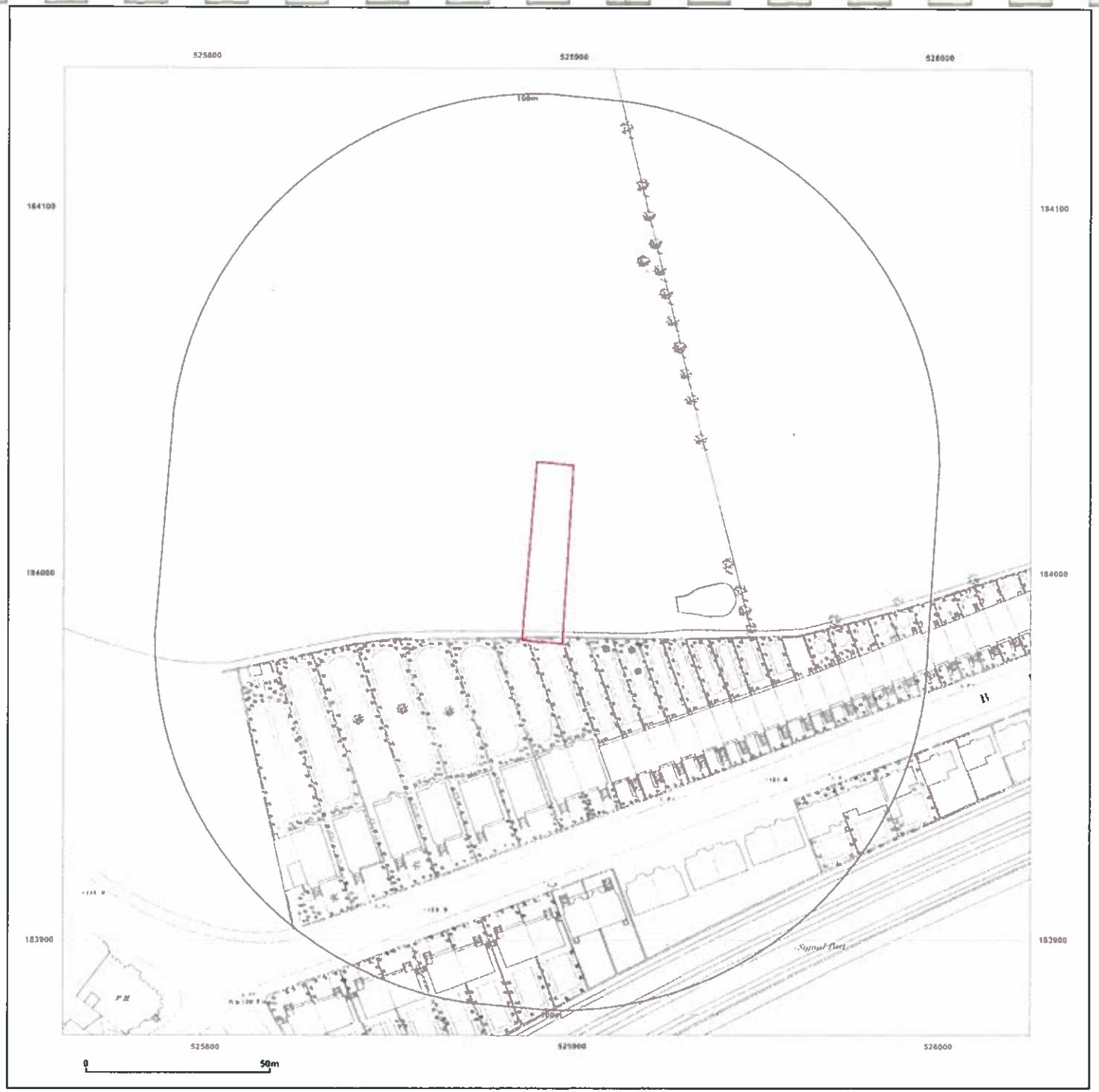
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: 1056 Scale Town Plan
Map date: **1868-1871**
Scale: 1:1,056
Printed at: 1:1,056

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

GroundSure

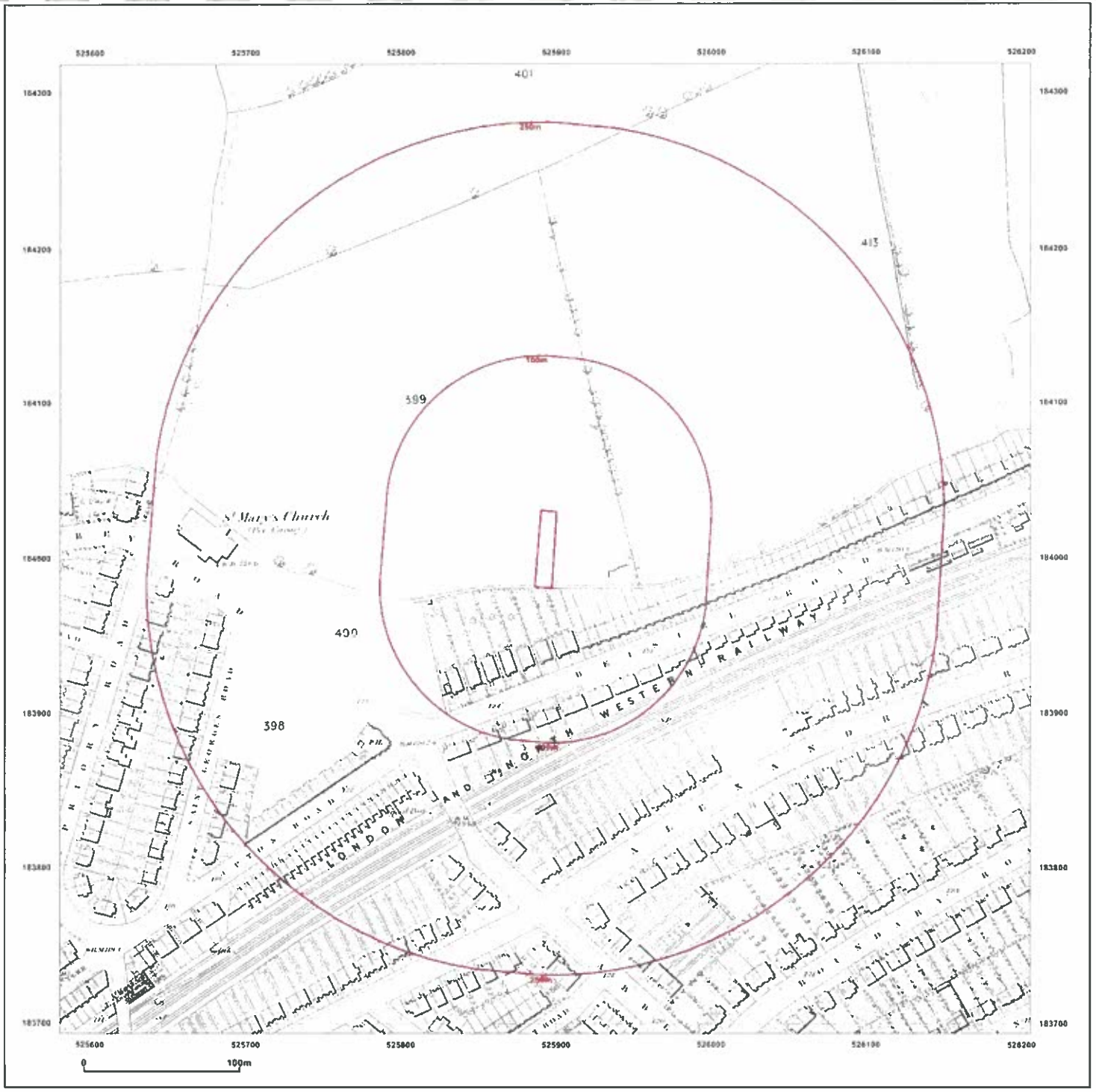
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: County Series
Map date: 1871
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

GroundSure

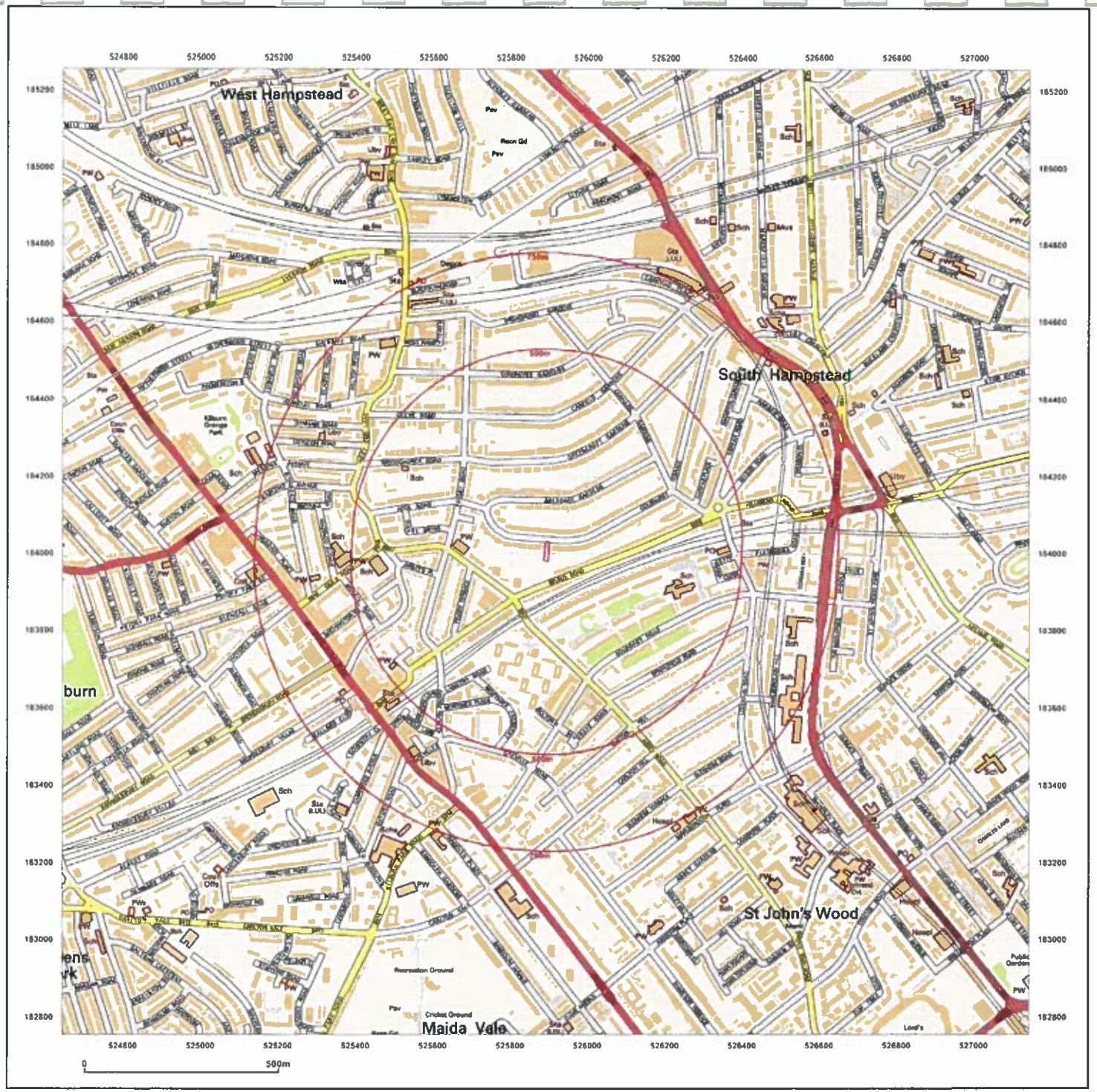
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST
TERRACE,SWISS
COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: National Grid
Map date: 2012
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2012

