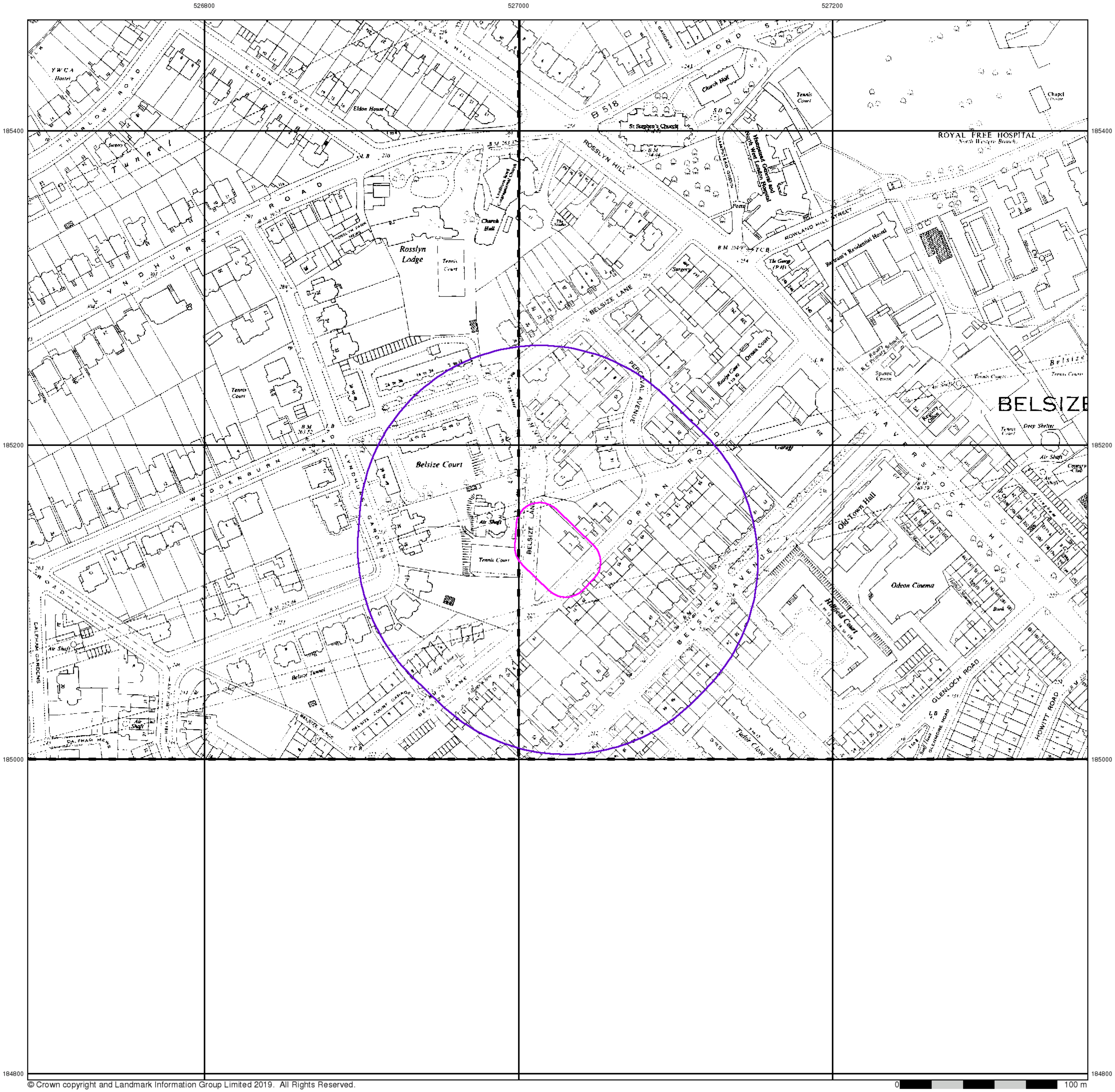


GEA

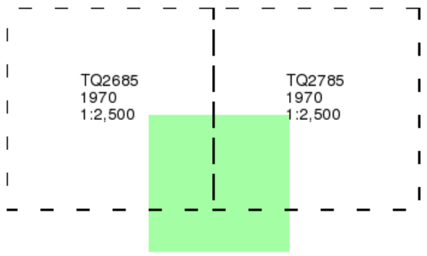
Ordnance Survey Plan

Published 1970

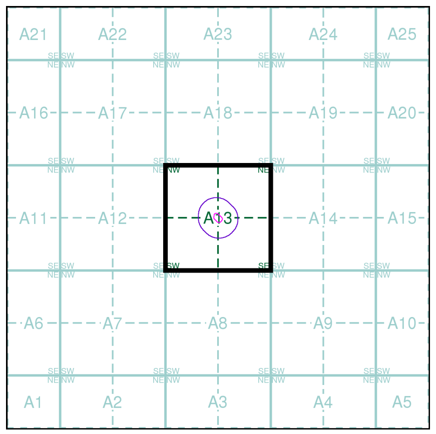
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	218619509_1_1
Customer Ref:	J19259
National Grid Reference:	527020, 185130
Slice:	A
Site Area (Ha):	0.23
Search Buffer (m):	100

