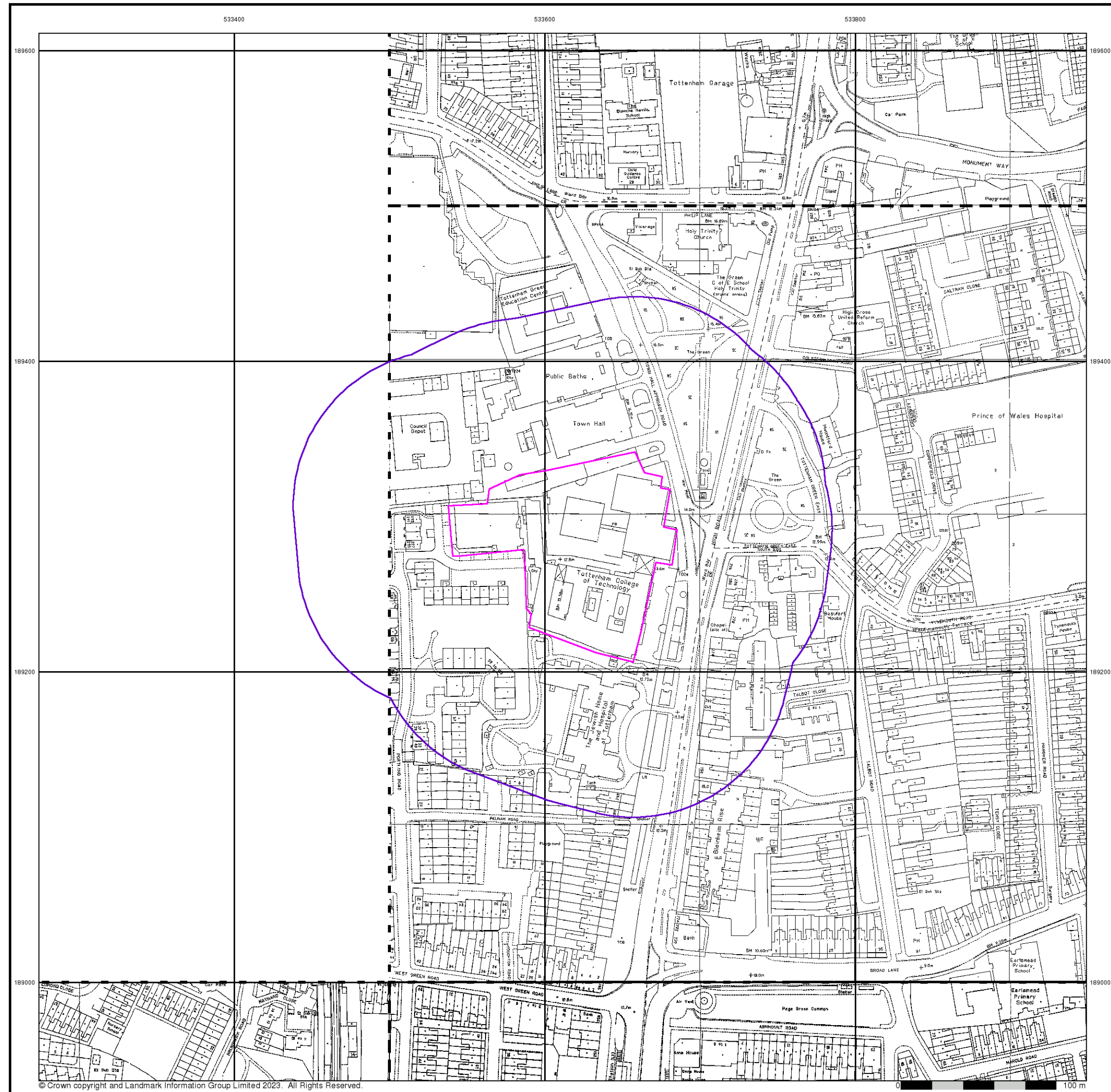




Large-Scale National Grid Data

Published 1991 - 1994

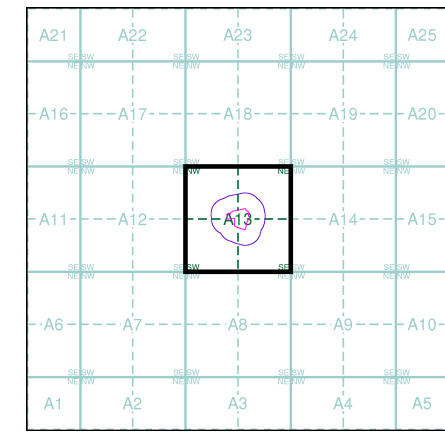
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

Q3389NE	1994	1:1,250
Q3389SE	1991	1:1,250
Q3388NW	1992	1:1,250
Q3388NE	1992	1:1,250

Historical Map - Segment A13



Order Details

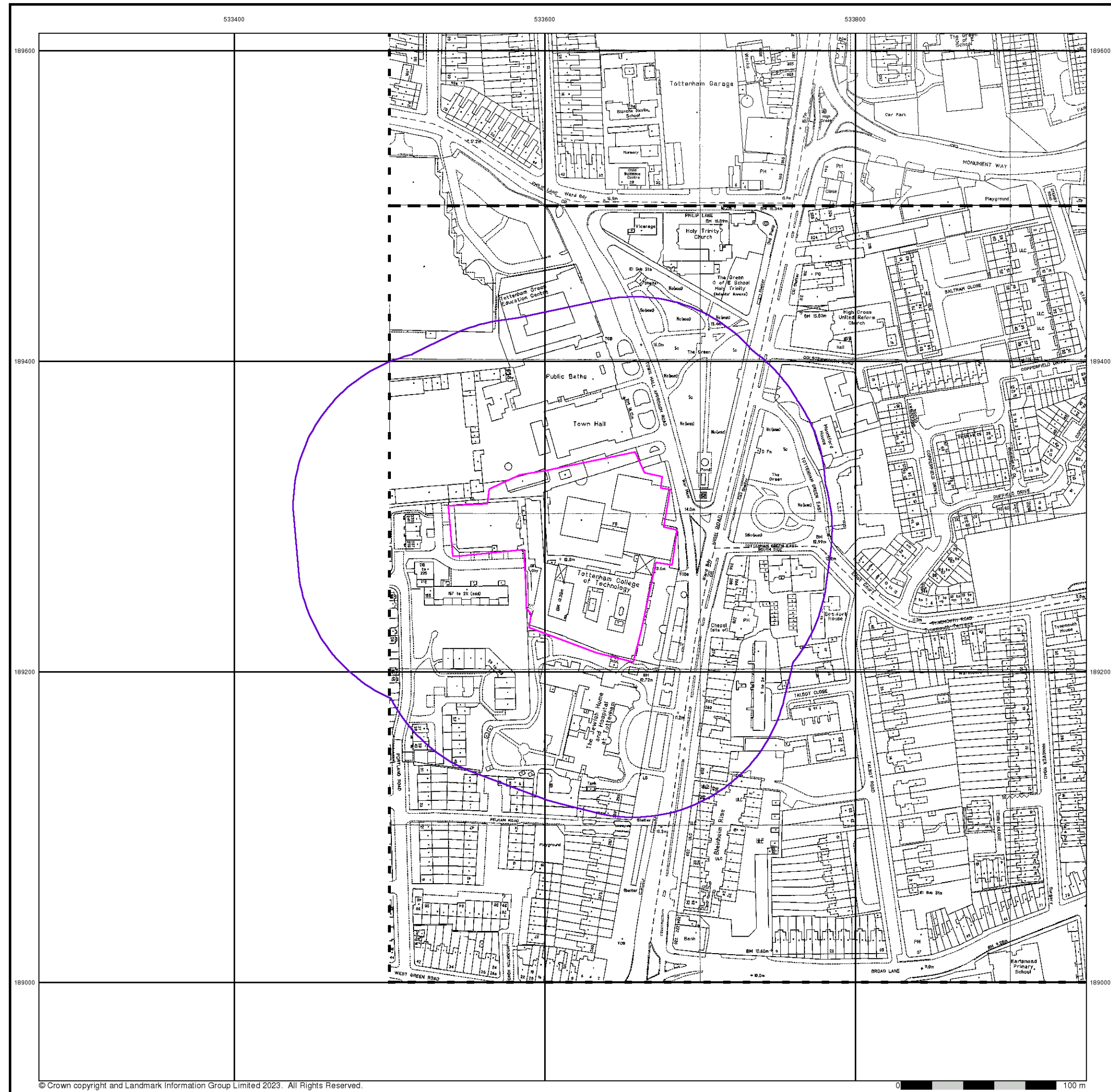
Order Number: 308348863_1_1
Customer Ref: 1922791
National Grid Reference: 533620, 189280
Slice: A
Site Area (Ha): 1.19
Search Buffer (m): 100