GroundSure

Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*

Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: 1:10,000 Raster
Map date: 2002
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

GroundSure

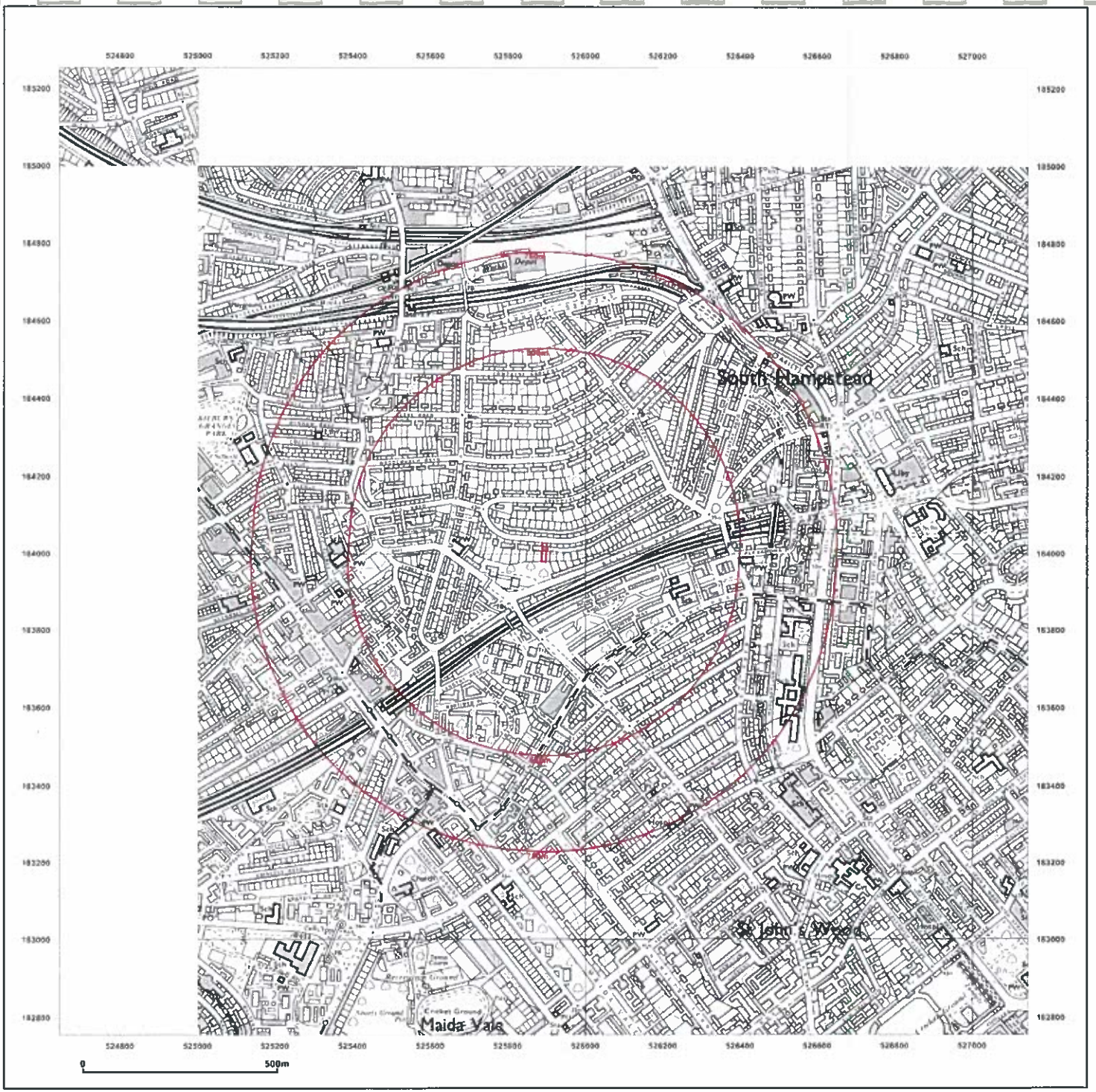
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST
TERRACE,SWISS
COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: National Grid
Map date: 1989-1993
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

Surveyed 1975
Revised 1993
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1987
Revised 1989
Edition N/A
Copyright N/A
Levelled N/A

GroundSure

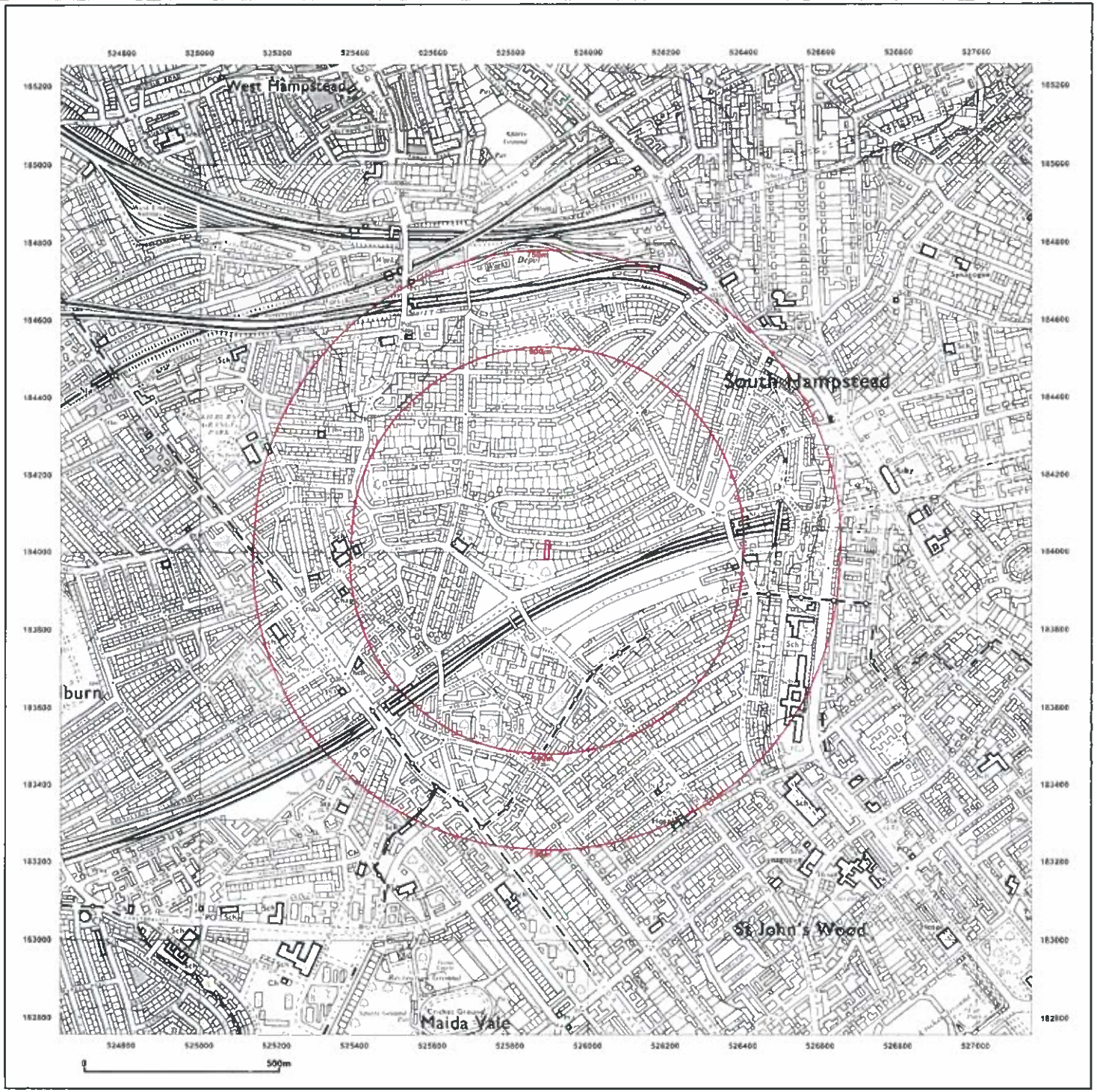
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: National Grid
Map date: 1973-1976
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

Surveyed 1975
Revised 1976
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

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

GroundSure

Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*

Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST
TERRACE,SWISS
COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: Provisional
Map date: 1965-1968
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1966
Revised 1966
Edition N/A
Copyright N/A
Levelled N/A