Site Details

40, Ornan Road, LONDON, NW3 4QB

Landmark
INFORMATION GROUP

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

GEA

Ordnance Survey Plan

Published 1974 - 1979

Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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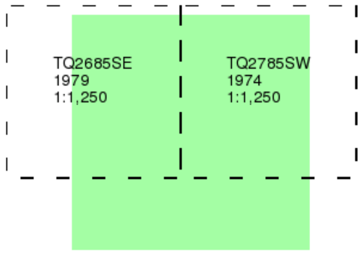
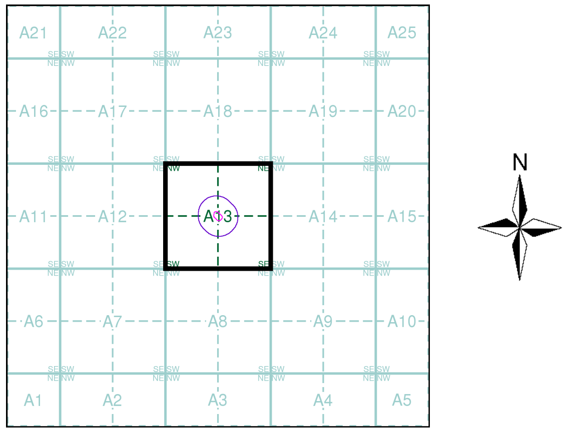


Historical Map - Segment A13



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Slice:	A
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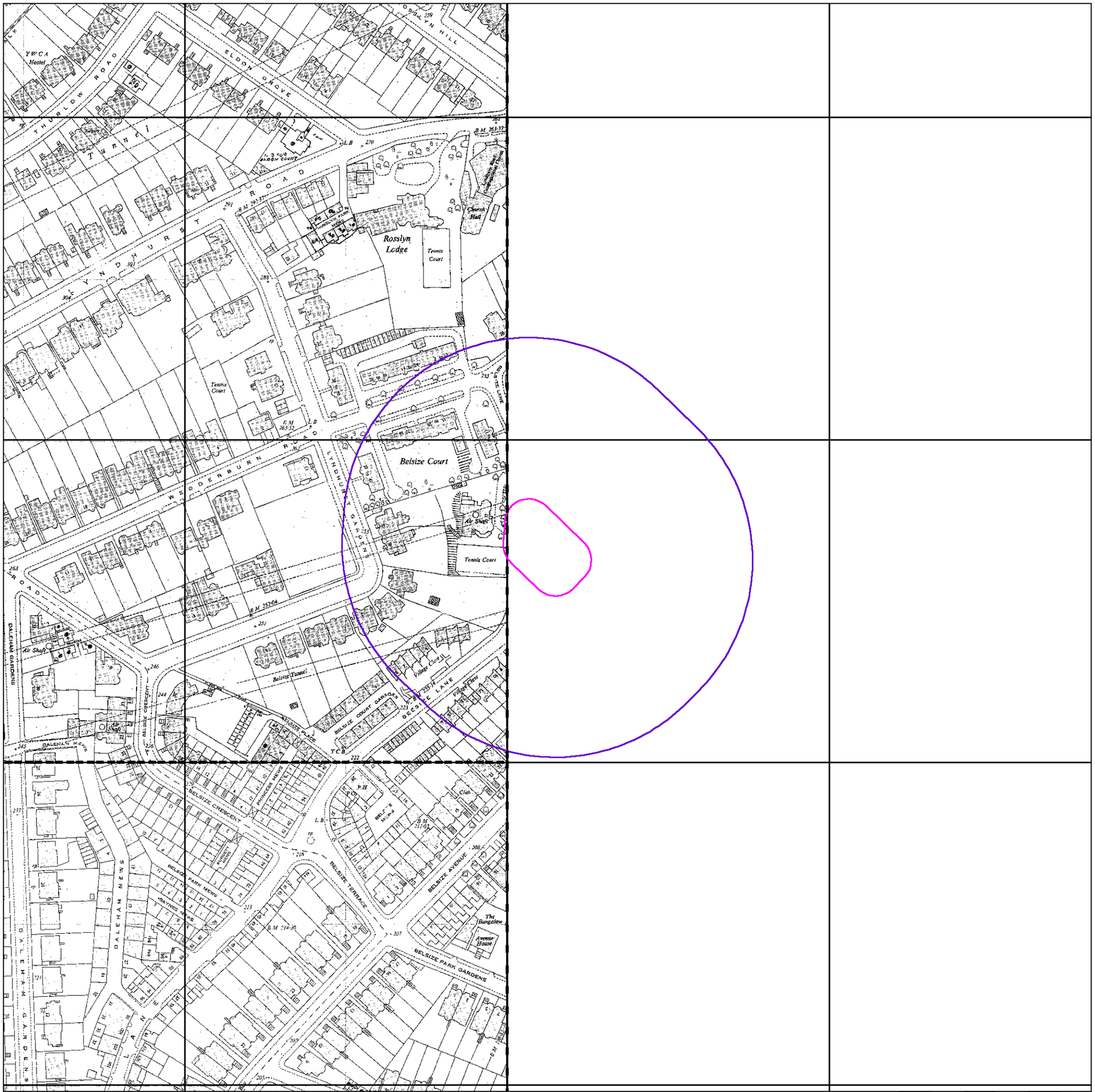