Site Details

The College of Haringey Enfield & North East L ..., Tottenham Centre, High Road, LONDON, N15 4RU



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Large-Scale National Grid Data

Published 1992 - 1994

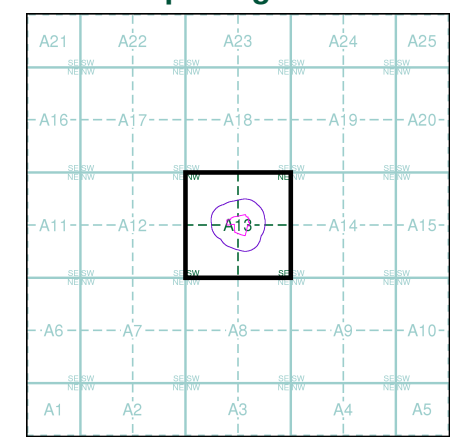
Source map scale - 1:1,250

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Map Name(s) and Date(s)

TQ3389NE
1994
1:1,250
TQ3389SE
1992
1:1,250

Historical Map - Segment A13



Order Details

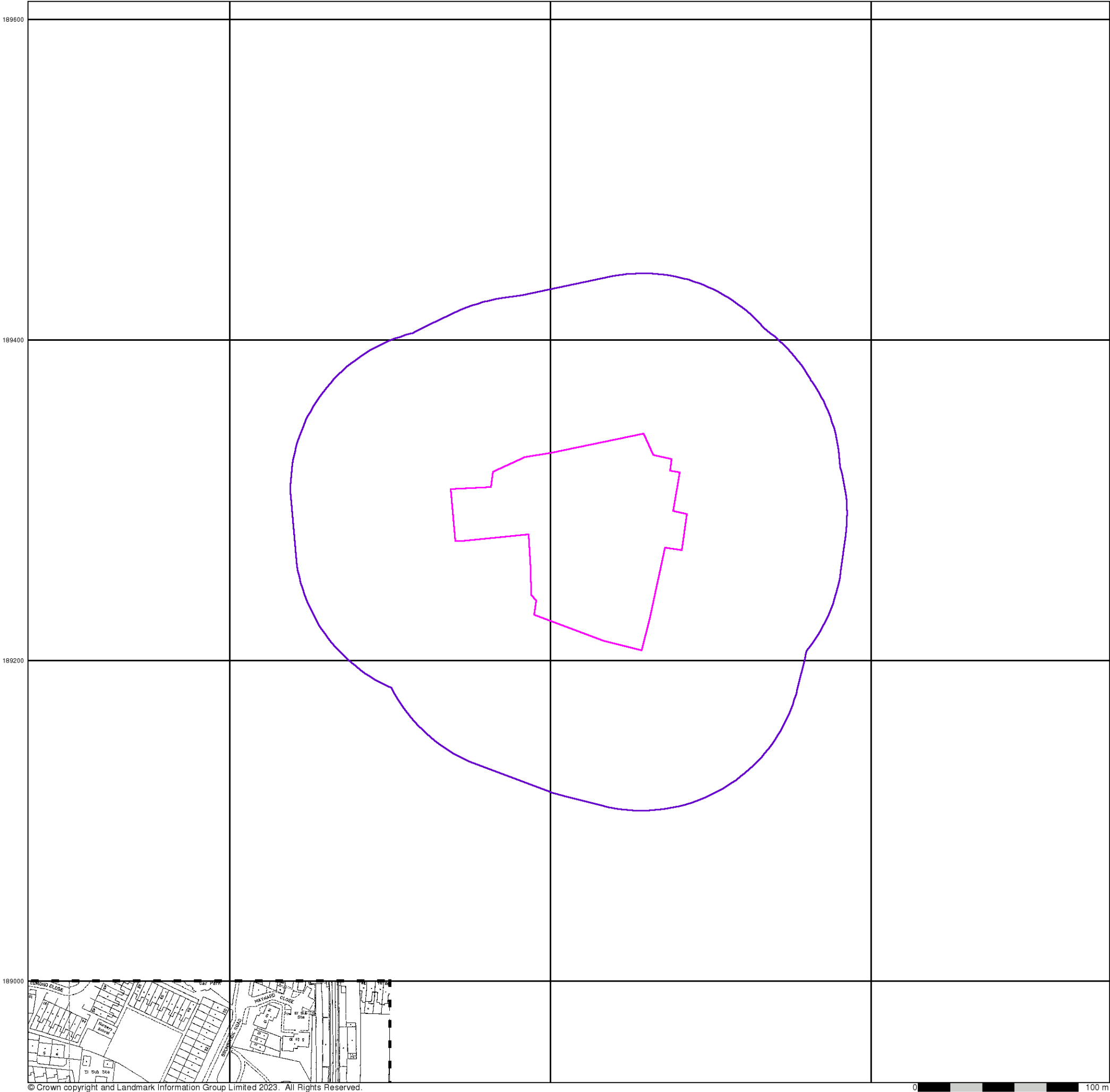
Order Number:	308348863_1_1
Customer Ref:	1922791
National Grid Reference:	533620, 189280
Slice:	A
Site Area (Ha):	1.19
Search Buffer (m):	100

Site Details

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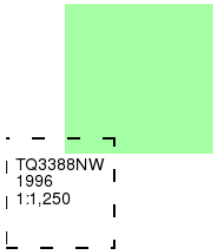
Large-Scale National Grid Data