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

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

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

GroundSure

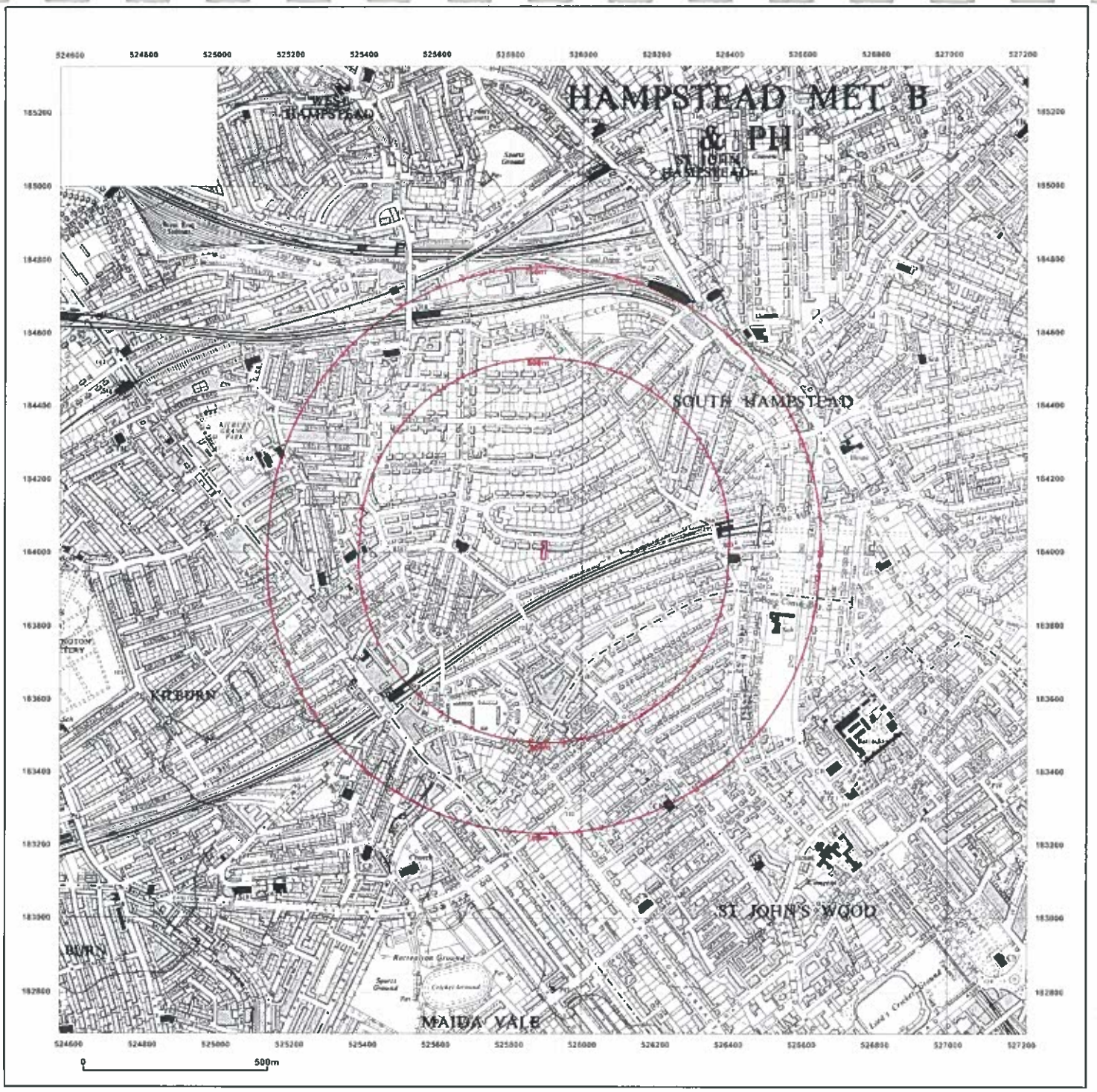
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: Provisional
Map date: 1957-1958
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

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

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

GroundSure

Ordnance Survey Licensed Partner

Produced by
GroundSure Environmental Insight
www.groundsure.com

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*

Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: Provisional
Map date: **1948-1951**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

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

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

Surveyed 1940
Revised 1940
Edition N/A
Copyright 1951
Levelled N/A

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

GroundSure

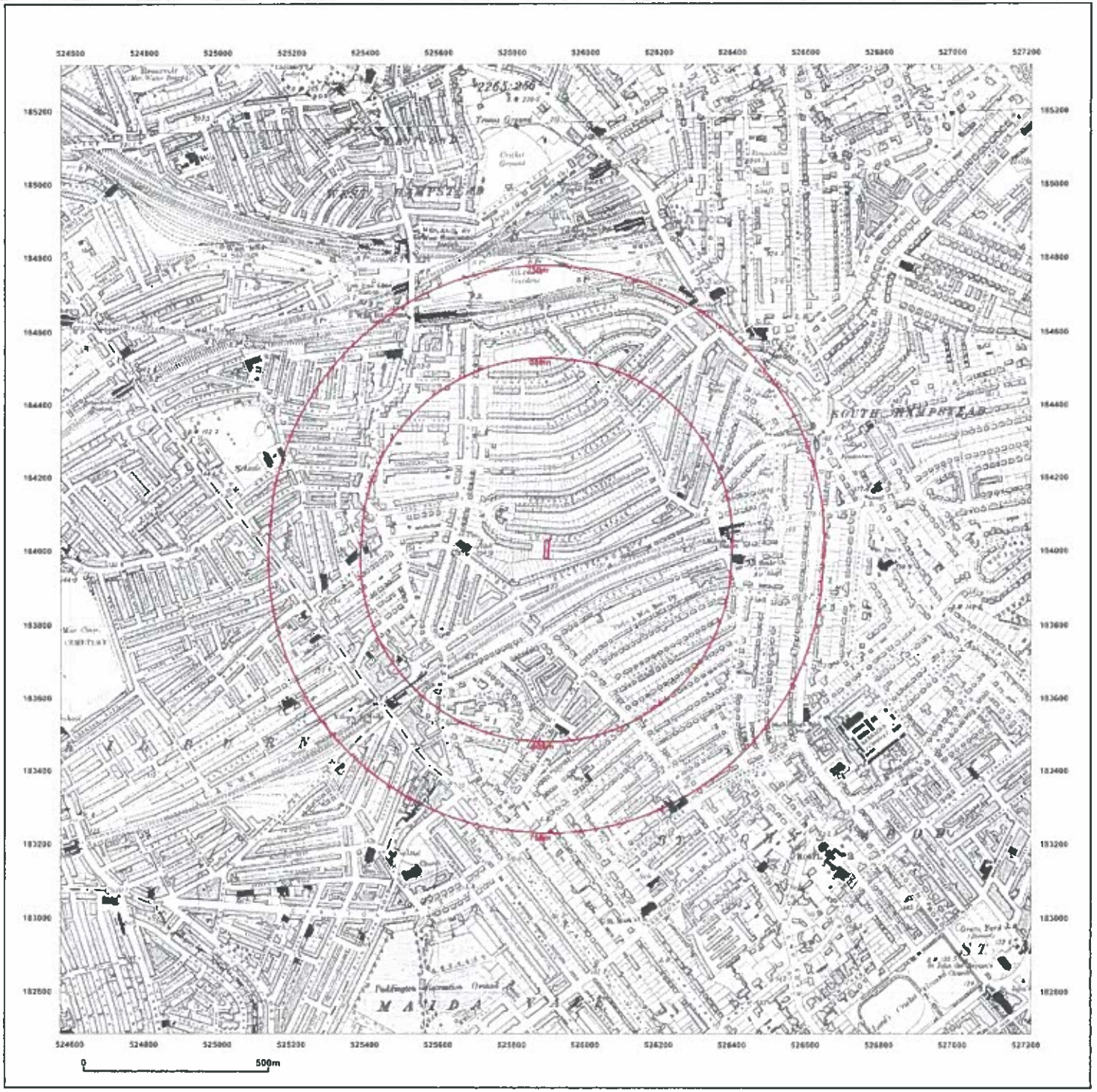
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey® Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: County Series
Map date: 1920
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1865
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1865
Revised 1920
Edition N/A
Copyright N/A
Levelled N/A

GroundSure

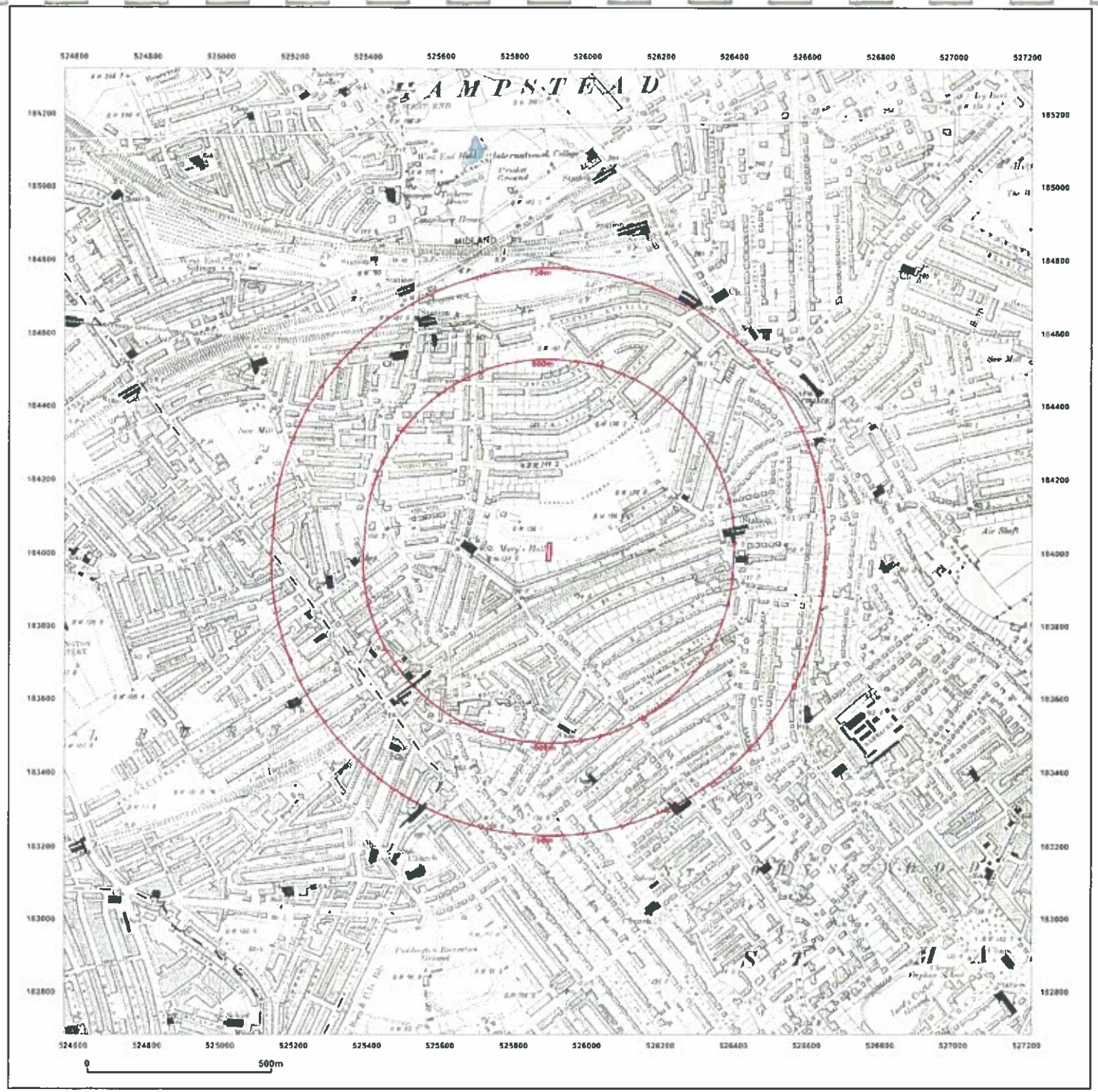
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST
TERRACE,SWISS
COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: County Series
Map date: 1894
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