GEA

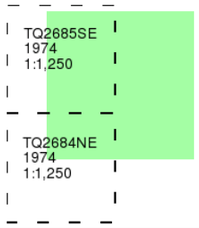
Supply of Unpublished Survey Information

Published 1974

Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



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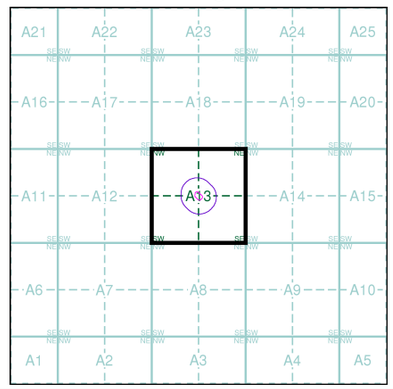

Order Details

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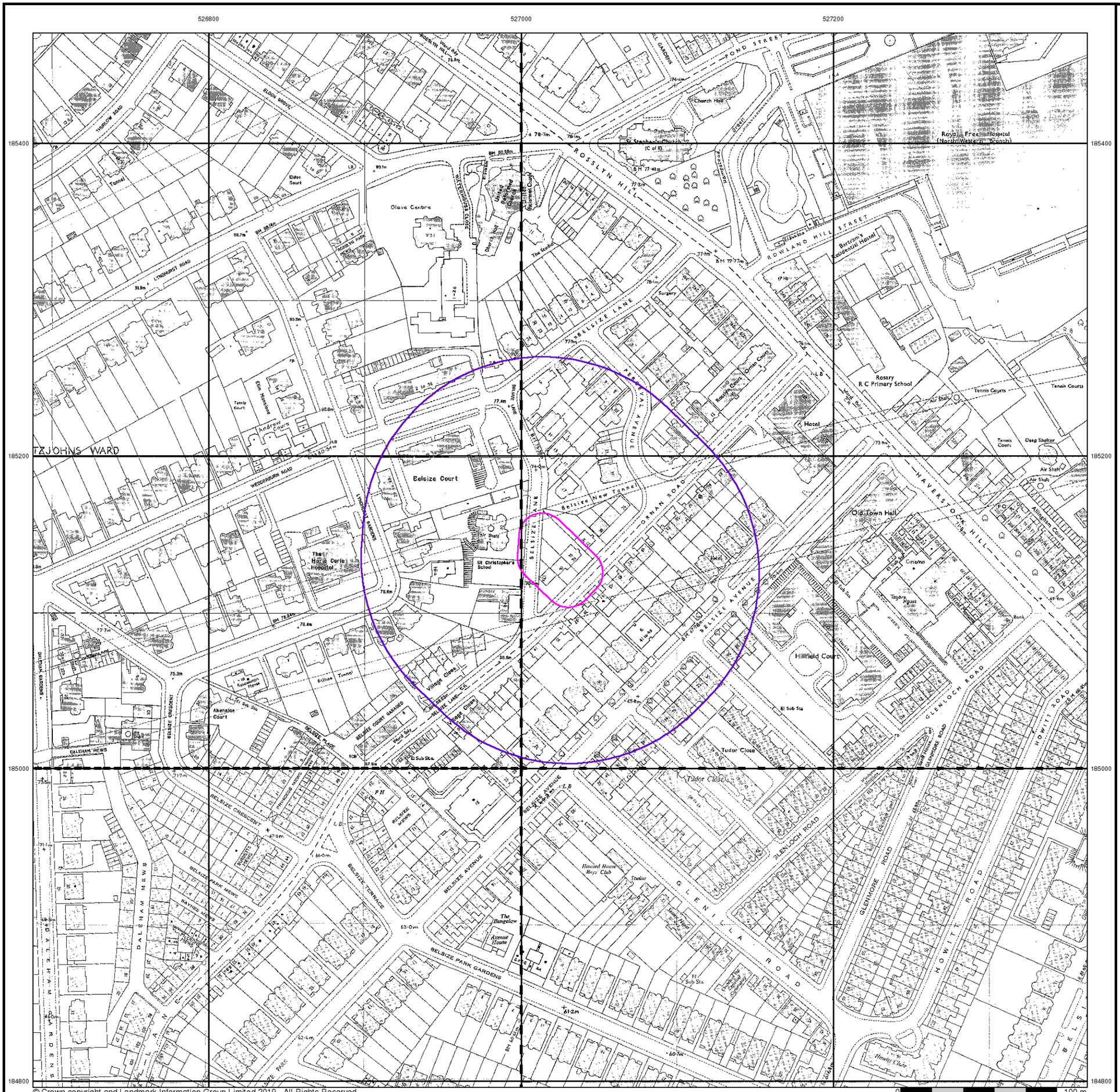