Published 1996

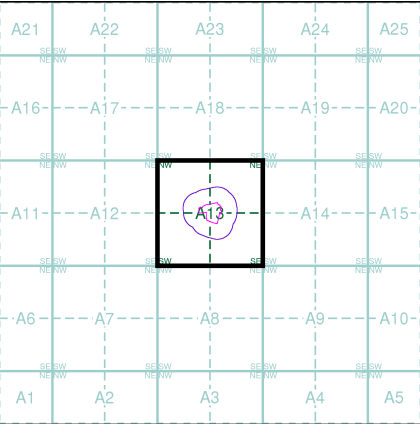
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 308348863_1_1
Customer Ref: 1922791
National Grid Reference: 533620, 189280
Slice: A
Site Area (Ha): 1.19
Search Buffer (m): 100

Site Details

The College of Haringey Enfield & North East L ..., Tottenham Centre, High Road, LONDON, N15 4RU



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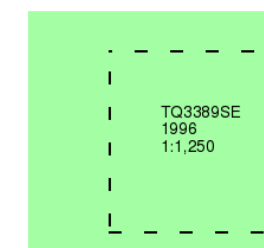
Large-Scale National Grid Data

Published 1996

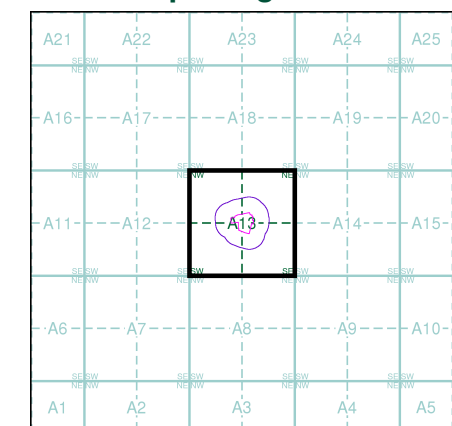
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

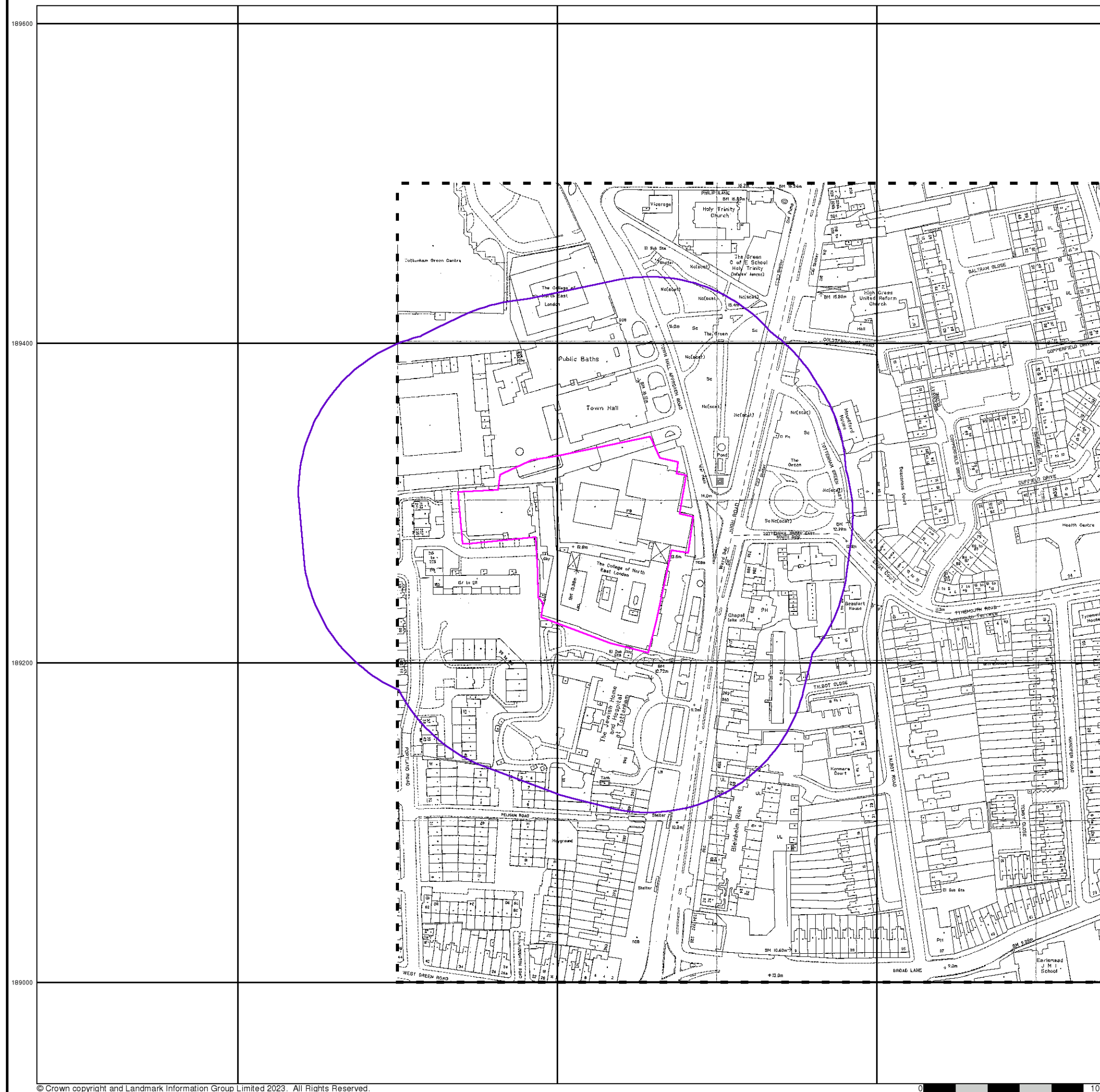
Order Number: 308348863_1_1
Customer Ref: 1922791
National Grid Reference: 533620, 189280
Slice: A
Site Area (Ha): 1.19
Search Buffer (m): 100

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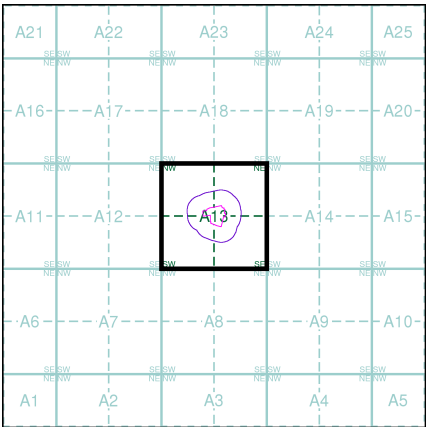


Historical Aerial Photography

Published 1999

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number: 308348863_1_1
Customer Ref: 1922791
National Grid Reference: 533620, 189280
Slice: A
Site Area (Ha): 1.19
Search Buffer (m): 100

Site Details

The College of Haringey Enfield & North East L ..., Tottenham Centre, High Road, LONDON, N15 4RU

Landmark
INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

APPENDIX E OTHER SUPPORTING DESK STUDY INFORMATION



BGS ID: 845776 : BGS Reference: TQ38NW9
EPSG: 27700 : 533590,189380

Institute of Geological Sciences
RECORD OF SHAFT OR BOREHOLE

6-in or 1:10 000 Map Registration No.