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

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

GroundSure

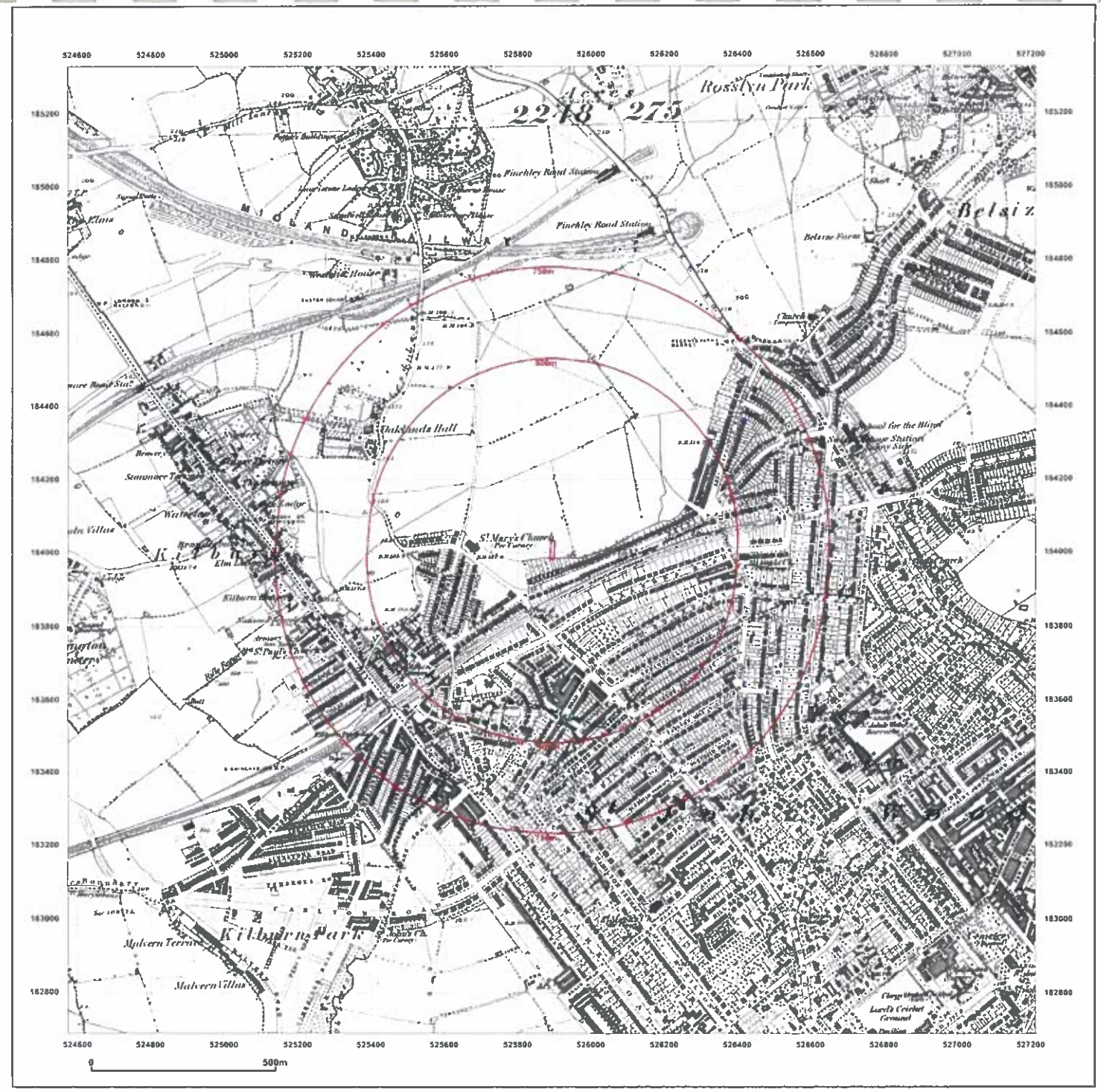
Produced by
GroundSure Environmental Insight
www.groundsure.com

Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*



Ordnance Survey®
Historical Mapping Extract

www.centremapslive.com

Site Details:

231,GOLDHURST TERRACE,SWISS COTTAGE,LONDON, NW6 3EP

Client Ref: 4873
Report Ref: CMAPS-CM-337906-4873-250614HIS
Grid Ref: 525893, 184006

Map Name: County Series
Map date: 1873-1874
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1865
Revised 1873
Edition 1873
Copyright N/A
Levelled N/A

Surveyed 1866
Revised 1874
Edition N/A
Copyright N/A
Levelled N/A

GroundSure

Produced by
GroundSure Environmental Insight
www.groundsure.com

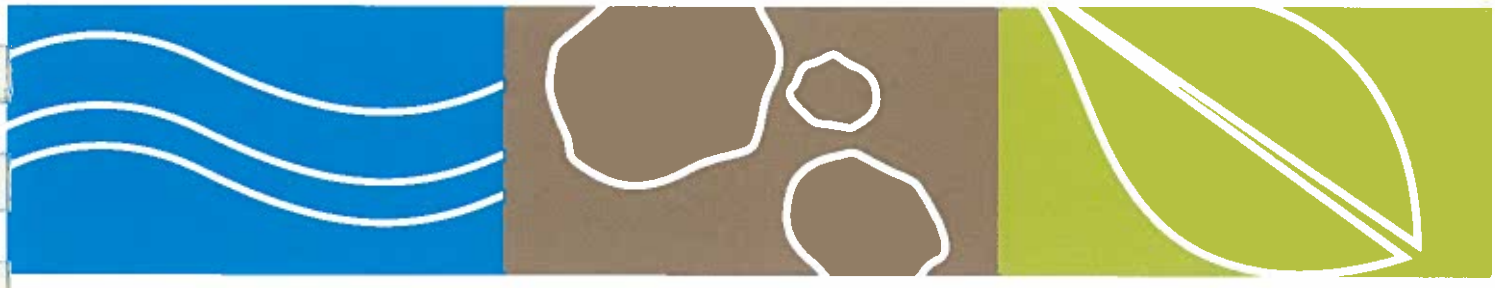
Ordnance Survey Licensed Partner

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

Production date: 25 June 2014

To view map legend click here *Legend*

Appendix C



Ashton Bennett

Ashton Bennett Consultancy
Tel: 01484689531
email: geoenviro@ashton-bennett.co.uk
www.ashton-bennett.com

Borehole No
WS1
Sheet 1 of 1

Project Name: 231 Goldhurst Terrace	Project No.: 3170	Co-ords: -	Hole Type: WLS
Location: London		Level: -	Scale: 1:50
Client: Mr & Mrs Zur-Szpiro		Dates: 21/08/2014	Logged By: T Bennett

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			MADE GROUND - Topsoil with grass and roots
					0.45			MADE GROUND - Brown clay with red brick and pottery.
					0.75			MADE GROUND - Black brown grey clay with gravel of clinker red brick and pottery
		1.00	SPT	N=5 (1,1,1,1,1,2)				Orange brown silty gravelly CLAY. Gravel is flint
		2.00	SPT	N=8 (1,2,1,2,2,3)	2.00			Brown grey silty gravelly CLAY. gravel is flint and selenite
		3.00	SPT	N=9 (1,2,2,2,2,3)	3.00			Brown grey silty moist CLAY
		4.00	SPT	N=15 (2,3,3,4,4,4)				
		5.00	SPT	N=16 (3,4,4,4,4,4)				
					5.45			End of Borehole at 5.45 m

Type	Results

Remarks:

AGS

Ashton Bennett

Ashton Bennett Consultancy
Tel: 01484689531
email: geoenviro@ashton-bennett.co.uk
www.ashton-bennett.com

Borehole No
WS2
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
231 Goldhurst Terrace	3170		WLS
Location: London		Level: -	Scale 1:50
Client: Mr & Mrs Zur-Szpiro		Dates: 21/08/2014	Logged By T Bennett

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			MADE GROUND - Topsoil with grass and roots
					0.35			MADE GROUND - Topsoil with red brick limestone roots pebbles and coal
					0.80			MADE GROUND - Black brown clay with gravel of red brick and pebbles with roots
		1.00	SPT	N=4 (1,1,1,1,1,1)				Brown orange silty CLAY
		2.00	SPT	N=8 (1,2,1,2,2,3)	2.00			Wet brown grey silty CLAY
		3.00	SPT	N=10 (1,2,2,2,3,3)	3.00			Wet brown grey blue silty CLAY
		4.00	SPT	N=8 (1,2,2,2,2,2)				
		5.00	SPT	N=15 (2,3,3,4,4,4)				
					5.45			End of Borehole at 5.45 m

Type	Results

Remarks: Monitoring point installed

AGS

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 781332 R1 1774

Date	10-September-2014	Contract	Goldhurst

Client Ashton Bennett Consultancy
Address Unit K
Bridge Mills
Huddersfield Road
Holmfirth HD9 3TW

For the Attention of Frances Bennett

Samples submitted by client	28/08/2014	Client Reference	
Testing Started	29/08/2014	Client Order No.	
Testing Completed	10/09/2014	Instruction Type	Written

UKAS Accredited Tests Undertaken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of

Approved signatories: Mark Athorne (Laboratory Manager) Richard Clarkson

Structural Soils Ltd The Potteries Pottery Street Castleford WF10 1NJ Tel: 01977 552255 e-mail mark.athorne@soils.co.uk

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	% <425um	Description of Sample
WS1	2	D	2.00	33	78	26	52	100	Grey brown slightly sandy CLAY
WS2	2	D	3.00	34	74	24	50	100	Grey brown slightly sandy CLAY