GEA

Additional SIMs

Published 1985 - 1990

Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

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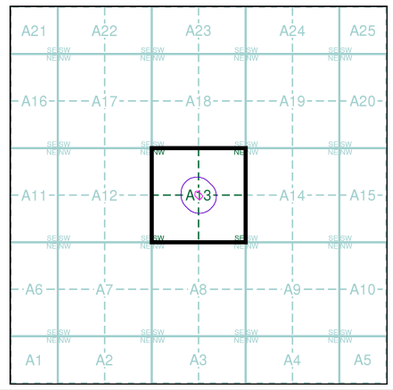
TQ2684NE 1985 1:1,250	TQ2784NW 1990 1:1,250

Historical Map - Segment A13



Order Details

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Customer Ref:	J19259
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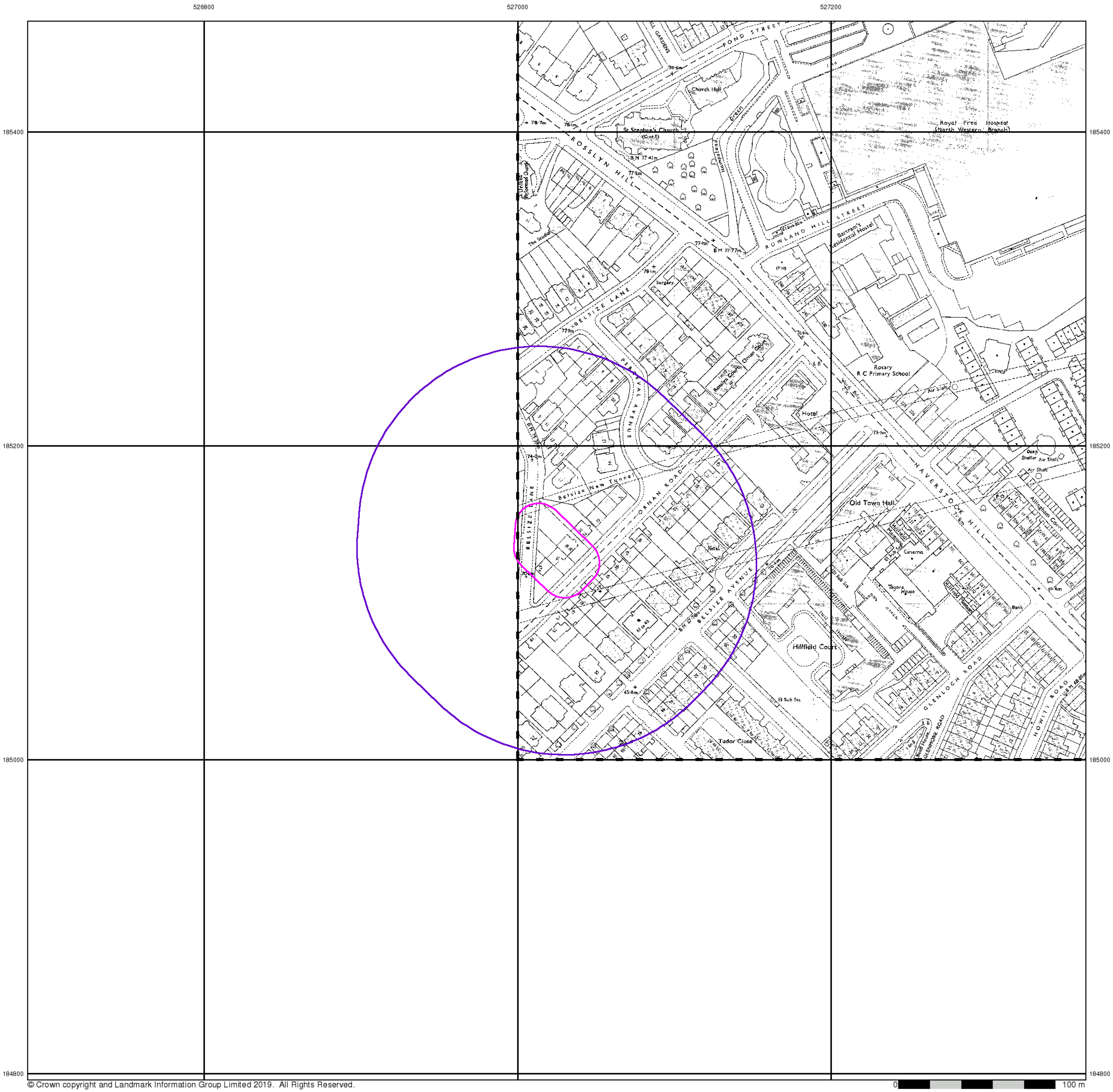