TQ 38NW/9

Name and Number of Shaft or Borehole:

National Grid Reference

TQ 3359.8938

For whom made

Town or Village

County

Exact site (reference to a fixed point on 1-in or 1:50 000 Map)

1-in or 1:50 000
New Series Map No.

Enter 'C' if
Confidential

256

Purpose for which made

Ground level at shaft bore relative to O.D. 2.155' OD. If not ground level give O.D. of beginning of shaft bore _____ m.

Made by

Date of sinking

Information from London Sheet NII NE

Examined by

Specimen Numbers and Additional Notes

Contact BGS: ngdc@bgs.ac.uk

NGRTQ 3360 8937

Tottenham.

256

TQ 38/26

160

NE/W.

The Baths, Municipal Buildings.

Made & communicated by Brown

Details in Records London Wells, p. 180.

Site visited 24/4/47. DKB.

R.W.L. 158'

P.W.L. 170'

yield 10,000 g.p.h. usually pump about 8 times
per day, but it varies.

well top ground level.

Hardness 22°.

Information from Sect 6 return 1956.

Water withdrawn by Sulzer Centrifugal Pump (Non-Submersible)
plant installed November 1955.

16
11.2.57



1

TQ 38/26

Copy made
JWS. 14/2

256

12

Inland Water Survey for Great Britain

LEE 160

Name or Description of
Authority or Undertaking..... *Bois of Tottenham*

Postal Address..... *Town Hall,*

N. 15.

(A) OVER-GROUND WATER.

- (I) (a) Do you take systematic records of levels of
water in :—
- (1) rivers
 - (2) streams
 - (3) reservoirs
 - (4) lakes
 - (5) canals or navigable rivers

(b) If so, please give a short description of the
method used.

*M.W.B. { See letter dated
13 March 1935 from
the Town Clerk
Town Hall
Tottenham N. 15*

(c) How often are the readings taken?

(d) Exact points at which the records are taken.
(A map or sketch would be helpful.)

(e) Have the levels been related to Ordnance
Datum Level or to some other standard (in
the latter case please specify standard)?

(f) Are all the levels (e.g., highest and lowest)
covered satisfactorily by the records taken?

(g) Are arrangements made for extra readings
during rise and fall of floods, etc.?

(II) What types of systematic records of discharge
other than records of levels are kept as
regards :—

- (1) rivers
- (2) streams
- (3) reservoirs
- (4) lakes
- (5) canals or navigable waterways

234 P.T.O.



3

(III) (a) Have measurements been made from which the data for levels can be converted to records of discharge of:—

- (1) rivers and streams
- (2) reservoirs
- (3) lakes
- (4) canals or navigable waterways

(b) If so, how have these measurements been made (*e.g.*, by current meters, velocities of floats, surveys of sections, calibration of weirs, records of water used for locking, etc.)?

(IV) (a) Are records kept in the case of springs breaking overground of the amount of water yielded?

(b) If so, what form of recording is used?

(c) How often are readings taken?

(d) Exact location of the spring. (A map or sketch would be helpful.)

(V) Since when have the records under I, II, III and IV been kept?

(VI) Are past records available?

(VII) REMARKS.

(Please indicate here any further information or particulars which may be thought likely to assist in the survey.)

234



TOTTENHAM BOROUGH COUNCIL.

(B) UNDERGROUND WATER—(WELLS AND BORINGS).

(In each case please state whether a well and/or boring is in question.)

256
160

TQ 38/26

I. GENERAL.

1. Exact site of well or boring **Rear of Public Baths, Town Hall Approach Road, indicated by a red cross on attached map.**
(A map or sketch showing position would be useful.)

2. Surface level of ground above Ordnance Datum **57 ft.**
3. Date of construction **Year 1900.**

WELLS.

4. Depth of well from surface level of ground (i.e., 2 above). If top of well is below the surface level of the ground (i.e., 2 above) state how much **58 ft.**
5. Depth of floor of galleries at site of well; also dimension and direction of galleries **(No Gallery) ft.**

BORINGS.

6. Depth of boring from surface level of ground (i.e., 2 above). If boring is in bottom of well, state depth of well ... **58 feet..** **385 ft.**
7. (a) Diameter of top of boring **1' 6 in.**
(b) Diameter of bottom of boring... .. **1' 6 in.**
8. Tubed from top of boring to **269 ft.**
9. Lining tubes perforated at depths of **- ft.**
10. Water struck during boring at depths of **130 feet from ground level** **ft.**
" " " " " "
11. What was rest level on completion of boring?

WELLS AND BORINGS.

12. Is the water raised by pump or air lift? **Pump**
13. Depth from top of well or boring to bottom of suction pipe **294 ft.**

234

5

II. If systematic measurements of water levels are made, state whether these include :—

- | | | |
|---|-----------------------|----------------------------------|
| (a) Pumping levels..... | (b) Rest levels | No information available, but |
| (c) Time of recovery to rest level on cessation of pumping | | no shortage of |
| (d) Changes in pumping level, if rate of pumping is altered. | | water has ever been experienced. |

Also state : (e) at what intervals records are taken (i.e., daily, weekly, etc.)

Please furnish a specimen graph of records taken over as long a period as available (up to 1 year).

III. If measurements are made only occasionally, please indicate what is, or has been, done in this respect and furnish examples of any graphs or figures available.

IV. YIELDS.

- | | |
|---|-----------------------|
| (1) Number of gallons pumped per hour | 14, 750 |
| (2) Is pumping continuous? | No. |
| (3) If not, how many hours pumping per day? | 5 |
| (4) Maximum daily yields available | Approx. 73,750 galls. |
| Estimated | Unlimited supply. |

Based on actual tests

V. If a section or record of strata can be given please attach to this form.

No records available.

VI. (1) If a chemical analysis can be given please attach.

--

- | | |
|---|--|
| (2) If not state hardness | 23 degrees. |
| (3) For what purpose is the water used? | Swimming Baths,
Washing Baths,
Laundries, etc. |

23.1



ANALYSIS OF SAMPLE OF WATER FROM WELL, BOREHOLE, ADIT OR
OTHER WORK IN THE STATE IN WHICH IT IS ABSTRACTED

Please quote in all
correspondence the
Geological Survey
Reference Number

256/160

Date of taking sample 9th February 1948

(a) Physical Examination

Temperature at source 12 °C.

Colour Nil

Appearance Clear sparkling

Taste Pleasant

Smell Nil

(d) Other determinations to be carried out at the analyst's discretion or at the Minister's request, depending upon indications obtained and on general characteristics of waters of the district, e.g., manganese, fluorine, etc.