STRUCTURAL SOILS LTD

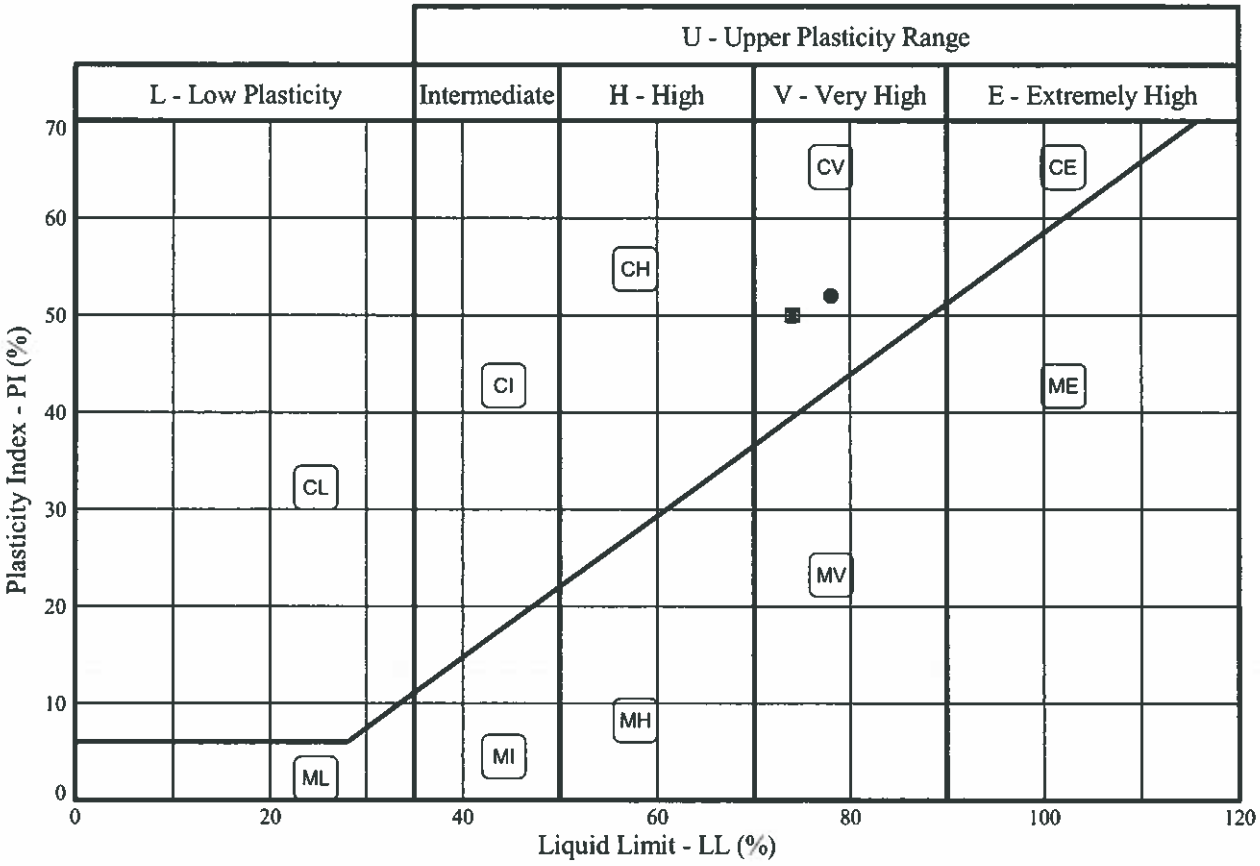
Contract: **Goldhurst**

Contract Ref: **781332**

AGS

PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1999
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC	LL	PL	PI	<425um
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%
●	WS1	2D	2.00	3.2/4.3/5.3/5.4	4.2.3	33	78	26	52	100
⊠	WS2	2D	3.00	3.2/4.3/5.3/5.4	4.2.3	34	74	24	50	100

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non standard test, NP = Non plastic.

Approved Signatories: J.BARRETT M.ATHORNE A.FROST M.RANDERSON R.CLARKSON M.FISHER C.COLE M.STOKES

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
M. Fisher	MAUREEN FISHER	10/09/14

Contract	Contract Ref:
Goldhurst	781332

AGS

TESTING VERIFICATION CERTIFICATE

UKAS TESTING
1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with Structural Soils Ltd Laboratory Quality Assurance Manual, Issue 6, January 2010 all results sheets and summaries of results issued by the laboratory are checked by an approved signatory. This check will also involve checking of at least 10% of calculations for each test type to ensure that data has been correctly entered into the computer and calculated. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Assurance Manual.

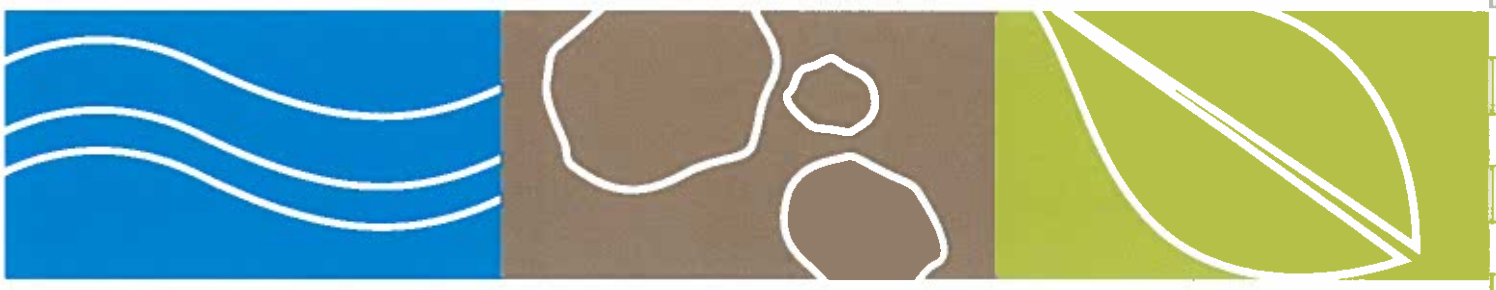
This testing verification certificate covers all testing compiled on or before the following datetime: **10/09/2014 15:40:59**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Mark Athorne (Laboratory Quality Manager)

STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Contract: **Goldhurst**	Job No: **781332**

Appendix D



Resilience and Flood Risk

231 Goldhurst Terrace, London
Flood Risk Assessment

17/11/2014

Final Version 1 0

RAB: 942B

Frances A Bennett
Ashton Bennett
22C Lambourn Road
Clapham
London
SW4 0LY

Lichfield Business Village, The Friary,
Lichfield, Staffordshire WS13 6QG
T. 01543 308 631

Unit 13, St Stephens Court, Willington,
Crook, County Durham DL15 0BF
T. 01388 748 366

Kingsbrook House, 7 Kingsway,
Bedford, Bedfordshire MK42 9BA
T. 01234 363 582

Revision history

Version	Date	Amendments	Issued to
Draft v1.0			Frances A Bennett
Final v1.0			Frances A Bennett

Quality control

Action	Signature	Date
Prepared	Andrew McHugh BSc (Hons) MCIWEM	15/10/2014
Checked	Alexandros Tsavdaris BEng MSc PhD	21/10/2014
Approved	Ray Pickering DipCE CEng MCIWEM C.WEM MCGI MEPS	23/10/2014

Disclaimer

RAB Office

Bedford Office

Kingsbrook House
7 Kingsway
Bedford
Bedfordshire
MK42 9BA

This page intentionally left blank

Contents

This page intentionally left blank

1.0 Introduction

RAB Consultants has prepared this Flood Risk Assessment (FRA) in support of a proposed residential development at 231 Goldhurst Terrace, London, NW6 3EP.

The National Planning Policy Framework requires a Flood Risk Assessment to be carried out to ensure flood risk to the proposed development is considered as well as the impact the development will have elsewhere on people and property.

The 2011 Surface Water Management Plan (SWMP) of the London Borough of Camden identifies the development site as being within a Critical Drainage Area (CDA). CDA's are areas of significant flood risk, characterised by the amount of surface runoff that drains into the area, the topography and hydraulic conditions of the pathway and the receptors (people, properties and infrastructure) that may be affected by surface water flooding. This FRA has been prepared in accordance with the Environment Agency's Flood Risk Assessment (FRA) Guidance Note 1 (Development Greater Than 1 Hectare (ha) in Flood Zone 1, and Critical Drainage areas less than 1ha).

2.0 Site location

The proposed development site is 231 Goldhurst Terrace, London, NW6 3EP (National Grid Reference: TQ 25814 84021). The property is on the southern side of Goldhurst Terrace and to the north of Belsize Road (see Figure 1 below).

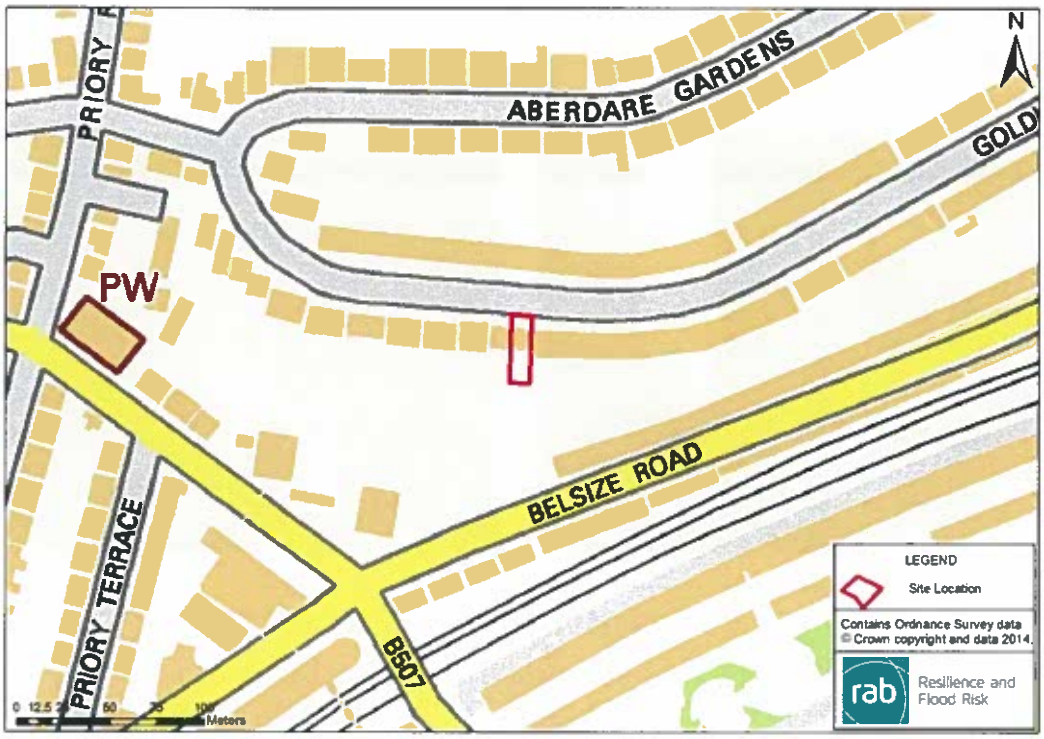


Figure 1 – Site Location

3.0 Existing site and development proposal

231 Goldhurst Terrace is a four bedroomed, semi-detached residential property located on the southern side of Goldhurst Terrace with an area approximately 130m^2. The property has four storeys including a basement which is currently unused. To the rear of the property is a decking area which extends in a southerly direction into the garden. The property is drained via a formal guttering and downpipe system with all roof-top run-off collected and discharged into a sewer in Goldhurst Terrace. Photographs of the property and drainage system are provided in Figure 2 below.

Guttering and downpipe at the front side of the property

Rear view of the property

Guttering and downpipe at the rear side of the property

Foul water manhole located at the side of the property

Figure 2 – Existing building on development site

It is proposed to extend the building at the rear (south) by erecting a single floor extension from the existing dining room area and a three storey extension from the Kitchen. The increase in impermeable area as a result of the development will be approximately 25-50m^2. The development will create living space in the lower ground floor of the dwelling which will be used as living space. The development proposal includes plans to create two separate accesses into the lower ground floor of the property. One will be from the front of the property and the second from the rear.

4.0 Flood risk

4.1 River (fluvial)

River flooding may occur when a watercourse (river, stream or natural watercourse) is at its maximum capacity and the water overtops or breaches the riverbanks. River flooding is closely linked to periods of heavy rain and waterlogged catchments.

The proposed development is located within Flood Zone 1 in accordance with the Environment Agency's Flood Map for Planning (Rivers and Sea). Flood Zone 1 is land assessed as having less than a 1 in 1,000 year [0.1% annual probability (a.p)] chance of flooding in any given year.