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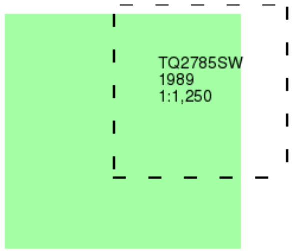
Additional SIMs

Published 1989

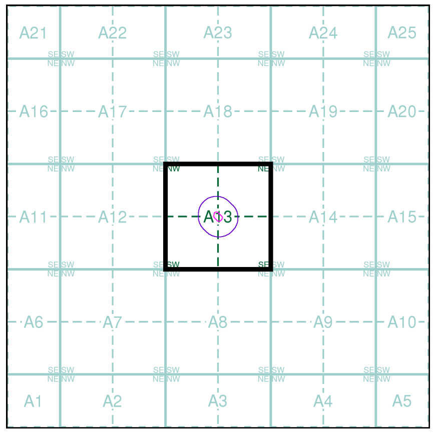
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



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Order Details

Order Number:	218619509_1_1
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Slice:	A
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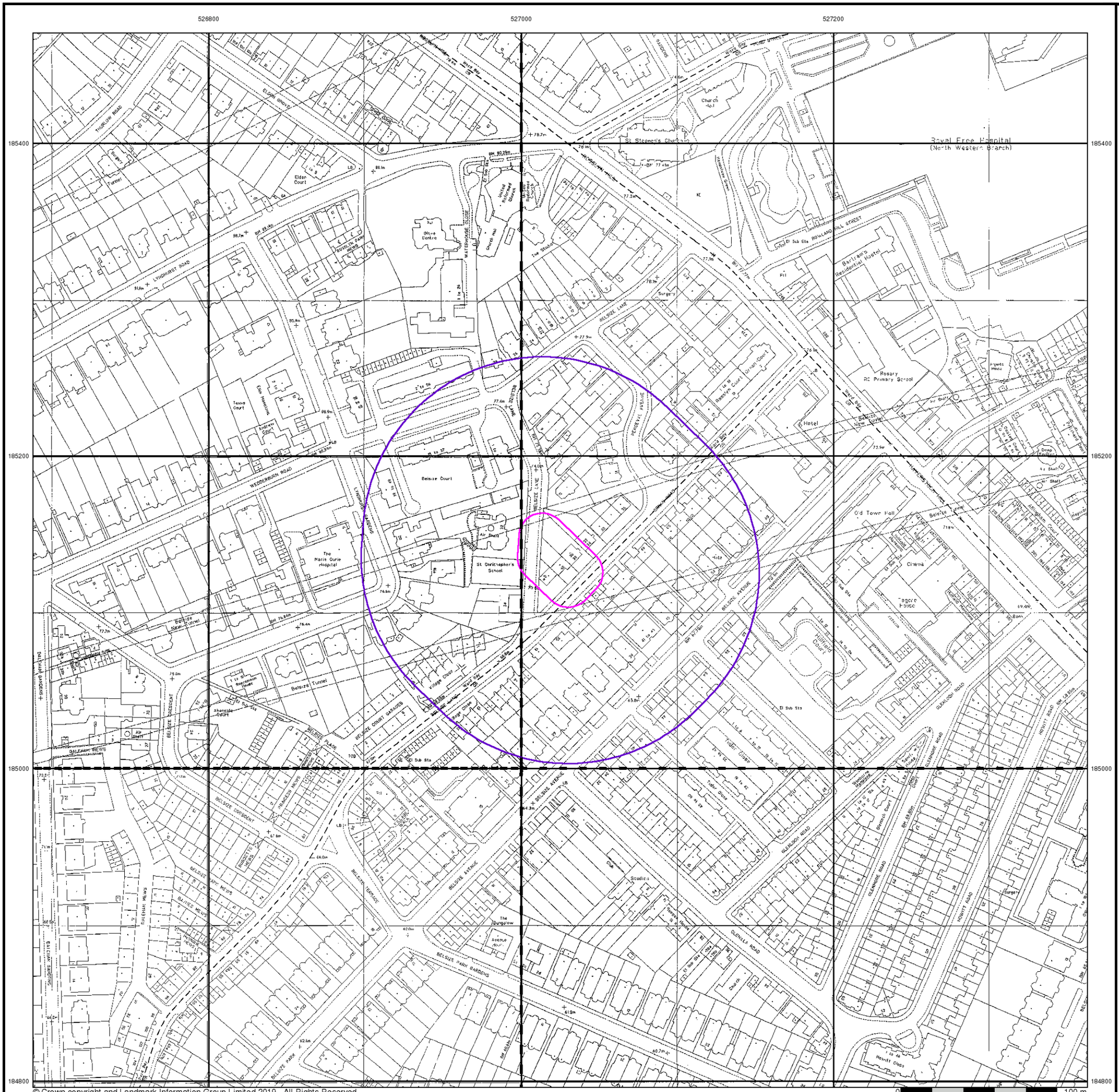