.....parts per million*

..... " " "

..... " " "

(b) General Chemical Examination

Parts per million*

Reaction, pH	<u>7.4</u>
Free Carbon dioxide, as CO	<u>8.54</u>
Ammoniacal Nitrogen, as N	<u>0.45</u>
Albuminoid Nitrogen, as N	<u>0.011</u>
Nitrous Nitrogen, as N	<u>0.003</u>
Nitric Nitrogen, as N	<u>not detectable</u>
Hardness (state test used <u>Calcium soap</u>), as CaCO ₃ —	
Temporary	<u>137.4</u>
Permanent	<u>178.6</u>
Permanganate figure (4 hours, 80°F.) as O	<u>0.162</u>
Alkalinity, as CaCO	<u>232.0</u>
Total Solids	<u>446.0</u>

(c) Mineral Analysis

Calcium, as Ca	<u>54.31</u>
Magnesium, as Mg	<u>28.83</u>
Sodium, as Na	<u>70.40</u>
Carbonate, as CO ₃	<u>176.00</u>
Chloride, as Cl	<u>38.00</u>
Sulphate, as SO ₄	<u>100.91</u>
Nitrate, as NO ₃	<u>not detectable</u>
Iron	<u>0.44</u>

* Analyses expressed in parts per million are desired ; if they are expressed in any other units the appropriate alteration should be made.



THIRD SCHEDULE

RETURN OF ANALYSIS OF UNDERGROUND WATER
UNDER WATER ABSTRACTION REGULATIONS, 1947.

256/160

TQ 38/26

Name and address of person making return

M. LINDSAY TAYLOR

CLERK TO BORDUGH OF TOTTENHAM
TOWN HALL, TOTTENHAM. N.15

Full address of premises in which well,
borehole, adit or other work is
situated if different from above

CENTRAL BATHS, TOTTENHAM

Name and address of analyst

PUBLIC HEALTH LABORATORY SERVICE
CENTRAL PUBLIC HEALTH LABORATORY
COLINDALE AVENUE

COLINDALE

LONDON N.W.9

(e) Bacteriological Analyses, if available,
should be attached to this form.

Plate count Yeastol agar 3 days 22°C
periodically 1 per million

Plate count Yeastol agar 2 days 37°C
periodically 2 per million

Probable no. of coliform bacteria
1000000 3 days 37°C
1 per 100 million



Chel

THIRD SCHEDULE

RETURN OF ANALYSES OF UNDERGROUND WATER

TQ38/26

Geological Survey
No. 56.
256/160

Name and address of person
making return

The Medical Officer of Health,
Town Hall, Tottenham, N.15.

Full address of premises in which
well, borehole, silt or other work
is situated if different from above

Central Baths,
Tottenham, N.15.

ANALYSIS OF SAMPLE OF WATER FROM WELL, BOREHOLE, ADIT OR OTHER
POINT IN THE STATE IN WHICH IT IS ABSTRACTED.

Date of taking sample 9th February, 1948.

(a) Physical Examination

Temperature at source	12 °C.
Colour	Nil
Appearance	Clear, sparkling.
Taste	Palatable
Smell	Nil

(b) General Chemical Examination

Reaction, pH	7.4	
Total carbon dioxide, as CO ₂	8.54	parts per million
Ammoniacal Nitrogen, as N	0.45	"
Albuminoid Nitrogen, as N	0.011	"
Nitrous Nitrogen, as N	0.002	"
Nitric Nitrogen, as N	not detectable	"
Hardness (statute test used Clarke's), as CaCO ₃ -		
Soap		
Temporary	137.4	"
Permanent	148.6	"
Potassium permanganate figure (4 hours 80°F.)		
as O	0.162	"
Alkalinity, as CaCO ₃	232.0	"
Total Solids	496.0	"

(c) Mineral Analysis

Calcium, as Ca	54.31	parts per million
Magnesium, as Mg	22.83	"
Sodium, as Na	70.20	"
Carbonate, as CO ₃	146.00	"
Chloride, as Cl	32.00	"
Sulphate, as SO ₄	100.41	"
Nitrate, as NO ₃	not detectable	"
Iron	0.44	"

(d) Other determinations to be carried out at the analyst's
discretion or at the Minister's request, depending upon
indications obtained and on general characteristics of
waters of the district, e.g., manganese, fluorine, etc.

parts per million

(e) Bacteriological Analyses, if available, should be attached to
this form.

Analyses expressed in parts per million are desired; if they are
expressed in any other units the appropriate alteration should
be made.



256/160
To 38/26

256/160

London Clay
Woolwich + Reading Beds
Thanet Sand
Upper Chalk

ft	ms
104	0
58	0
14	0
277	0

Swanton, 1976



256/160

TQ 38/26

The Public Health Laboratory Service,
Central Public Health Laboratory,
Colindale Avenue, Colindale, London, N.W.9.

Water Bacteriological Examination Report.

Authority of Sender. Dr. Hogben, Town Hall, N.15.

Lab. Ref. No. F. 130/48.

Nature of Sample. Water taken from Artesian Well at
the Central Baths.

Date and hour of collection. 27.1.48 11.30 a.m.

Date and hour of arrival. 27.1.48 4.30 p.m.

Plate Count. Yeastral agar 5 days 22° C. aerobically 1 per ml.

Plate Count. Yeastral agar 2 days 37° C. aerobically 2 per ml.

Probable number of coliform bacilli, MacConkey 2 days, 37° C.
- less than 1 per 100 ml.

Signed. Betty C. Hobbs.

2nd February, 1948.





FORM WR - 38

Consent No: TP05/19

BGS No:

BOREHOLE RECORD

A. SITE DETAILS

Borehole drilled for: Bernie Grant Centre

Location: Tottenham, London N15 4RY

NGR (8 fig): TQ 33585 893471

Please attach site plan

Ground Level (if known):

Testing Company: G. STOW PLC

Date work Commenced: 2 WED 3rd MAY. Completed: 5th MAY 2006

B. CONSTRUCTION DETAILS

Please note that this is an existing borehole not drilled by G. Stow PLC we have no construction detail records.

Borehole datum (if not ground level) m below GL
(point from which all measurements of depth are taken eg flange, edge of chamber, etc)

Borehole drilled diameter

..... diameter mm from to m/depth

..... diameter mm from to m/depth

..... diameter mm from to m/depth

Casing material and type (eg plain steel, plastic slotted)

..... diameter mm from to m/depth

..... diameter mm from to m/depth

..... diameter mm from to m/depth

..... diameter mm from to m/depth

Grouting details:

Water struck at: m (depth below datum - mbd)

..... m (depth below datum - mbd)

Rest water level on completion m (depth below datum - mbd)

C. TEST PUMPING SUMMARY (Please supply fully details on Form WR-39)

Test Pumping Datum 29 m (depth below datum - mbd)
(if different from borehole datum)

Pump Suction Depth mbd

Water Level (Start of Test) ... 29mbd

Water Level (End of Test) 30.62mbd

Pumping rate ... 20.82 :l/s

..... for 12 hours

Recovery to 28.69mbd in 14 hrs 40mins
(from end of pumping)

Date(s) of measurements 04/05/06 & 05/05/06

Please Supply Chemical Analysis if Available

PUMPING TEST SUMMARY (Thames Region EA)

Applicant: Bernie Grant Centre Partnership, Town Hall Approach Road, Tottenham.
N15 4RY

Contact/Agent: Mr Chris Shirley-Smith, Water Works UK Limited, 21 Cornwall Avenue,
London. N22 7DA

Site Location: As for the applicant above.