The North London Strategic Flood Risk Assessment (SFRA) (2008) confirms the London Borough of Camden has no major fluvial watercourses within its borough boundaries. There are three ordinary watercourses which flow through the borough of Camden at the following locations:

- Parliament Hill (3km north east of Glastonbury Road)
- Regents Canal (2km to the south of Glastonbury Road)
- Hampstead Heath (2.5km to the east of Glastonbury Road)

None of the above watercourses pose a flood risk to West Hampstead therefore the site has low risk of fluvial flooding.

4.2 Tidal flooding – River Thames

The proposed development site is shown to be within the Environment Agency Flood Zone 1; land assessed as having less than a 0.1% a.p of flooding, therefore not at risk of tidal flooding.

4.3 Surface water flooding

When the infiltration capacity of land or the drainage capacity of a local sewer network is exceeded, excess rainwater flows overland; this water will collect in topographic depressions and at obstructions, and can inundate development downslope. The severity of the rainfall event, the degree of saturation of the soil before the event, the permeability of soils and geology, hill slope steepness and the intensity of land use all contribute to and affect the severity of overland flow.

The Environment Agency most recent flood map for surface water published in December 2013 is freely available online at their website and can be used to see the approximate areas that would experience surface water flooding from a variety of rainfall return periods. The risk is categorised based on annual probability of occurrence. The different risk categories are displayed below in Table 1.

Environment Agency Surface Water Risk Category	Surface water flooding annual probability of occurrence
Very Low	Less than 0.1% (1 in 1000 years)
Low	Between 1% and 0.1% (1 in 100 years and 1 in 1000 years)
Medium	Between 1% and 3.3% (1 in 100 years and 1 in 30 years)
High	Greater than 3.3% (1 in 30 years)

Table 1 - Environment Agency Surface Water Risk Categories

The map identifies 231 Goldhurst Terrace at 'Very Low' flood risk (See Figure 3 below).

Figure 3 – Environment Agency's Risk of Flooding from Surface Water map

4.4 Drainage and sewage infrastructure flooding

Sewer flooding occurs when the capacity of the underground sewer system is exceeded, which in turn can lead flood property or its surrounding land. Thames Water are responsible for the management of urban drainage and sewerage within the Borough.

According to the 2011 London Borough of Camden Surface Water Management Plan (SWMP) the site is located within CDA Group 3_010 – West Hampstead which has a pluvial/sewer capacity issue. 101 properties in the 'NW6 3' postcode have experienced flooding in the past decade, due to overloading of the drainage network. There is no record of 231 Goldhurst Terrace flooding as a result of sewers surcharging.

It is important to understand that previous sewer flood incidents do not indicate the current or future risk to the site as upgrade work could have been carried out to alleviate any issues or conversely in areas that have not experienced sewer flooding incidents the local drainage infrastructure could deteriorate leading to future flooding.

4.5 Groundwater flooding

Groundwater flooding most commonly occurs in low lying areas which are underlain by permeable rocks or aquifers. Flooding occurs when the groundwater table rises up from the permeable rocks to the ground surface, flooding low lying areas or occurring as intermittent springs. Flooding is most likely to occur after prolonged periods of rainfall when a greater volume of rain will percolate into the ground, causing the groundwater table to rise above its usual level. Low lying areas are generally more prone to groundwater flooding because the water table is usually at a much shallower depth and groundwater

flow paths tend to travel in a direction from high to low ground. Areas prone to groundwater flooding also often experience surface water flooding problems. Groundwater flooding occurs much more slowly than other forms of flooding and the risks to people are generally low, however, the slow onset of groundwater flooding is mirrored by the time that flood water can take to dissipate back into the ground unless there is an alternative flow path for the flood water.

British Geological Survey (BGS) records indicate that the proposed development site overlays bedrock composed of Thames Group – clay, silt, sand, and gravel. According to the British Geological Survey Infiltration Maps, superficial deposits are absent and hence the permeability of the bedrock is likely to determine the drainage properties of the ground. The bedrock permeability is spatially variable, but likely to permit moderate infiltration. The 2008 SFRA suggested that groundwater flooding for the London Borough of Camden, was found to be a relatively low risk. Nevertheless, the BGS Infiltration Maps suggested that groundwater could rise to be approximately 3m below the ground surface demonstrating seasonal variations. However, the Infiltration Maps suggest that ground instability problems may be present thus, increased infiltration may result in ground instability. Therefore, infiltration SuDS are likely to be limited at this site.

Bearing that in mind, particular mitigation measures (see Section 5.0) should be employed.

4.6 Flooding from artificial water bodies

Reservoirs, canals and other artificial water bodies often hold large volumes of water above ground level. Should a breach, overtopping or failure occur, there may be a sudden release of deep fast-moving water with very little warning.

According to the Environment Agency's 'Risk of Flooding from Reservoirs' map, the development site lies outside an area that is expected to be affected by inundation should a reservoir fail

According to the Canal & Rivers Trust, there are no major canals near the property which are likely to pose a flood risk to the development.

4.7 Previous flood history

The North London SFRA (2008) Map 22 confirms Goldhurst Terrace was affected by both the 1975 and 2002 flood events. There is no information on affected properties and local flood depths.

The Camden Flood Risk Management Study provides the following information on the two aforementioned flood events:

The 1975 flood was caused by a severe storm between 5.30pm and 8.00pm on 14 August 1975. It caused extensive flooding in West and South Hampstead as well as Gospel Oak, Kentish Town, Belsize Park and Camden Town. It was the heaviest and most concentrated rainfall event since records began for this part of Camden, with 150mm falling in two and a half hours. The drainage capacity of drain pipes, road gullies and sewers was unable to cope with the volume of surface water runoff involved.

The 2002 flood was less severe but still saw 60mm fall in just under an hour during the evening of 7 August 2002. This rainfall event had a 0.1% chance of happening in any year or 1 in 100 year return period. The resultant flooding inflicted considerable damage on Camden residents and their homes, public services and facilities, and private businesses. Nearly all the flooding occurred north of the Euston Road, and primarily in West and South Hampstead (NW2 and NW6 postcode areas).

The homeowner has confirmed there has been no flooding to the property.

4.8 Climate change

There is clear scientific evidence that global climate change is happening now. In the UK sea level has risen and more winter rain has fallen in intense wet spells over the past century. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation; however the broad trends are in line with projections from climate models.

Looking ahead, greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

In assessing the impacts of climate change on flood risk emanating from the land and rivers, sensitivity ranges in Table 5 (Table 2 in this report) of the Technical Guidance to the National Planning Policy Framework may provide an appropriate precautionary response to the uncertainty about climate change impacts on rainfall intensity.

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall Intensity	+5%	+10%	+20%	+30%
Peak River Flow	+10%	+20%		

Table 2 - NPPF Technical Guidance recommended national precautionary sensitivity ranges for peak rainfall intensities and peak river flows

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability. Wetter winters and more rain falling in wet spells may increase river flooding. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the unexpected. Drainage systems in the borough have been modified to manage water levels and could help in adapting locally to some impacts of future climate on flooding, but may also need to be managed differently.

To mitigate against the risk of climate change causing increased rainfall and the risk of flooding to the property the development should consider incorporating the following mitigation measures.

5.0 Mitigation Measures

5.1 Flood Resilience

- Tanking systems (waterproof lining for a basement by covering the inside walls with a coating or membrane bonded to the structure).

5.2 Resistance

- Non-return valves on foul drain pipes (to prevent the backup of water through foul system).

6.0 Surface water runoff

The area for development is to the rear of the property and is currently utilised as garden decking. The proposed development will increase the impermeable area by 25-50m^2 therefore, increasing surface water run-off from the property. The proposed development will incorporate guttering and downpipes to collect rainwater from the rooftops and discharge it via the existing system into a Thames Water sewer within Goldhurst Terrace. Permissions will be required from Thames Water in order to do this.

6.1 SuDS – Sustainable Drainage Systems

Paragraph 1.3.2 from the SuDS manual (C697) discusses the SuDS 'management train', which is intended to mimic the natural catchment process as closely as possible. Table 3 gives examples of the hierarchy of techniques that can be used to achieve the management train.

Technique	Description
Prevention	The use of good house design and housekeeping measures to prevent runoff and pollution; rainwater reuse/harvesting.
Source control	Soakaways, porous and pervious surfaces, water butts, green roofs.
Site control	Routing water to large Soakaways, infiltration or detention basins.
Regional control	Balancing pond, wetlands, swales, retention ponds.

Table 3 - Hierarchy of techniques and their descriptions

The use of some of the above techniques could be feasible for this proposed development as described in Table 4 below:

Technique	Issues	Feasible? Y / N / M (maybe)
Prevention		
Good building design and rainwater harvesting	Ensuring that drains and guttering are properly laid, located and maintained. Water butts could be used for collecting rainwater and using within the garden areas (e.g. watering flowers). The homeowner has also confirmed grey water recycling will be incorporated in the basement. This tank should have sufficient capacity to cope with any additional run-off volumes as a result of the increased impermeable area.	Y Y
Source Control		
Porous and pervious materials	There is no scope/opportunity for using porous/pervious materials e.g. for walkways. The proposed development is an extension to the existing dwelling with no proposals for walkways.	N
Soakaways	There is scope for soakaways within the garden area to the rear of the property given the size of area available. The North London SFRA (2008) confirms the area is above the London Clay formation which is almost entirely impermeable and therefore the likelihood of infiltration being successful is low. Suitable infiltration tests in line with BRE Digest 365 methodology would need to be undertaken whether soakaways would be feasible.	M
Green roof	A green roof has not been incorporated into the design of the residential dwelling but could be considered.	M
Site and Regional Control		
Infiltration / detention basins / balancing ponds / wetlands / swales / retention ponds	There is no scope for providing site and regional control systems given the size of the site.	N

Table 4 – Feasibility of techniques at the proposed site

There is scope for SuDS on site through the use of water butts and water recycling systems. Initial investigations suggest that soakaways will be ineffective in the area given the underlying ground conditions of clay. This would need to be determined by a suitable infiltration test in line with BRE Digest 365 methodology. A green roof could be considered as part of the development proposal. The grey water recycling tank will need to provide sufficient capacity to cope with any additional surface water run-off volumes as a result of the increased impermeable area.

7.0 Conclusion

RAB Consultants has prepared this Flood Risk Assessment (FRA) in support of a planning proposal for an extension to an existing residential development at 231 Goldhurst Terrace, London, NW6 3EP.

The development site is located in Flood Zone 1 in accordance with the Environment Agency's Map for Planning (Rivers and Sea) but is located in the Critical Drainage Area (CDA) Group 3_010 – West Hampstead as identified within the London Borough of Camden SWMP (2011). This area has a pluvial/sewer capacity issue.