GEA

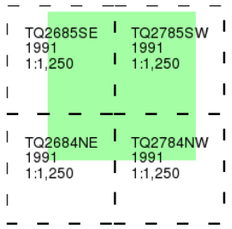
Large-Scale National Grid Data

Published 1991

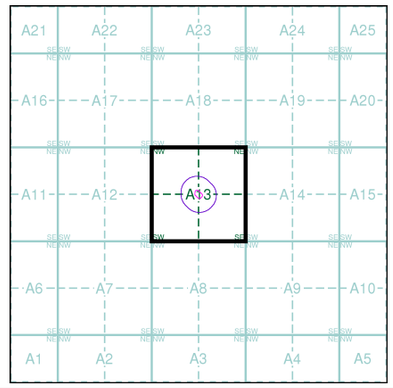
Source map scale - 1:1,250

'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

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National Grid Reference:	527020, 185130
Slice:	A
Site Area (Ha):	0.23
Search Buffer (m):	100

Site Details

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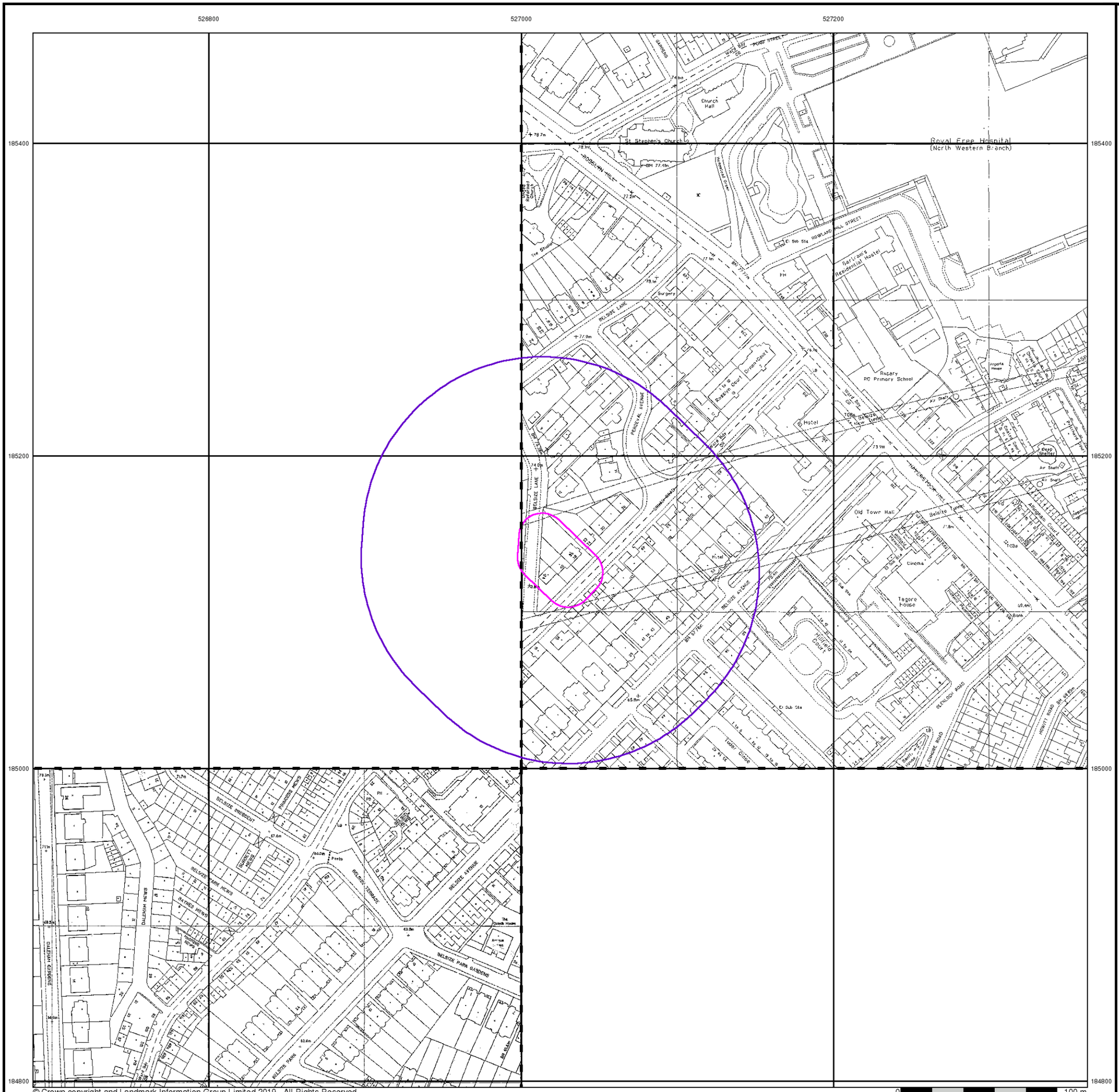

GEA

Large-Scale National Grid Data

Published 1992 - 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.