NGR: TQ 33585 89371

Consent Number: TP05/19

Elevation: Approx. 13mOD

Proposal:

To commission the existing borehole for building cooling, toilet flushing, swimming pool top-up, cooling tower and irrigation of public space.

Consented Quantities:

20.8	m ³ /hour
500	m ³ /day

Average Yield over the 12 hour test: 20.99 l/s

GEOLOGY

Strata: Drift, London Clay, WRB, Thanet Sands, Chalk

Aquifer: Upper Chalk

BOREHOLE CONSTRUCTION

Borehole Depth: 125 m

Borehole Diameter: Grd. level – 22 mbgl = 2.1 m; 22 – 125 mbgl = 500 mm

Linings: Grd_level–22 mbgl=Brick lined; 22-58 mbgl=Steel Casing; 58-125 mbgl=Unlined

New/Existing: Existing

TEST RESULTS

Test Date: 04/05/06 @ 7:20 am until 04/05/06 @ 19:20 pm and recovery till 05/05/06
for 14 hours 40 minutes

Pumping rate achieved during test: 75.6 m³/hour

CONSTANT RATE TEST

ABH data:

Datum: 29 mbd

Pump Suction Depth: Not supplied

RWL: 29 mbd

PWL: 31.61 mbd

Drawdown: 2.61 m

Observations

There were no reported problems with the pump test. The observation boreholes were not specifically monitored during the test. Data acquired from the installed loggers at the OBHs were supplied. However, these data are not useful for the analysis of the pump test data because it was not possible to synchronise the time

intervals at which the loggers recorded the data with the time the drawdown were measured in the abstraction borehole. Also, the data logger records show water level fluctuation during the period of the pump test.

It was also observed that the test was carried out for only 12 hours instead of the consented 24 hours. Therefore, it appears that the drawdown has not reached equilibrium as at the time the pumping was stopped. Also, the abstraction rate during the test was over 260 % greater than the consented rate of 20.8 m³/hour.

The borehole is already in existence and therefore no specific borehole construction and strata details were available.

Pump Test Data Analysis

The analysis of the pump test data using Theis Equation and Jacob's Equation gives average Transmissivity and storage coefficient values as 972.21 m²/d and 1.99E-04, respectively. Only the pump test data obtained at the abstraction borehole were used in the analysis (see attached).

The nearest licence borehole is approximately 1710 m towards the SW. This analysis shows that there is potentially 0.6m of drawdown at this borehole after 10 days of continuous pumping. This is a worse case scenario due to the assumptions of the Theis equation. The observed impact is not likely to be significant, as there will be recovery in the pumped borehole while it is switched off. In addition, there will also be baseflow through the aquifer, which will mitigate against the abstraction.

RECOMMENDATION

Although, the pump test carried out did not strictly adhere to specifications in the issued Consent, however, the data was sufficient to compute values for aquifer properties by using non-equilibrium well formula (Theis and Jacob well hydraulic Equations). The results show that the aquifer properties can sustain the consented abstraction rate of 20.8 m³/hour with little or no derogation. Based on this, It is considered that there will be no significant derogation from the Bernie Grant Centre Partnership abstraction and therefore, this application should be allowed to progress. The licence may be issued to the common CAMS end date.

Signed:

Dated:

Olayinka Oladeji
Hydrogeologist
Groundwater and Contaminated Land Team B

G.STOW PLC

CONSTANT RATE PUMPING TEST

CONSENT NO.	TP05/19	Description of datum point
Pumping test at	Bernie Grant Centre - Tottenham - London	Dip tube at head plate
NGR		Height above ground level
Observations from		Height to dip point above concrete = 400mm
NGR		

Date	Time	Elapsed Time		Depth of water level below datum (metres)	Drawdown (metres)	Meter reading	Flow rate l/s	Comment
		Minutes	Hours					
		DAY (-3)				Mag. Flo		
		DAY (-2)						
		DAY (-1)						
04/05/2006	7.20 am	0		29				Pump Start
		0.5		30.1	1.1			
		1		30.24	1.24		17.54	
		1.5		30.78	1.78		21.64	
		2		30.95	1.95		21.47	
		2.5		30.98	1.98		21.32	
		3		31	2		21.25	
		3.5		31.02	2.02		21.16	
		4		31.04	2.04		21.22	
		4.5		31.06	2.06		21.17	
		5		31.07	2.07		21.16	
		6		31.09	2.09		21.11	
		7		31.11	2.11		21.12	
		8		31.12	2.12		21.08	
		9		31.14	2.14		21.07	
		10		31.15	2.15		21.01	
		12		31.17	2.17		21.03	
		14		31.19	2.19		21.01	
		16		31.21	2.21		21	
		18		31.22	2.22		21	
		20		31.23	2.23		20.98	
		25		31.26	2.26		20.95	
		30		31.28	2.28		20.96	
		35		31.29	2.29		20.93	
		40		31.31	2.31		20.93	
		45		31.32	2.32		20.92	
		50		31.33	2.33		20.88	
		55		31.34	2.34		20.94	
	08.20 am	60	1 hr	31.35	2.35		20.84	
	08.30 am	70		31.42	2.42		21.17	
	08.40 am	80		31.43	2.43		21.19	
	08.50 am	90		31.44	2.44		21.12	
	09.05 am	105		31.46	2.46		21.11	
	09.20 am	120	2hr	31.46	2.46		21.1	
	09.35 am	135		31.48	2.48		21.08	

G.STOW PLC

CONSTANT RATE PUMPING TEST (CONTINUED)

CONSENT NO.	TP05/19	Description of datum point
Pumping test at	Bernie Grant Centre - Tottenham - London	Dip Tube at head plate
NGR		Height above ground level
Observations from		Height to dip point above concrete = 400mm
NGR		

[illegible]

G.STOW PLC

CONSTANT RATE PUMPING TEST - RECOVERY

CONSENT NO.	TP05/19	Description of datum point
Pumping test at	Bernie Grant Centre - Tottenham - London	Dip tube at head plate
NGR		Height above ground level
Observations from		Height to dip point above concrete = 400mm
NGR		

[illegible]

G.STOW PLC

CONSTANT RATE PUMPING TEST - RECOVERY (CONTINUED)

CONSENT NO.		Description of datum point
Pumping test at		
NGR		Height above ground level
Observations from		
NGR		

[illegible]



RECORD OF BOREHOLE NO. 1

TQ38NW1
3363.2927.