The site is at low risk of flooding from all other sources including fluvial, surface water and groundwater. To mitigate against the risk of groundwater flooding the basement should be 'tanked'. In addition Non Return Valves (NRV's) could be installed on the foul water drainage network to prevent flood water backing up through the systems and causing internal flooding.

The development has the potential to increase surface water run-off from the site as a result of increased impermeable areas. Good building design and rainwater harvesting should be incorporated into the design and green roofs could be considered. The proposed grey water recycling unit will need to provide sufficient capacity to attenuate any additional surface water run-off from the development.

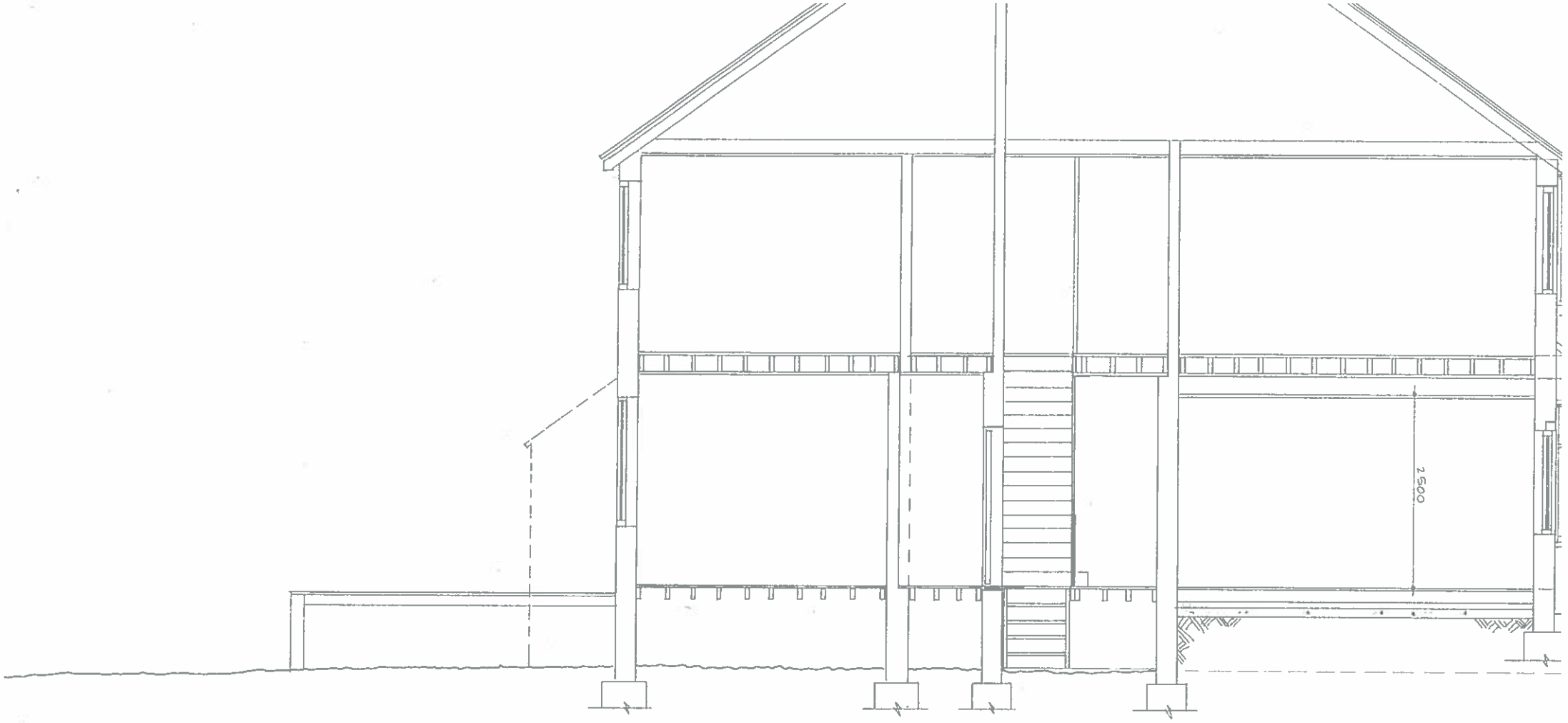
8.0 Recommendations

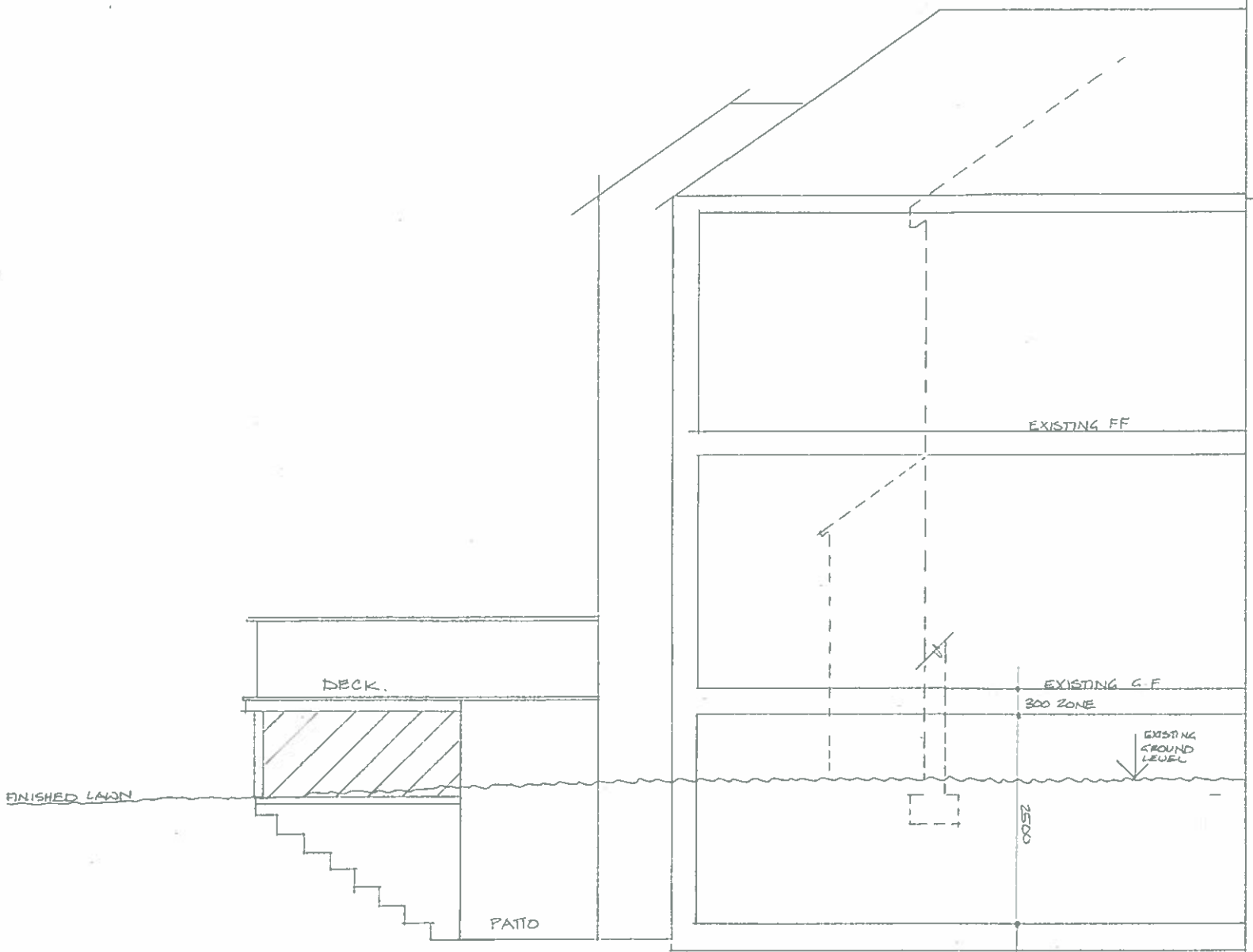
- Ground floor levels are raised above local ground levels in line with normal building practice.
- Tanking should be incorporated into the basement construction.
- The grey water recycling unit should be sufficiently designed to cope with additional surface water volumes created by the development.

This page intentionally left blank

Appendix A – Development Plans

This page intentionally left blank


2500



Notes:
All dimensions must be checked on site and not scaled from this drawing

MURRAY-SMITH
ARCHITECTS
Sarah Murray-Smith
RIBA BSc (Hons), Dip Arch (UCL)