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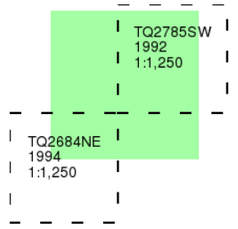
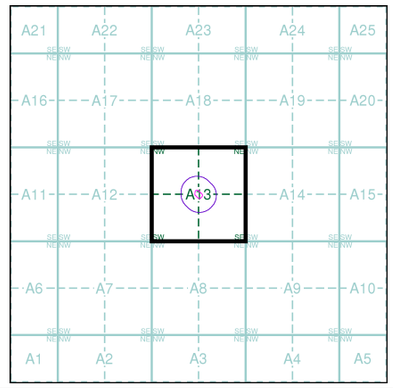


Historical Map - Segment A13



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National Grid Reference:	527020, 185130
Slice:	A
Site Area (Ha):	0.23
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0 100 m

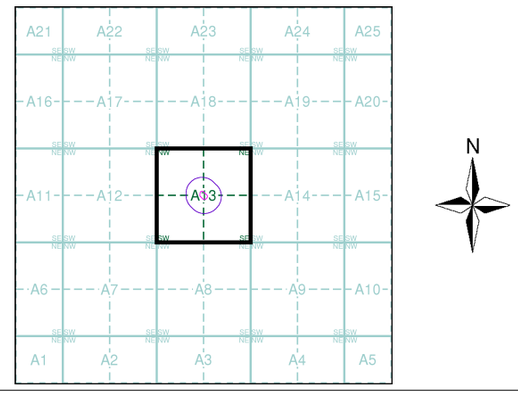
GEA

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



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Herts, EN11 0EX
Tel: +44 (0)1992 245 020
E-mail: info@1stlinedefence.co.uk
Company No: 7717863
VAT No: 128 8833 79

www.1stlinedefence.co.uk

Express Preliminary UXO Risk Assessment

Client	GEA Ltd.
Project	40 Ornan Road, London
Site Address	40 Ornan Road, Hampstead, London, NW3 4QB
Report Reference	EP9743-00
Date	25/09/19
Originator	OG

Assessment Objective

This preliminary risk assessment is a qualitative screening exercise to assess the likely potential of encountering unexploded ordnance (UXO) at 40 Ornan Road, London. The assessment involves the consideration of the basic factors that affect the potential for UXO to be present at a site as outlined in Stage One of the UXO risk management process.

Background

This assessment uses the sources of information available in-house to 1st Line Defence Ltd to enable the placement of a development site in context with events that may have led to the presence of German air-delivered or Allied military UXO. The report will identify any immediate necessity for risk mitigation or additional research in the form of a Detailed UXO Risk Assessment. It makes use of 1st Line Defence's extensive historical archives, library and unique geo-databases, as well as internet resources, and is researched and compiled by UXO specialists and graduate researchers.

The assessment directly follows CIRIA C681 guidelines "Unexploded Ordnance, a Guide for the Construction Industry". The document will therefore assess the following factors:

- Basic Site Data
- Previous Military Use
- Indicators of potential aerial delivered UXO threat
- Consideration of any Mitigating Factors
- Extent of Proposed Intrusive Works
- Any requirement for Further Work

It should be noted that the vast majority of construction sites in the UK will have a low or negligible risk of encountering UXO and should be able to be screened out at this preliminary stage. The report is meant as a common sense 'first step' in the UXO risk management process. The content of the report and conclusions drawn are based on basic, preliminary research using the information available to 1st Line Defence at the time this report was produced. It should be noted that the only way to entirely negate risk from UXO to a project would be to support the works proposed with appropriate UXO risk mitigation measures. It is rarely possible to state that there is absolutely 'no' risk from UXO to a project.