Ground level: Approx 45.0ft above O.D. Newlyn Dia. of boring: 8in
Type of boring: Shell and Auger Lining tubes: 8in to 40ft

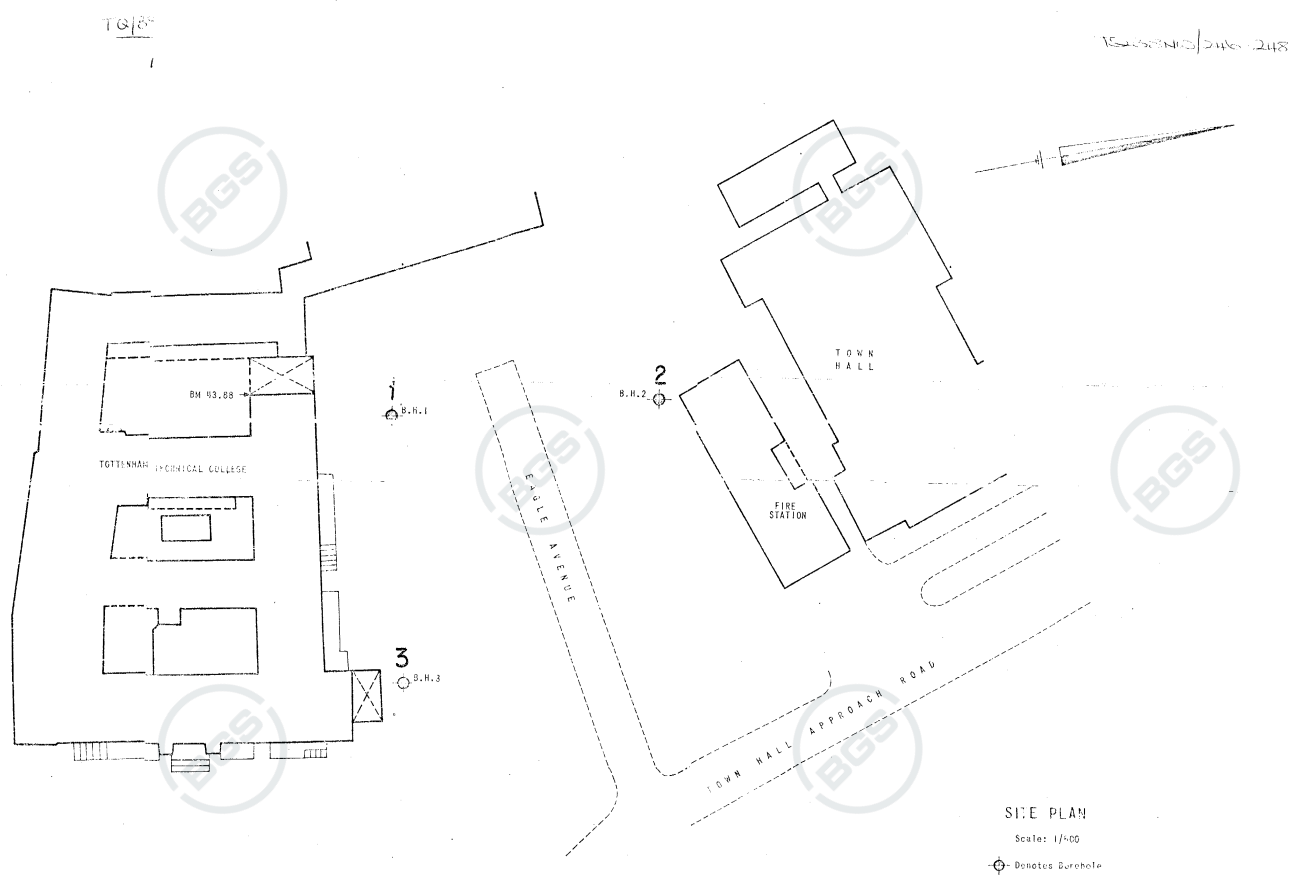
Daily Progress	Samples		Change of Strata			Description of Strata
	Depth	Type	Legend	Depth	O.D. Level approx	
	2'0"	D				FILL (paved ash and cobbles over sandy clay and brick rubble)
	4'0"	BD		7'0"	38.0	
	8'6" - 10'0"	U(4) D				Stiff brown silty CLAY with occasional fine sand partings
	10'0"	D				
	12'0"	D				
	13'6" - 15'0"	U(4) D				
	15'0"	D				
	17'0"	D				
	18'6" - 20'0"	U(4) D		21'6"	23.5	Stiff, becoming very stiff, fissured dark brown, becoming dark grey, silty CLAY with occasional fine sand partings. claystone at 48ft 6in depth
	20'0"	D				
	22'0"	D				
	23'6" - 25'0"	U(4) D				
	25'0"	D				
	27'0"	D				
	28'6" - 30'0"	U(4) D				
	30'0"	D				
	32'0"	D				
	33'6" - 35'0"	U(4) D				
	35'0"	D				
	37'0"	D				
	38'6" - 40'0"	U(4) D				
	40'0"	D				
	42'0"	D				
	43'6" - 45'0"	U(4) D				
	45'0"	D				
	47'0"	D				
1.4.68	49'0" - 50'6"	U(4) D				
	50'6"	D				
	52'0"	D				
	54'0" - 55'6"	U(4) D				
	55'6"	D				
	57'0"	D				
	59'0" - 60'6"	U(4) D				
	60'6"	D				
	62'0"	D				
	64'0" - 65'6"	U(4) D				
	67'0"	D				(see over)

type of sample:
4 1/4" - 4 in. dia. undisturbed sample.
1 1/2" - 1 1/2 in. dia. ...
DUC - disturbed sample.
BD - bulk disturbed sample.
V - vane test.
S - standard penetration test.
C - dynamic cone penetration test.

Remarks: (Observations on ground-water, etc.)

TQ/38NW/246
3363.8927.

Contact BGS: ngdc@bgs.ac.uk



STAGE 1 PRELIMINARY UXO RISK ASSESSMENT

REPORT REF: PRA 23-2084 | Revision: 0

Client: RSK Geosciences

Project: Tottenham Centre, London

Date: 30/03/2023



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0207 117 2492
www.brimstoneuxo.com

INTRODUCTION

The Stage 1 Preliminary Risk Assessment is an initial screening assessment designed to highlight any sources of unexploded ordnance (UXO) with the potential to contaminate a given site.

The aim of the Stage 1 assessment is to identify or discount the need for further detailed research - a Stage 2 Detailed UXO Risk Assessment.

This desktop assessment has been researched and written by a dedicated Researcher / Risk Assessor and produced in accordance with the CIRIA C681 Guidelines: 'Unexploded Ordnance, a Guide for the Construction Industry' (published in 2009).

In preparation for this assessment, original wartime records, historic OS mapping and the *Brimstone UXO Sources Database* have been reviewed. The latter incorporates multiple datasets plotting the positions of a variety of domestic military sites and confirmed historic German bombing targets.

The Stage 1 Preliminary Risk Assessment considers the following:

1. The Proposed Works
2. Enemy Action During WWI and WWII
3. British / Allied Military Activity
4. Historic Site Occupancy
5. Risk Mitigating Factors

THE SITE

The Site (approximately centred on the National Grid Ref: TQ 33628 89278) is situated in the London Borough of Haringey, approximately 895m south-west of Tottenham Hale railway station.