16 KIRK CLOSE
OXFORD OX2 8JN
TEL/FAX 01865 310199
MOBILE 0794 106 3013
msarchitects@btconnect.com

Client
ZUR - SZPIRO

Job
231 GOLDHURST TERRACE

Drawing
SECTION
GARDEN / NEW BASEMENT

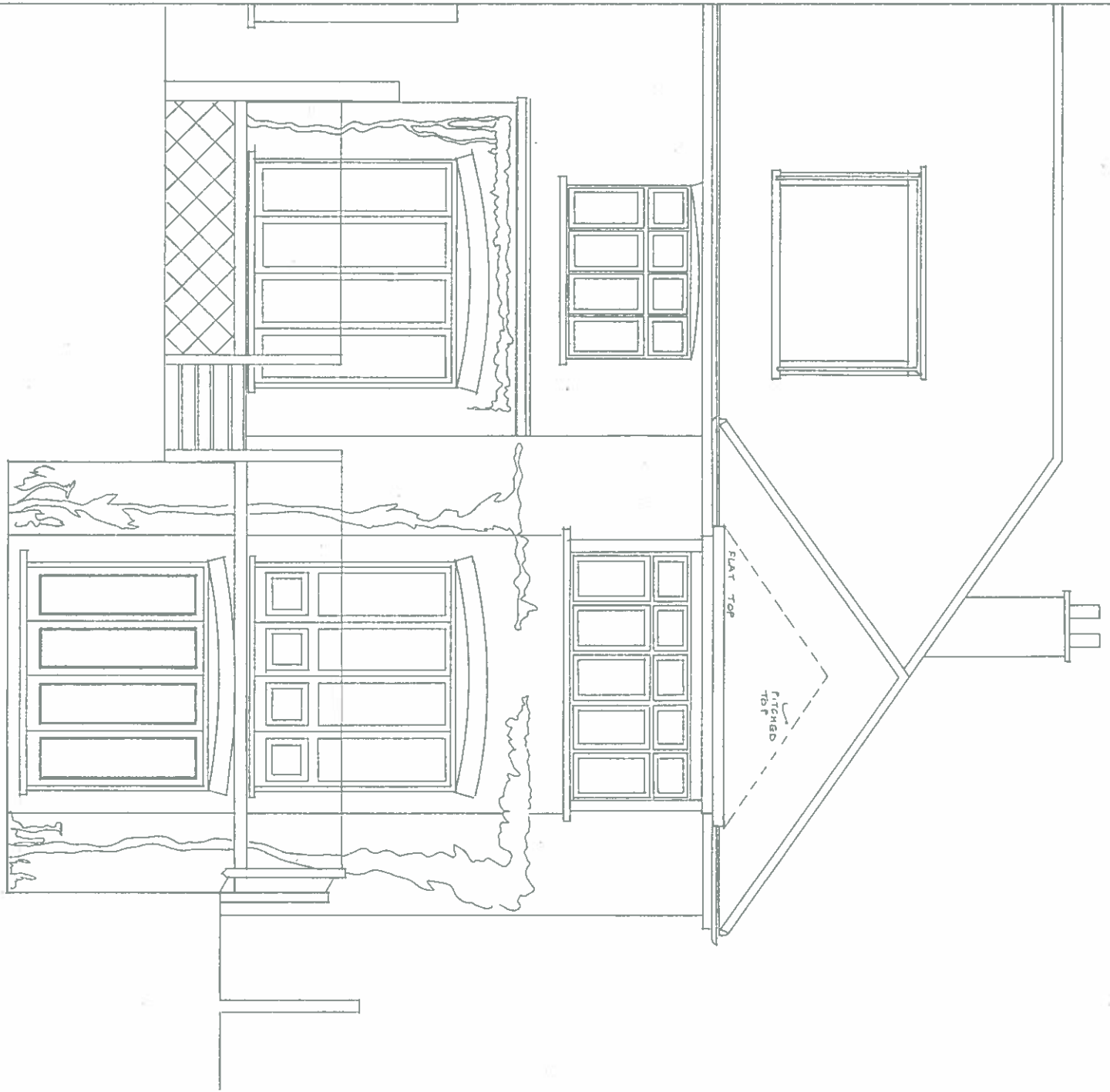
Scale
1:50

Date
AUG 2014

Drawn by
SMS

Drg. No.
Z-513 :

Rev.



Notes:
All dimensions must be checked on site and not scaled from this drawing.

MSA
MURRAY-SMITH
ARCHITECTS
Sarah Murray-Smith
RIBA BSc (Hons), Dip Arch (UCL)

16 KIRK CLOSE
OXFORD OX2 8JN
TEL/FAX 01865 310199
MOBILE 0794 106 3013
msarchitects@btconnect.com

Client
ZUR - SZPIRO

Job
231 GOLDHURST TERRACE

Drawing
REAR ELEVATION
PROPOSED

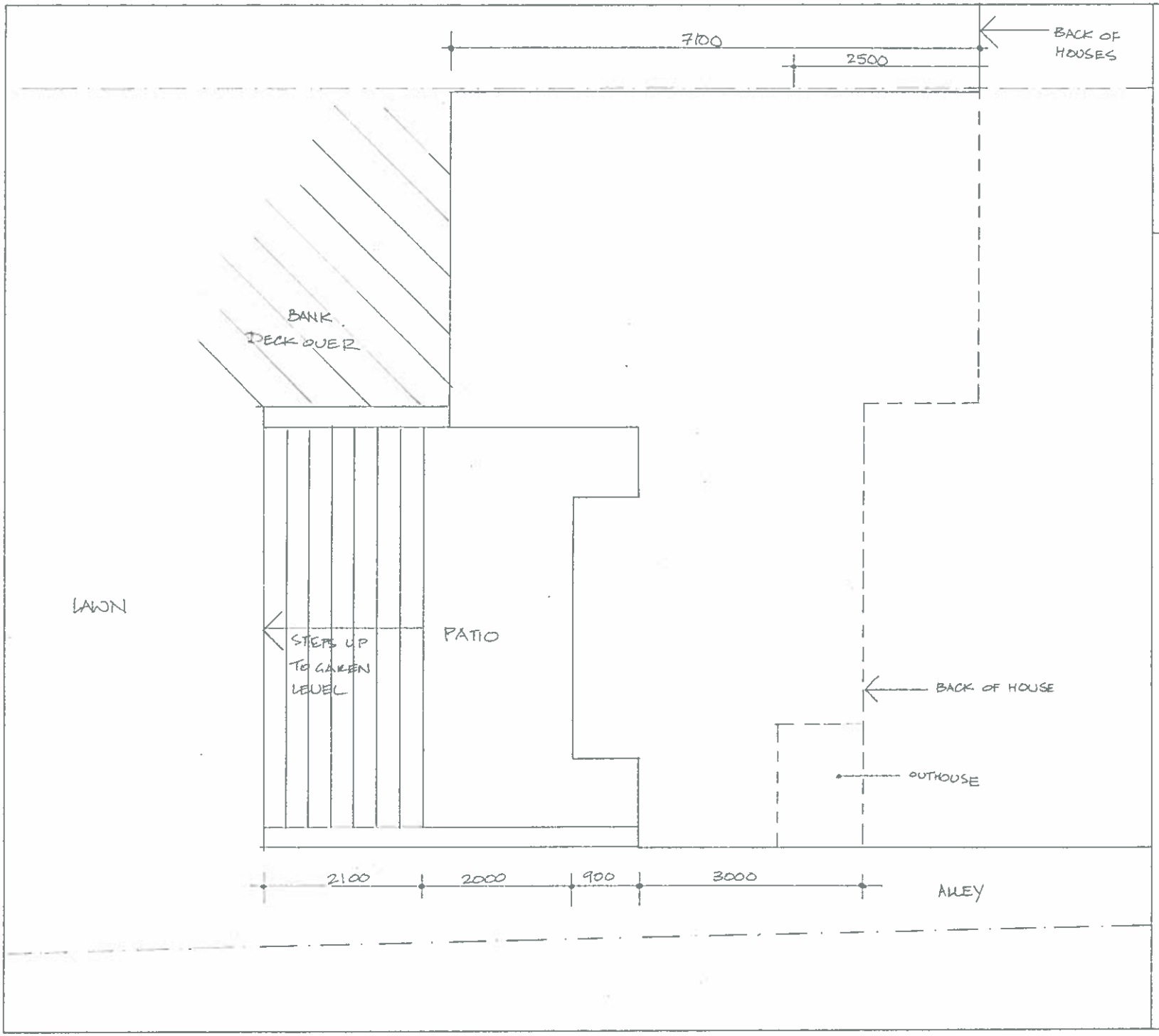
Scale 1:50

Date APRIL 2014

Drawn by SMS

Drg. No. Z-513: EL SK 15

Rev.



Notes:
All dimensions must be checked on site and not scaled from this drawing

MURRAY-SMITH
ARCHITECTS
Sarah Murray-Smith
RIBA BSc (Hons), Dip Arch (UCL)

16 KIRK CLOSE
OXFORD OX2 8JN
TEL/FAX 01865 310199
MOBILE 0794 106 2013
msarchitects@btconnect.com

Client
ZUR - SZPIRO

Job
231 GOLDHURST TERRACE

Drawing
BASEMENT DIMS TO REAR

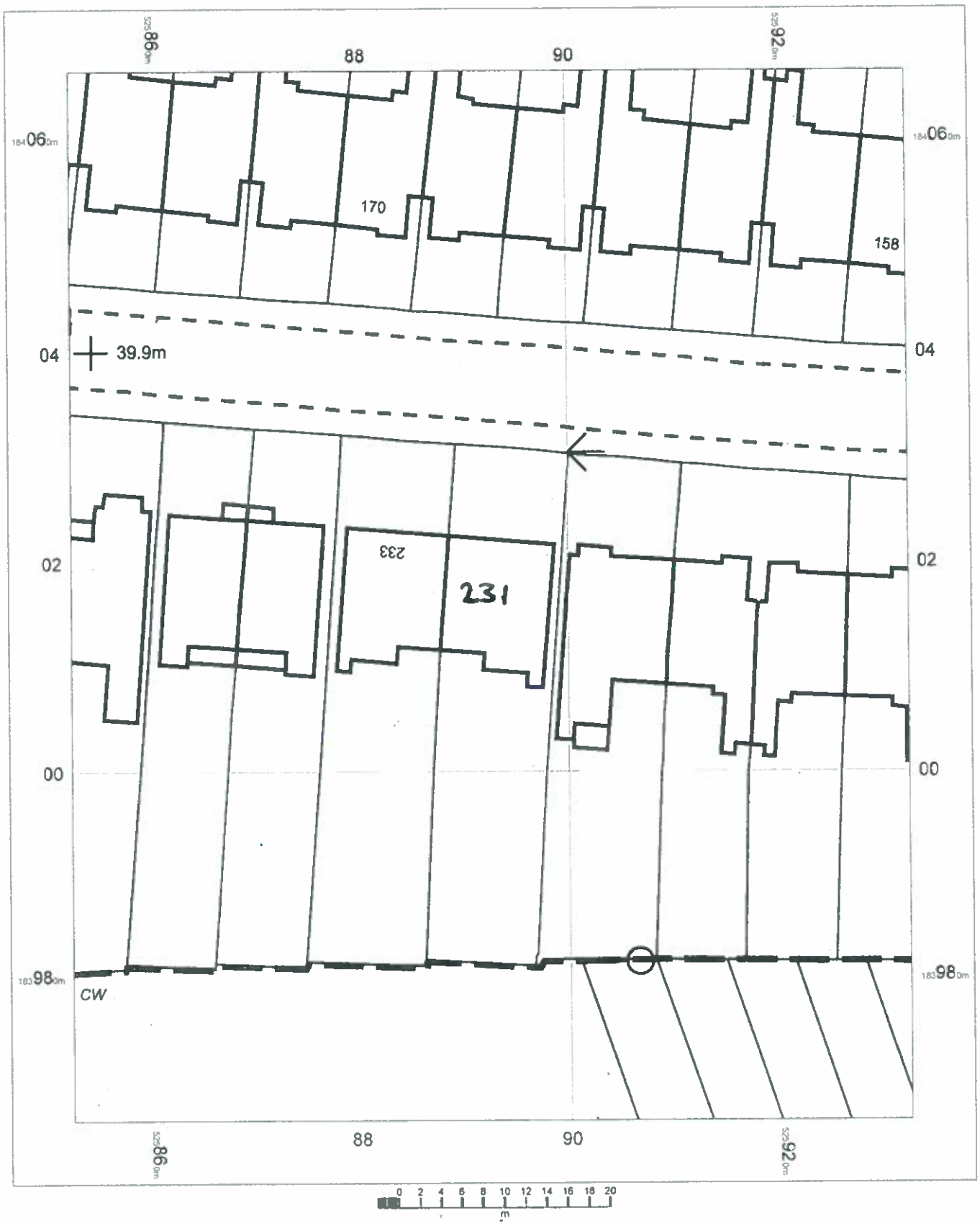
Scale
1:50

Date
AUG 2014

Drawn by
SMS

Drg. No.
Z-513 : SK18

Rev.



OS MasterMap 1250/2500/10000 scale
15 August 2014, ID: JEW-00352433
maps.johnewright.com

1:500 scale print at A4, Centre: 525892 E, 184017 N

Mapping sourced from Ordnance Survey

john wright

Appendix **E**