The Site comprises the Tottenham Centre (the College of Haringey, Enfield and North-East London), consisting of structures of varying storeys (generally two to three) and hard surfaced accessways, car parking facilities and courtyard areas. It is bound to the north by Isobel Place, to the east by Town Hall Approach Road and High Road, to the south by an unnamed accessway and residential properties on Portland Road and to the west by residential properties on Portland Road and associated garden areas.



THE PROPOSED WORKS

SI works will consist of one borehole to 25m bgl.

The client provided Site plan indicates that development will involve the construction of a new building associated with the college. However, no specific details have been provided.

ENEMY ACTION DURING WWI AND WWII

Potential Source of UXO	Significant?	Details
WWI German Bombing	x/✓	London was raided on several occasions during WWI. However, no evidence has been found to suggest that the Site was affected by bombing incidents. Anecdotal evidence suggests that the closest recorded incident occurred approximately 3.2km north-east of the Site on 3 rd September 1916.

WWII German Bombing	✓	British District Bombing Density Statistics	The Site is located within the WWII-era Municipal Borough of Tottenham, which sustained 101.2 bombs / 1,000 acres, a high bombing density.
		Evidence of Bomb Strikes / Damage	London bomb census mapping records approximately 24 bombing incidents within an approximate 200m radius of the Site; one of these is recorded on Site. An incendiary bomb ‘shower’ is recorded to the immediate west of the Site. A local bomb plot map for Tottenham also records an incident on Site, albeit in a different location; this is recorded within the footprint of the proposed new building. Middlesex County Council (MCC) war damage mapping records varying levels of damage to properties within the Site footprint. Three properties are recorded as suffering ‘total damage’, one structure is recorded as ‘some repairs possible, could become Category One’ and one structure is recorded as ‘borderline areas, uncertain whether repairs are possible’. It should be noted that this source only records serious damage; it is therefore possible that further structures within the Site footprint experienced minor damage. Low-resolution post-WWII aerial photography corroborates the damage mapping; the structures highlighted display evidence of significant structural damage occurring, with structural clearance also evident.
		Local Bombing Decoy Sites	None within a significant distance of the Site. The closest was located approximately 13.3km north-west of the Site.
		Local German Bombing targets	Luftwaffe target photography indicates that the Tottenham Water Treatment Works and Reservoir, approximately 850m east, was identified as a primary bombing target.
WWII German Cross Channel Artillery Shelling	✗	n/a	
BRITISH / ALLIED MILITARY ACTIVITY			
Potential Source of UXO	Significant?	Details	
WWII Home Guard (HG) Activity	✗/✓	Soldiers of the 25 th and 27 th (Enfield), 26 th (Wood Green) and 28 th (Hornsey) Middlesex HG battalions will have been active locally during WWII. However, they are unlikely to have accessed the Site or utilised it in any significant way given its developed nature.	
Site Requisitioned for Wartime Military Use	✗	n/a	
Existing or Historic Army or RAF Training Area / Weapons Range	✗	n/a	
Existing or Historic Military Bases and Other Installations	✗	n/a	
Existing or Historic Munitions or Explosives Factories	✗	n/a	
Existing or Historic Military Defensive Fortifications	✗	n/a	

WWII Light and / or Heavy Anti-Aircraft (LAA and HAA) Fire	✓	Numerous (>30) permanent HAA batteries were active within range of the Site during WWII. LAA guns likely defended vulnerable points within the wider area too. Luftwaffe activity in the region was frequent and intense. It is possible that an unexploded AA shell struck the Site and penetrated to a shallow depth within areas that sustained significant damage.
WWI German Bombing WWII Pipe-Mined Locations and Beach Minefields	✗	n/a
SITE HISTORY		
What was the Site occupancy historically, especially during WWI and WWII?	During WWII, the Site comprised structures of an assumed residential and commercial nature, as well as a hard surfaced accessway and further hardstanding in the form of yard areas. Garden areas may have also been present associated with residential properties.	
RISK MITIGATING FACTORS		
Post-Conflict Ground Works	Post-WWII redevelopment has consisted of the clearance of residential properties in the centre of the Site footprint and the construction of the college structure; this is known to have occurred by 1999. The remainder of the structures within the Site footprint appear to have largely retained their WWII-era composition, although it is anticipated that post-WWII redevelopment has occurred in these areas (likely general updates / maintenance). The excavations associated with the clearance of the residential properties and the development of the college structures are anticipated to have been shallow (1-2m bgl), although it is feasible that some of these structures may have required deep (>2m bgl) foundations. The laying of hardstanding and general maintenance will have likely disturbed WWII-era soil to very shallow (<1m bgl) depths.	
Likelihood of UXO Remaining	The risk associated with (any) very shallow and shallow buried UXO will have been partially mitigated. The risk associated with (any) deep buried UXO almost certainly remains unmitigated throughout the majority of the Site but may be partially mitigated within the footprint of some of the college structures.	
CONCLUSIONS		
German UXO: - London was the most heavily bombed British city during WWII. Although the Site was situated in a relatively peripheral area, it was situated in close proximity to a primary Luftwaffe bombing target. Consequently, the Site experienced a high bombing density, as indicated by official Home Office bombing statistics. - London bomb census mapping records an approximate 24 bombing incidents within an approximate 200m radius of the Site; one of these incidents is recorded on Site. This is corroborated by a local bomb plot map for Tottenham, although the incident in the local map is recorded in a different location; this is recorded within the footprint of the proposed new building. - MCC war damage mapping records varying levels of significant damage to a number of structures within the Site footprint. This is corroborated by low-resolution aerial photography, which displays evidence of significant damage and structural clearance in the areas recorded as sustaining damage. It should be noted that the war damage mapping does not record instances of minor damage; it is therefore feasible that further damage occurred within the Site footprint that is not identifiable within the aerial photography. - At the outset of WWII, access levels are anticipated to have been frequent and regular. However, following damage occurring, access levels are anticipated to have decreased significantly, potentially ceasing altogether in the worst affected areas. Evidence of a UXB strike is far less likely to have been identified and reported in areas subject to infrequent access. - Furthermore, the ground cover present within the damaged areas will likely have been uncondusive to the visual detection of UXBs i.e. rubble and debris. A UXB falling within such ground cover could have become obscured and gone overlooked, potentially remaining in situ. - Although post-WWII works will have mitigated the risk of encountering UXBs to varying depths across the Site area, the proposed works will exceed these depths and are believed to be located within the immediate vicinity of a recorded bombing incident. Therefore, workers may be exposed to a potential UXB encounter.		

British / Allied UXO:

- No evidence of significant military activity specifically occurring on Site has been found and none is likely to have occurred.
- It is quite possible that an unexploded AA shell struck the Site during WWII. Although any such item of UXO is unlikely to have penetrated the ground unseen within undamaged areas, a UXAA shell could have feasibly penetrated to a shallow depth within damaged areas and gone unnoticed.

RECOMENDATIONS

SI Works

A **Stage 2 Detailed Risk Assessment** is recommended in order to further assess the risk to proposed works. In lieu of a Detailed UXO Assessment, Brimstone recommends on Site support for any planned ground works.

Development Works

A client provided Site plan indicates that development works will consist of a new building associated with the college, although no specific details related to this were provided. The above recommendation applies to any ground works associated with the development.