Risk Assessment Considerations	
Site location and description/current use	The site is located in Hampstead, within the London Borough of Camden. According to recent aerial imagery, the site is currently occupied by a residential dwelling. It is bordered by Belsize Lane to the north and north-west, with residential structures located to the immediate east and west. Ornan Road is located to the south of the site. The site is approximately centred on the OS grid reference: **TQ 27022 85132**. 
Are there any indicators of current/historical military activity on/close to the site?	In-house records do not indicate that the site footprint had any former military use. No features such as WWII defensive positions, encampments or firing ranges are recorded to have been located at or in the immediate vicinity of the site. In addition, no information of ordnance being stored, produced, or disposed of within the proposed site boundary could be found. The closest recorded Heavy Anti-Aircraft (HAA) battery was situated approximately 1.1km to the north-east of the site. The conditions in which unexploded anti-aircraft ordnance may have fallen unrecorded within the proposed site are analogous to that of aerially delivered Luftwaffe bombs. For a discussion on these conditions, see the relevant sections below.
What was the pre- and post-WWII history of the site?	According to historical OS mapping dated 1934-35, the site was occupied by a residential structure. Further residential buildings border the site to the east and west, with roadways and other buildings in the general vicinity. *Belsize Court* is labelled to the north-west of the site across Belsize Lane. Post-WWII mapping dated 1954 does not indicate any significant change within the site boundary or in the immediate bordering areas. *Belsize Court* to the north-west appears to have been cleared, with new residential buildings now developed.
Was the area subject to bombing during WWII?	During WWII, the site was situated within the Metropolitan Borough of Hampstead. According to Home Office statistics, this borough sustained a high density of bombing with an average of 166 items dropped per 1,000 acres. This consisted of 321 high explosive (HE) bombs, 6 parachute mines, 31 oil bombs, 5 phosphorous bombs, 10 V-1 pilotless aircraft and 3 V-2 long range rockets bombs, culminating in 898 incidents in total. London bomb census mapping does not record any direct bombing within the site boundary. Incendiary bombing is recorded in the area to the immediate west, whilst conventional bomb strikes are recorded in the surrounds, including approximately 100m north-west, as well as to the north and north-east. Local bomb plot mapping for Hampstead approximately correlates with the locations of these strikes. It also does not depict any bomb strikes in the site area.
Is there any evidence of bomb damage on/close to the site?	According to London County Council (LCC) bomb damage mapping, no damage is recorded to the structure within the site, or indeed to any structure in the vicinity. The closest recorded damage is approximately 140m to the north-east of the site at the end of Ornan Road, whereby two buildings are marked as 'blast damage, minor in nature'. Whilst OS mapping suggests substantial change to Belsize Court to the north-west of

	the site, LCC mapping does not record any damage in this area - and in fact appears to suggest that the new buildings had already been developed. Further to this, client provided 1946 aerial imagery of the site does not show any signs of repair works, ground disturbances or other signs of bomb damage.
To what degree would the site have been subject to access?	Access and general monitor is anticipated to have been regular due to the undamaged structure on site, as well as the additional structures and roadways in the immediate locality. Thus, post-raid checks for evidence of UXO are likely to have been carried out. It should be noted, however, that access within residential gardens is considered to have been dependant on the vigilance of the occupant.
To what degree has the site been developed post-WWII?	Little development has occurred on site post-WWII, with the structure and garden area remaining.
What is the nature and extent of the intrusive works proposed?	The proposed works are understood to comprise window sampling boreholes.

Summary and Conclusions

During WWII, the site was situated within the Metropolitan Borough of Hampstead, which was subject to a very high bomb density according to official Home Office bombing statistics. However, no bomb strikes are recorded on site on London bomb census mapping and local Hampstead bomb plot mapping. Although, bombs are recorded in the general vicinity (particularly to the north-west, north and north-east, with an instance of incendiary bombing to the immediate west. LCC bomb damage mapping does not record any damage on site or indeed in the surrounding area. No changes are evident through pre- and post-WWII OS mapping, and no typical signs of damage are present on client provided 1946 aerial imagery.

As such, access and general monitor of the site is anticipated to have been regular due to the structure on site, the lack of damage, and the proximity of additional buildings and roadways. Thus, post-raid checks for evidence of UXO are likely to have taken place. It should be noted, however, that access within residential gardens would have been dependent on the vigilance of the occupant.

Recommendations

Given the findings of this preliminary report, it is recommended that **no further research** be undertaken for this report. Whilst it would be possible to conduct a Detailed UXO Risk Assessment to acquire additional resources such as written bomb incident records, local mapping and high-resolution WWII-era aerial imagery, it is not thought likely that the acquisition of such records would significantly alter the findings of this report.

If the client has any anecdotal or empirical evidence of UXO risk on site, please contact 1st Line Defence.

It should be noted that although the risk from unexploded ordnance on this site has been assessed as low/minimal, this does not mean there is 'no' risk of encountering UXO. This preliminary report has been undertaken with due diligence, and all reasonable care has been taken to access and analyse relevant historical information. By necessity, when dealing historical evidence, and when making assessments of UXO risk, various assumptions have to be made which we have discussed and justified within this report. Our reports take a common-sense and practical approach to the assessment of UXO risk, and we strive to be reasonable and pragmatic in our conclusions. As referenced, it would be possible to undertake further research into this site, but based on the evidence to hand, this is not deemed strictly necessary, and no reasonably justifiable requirement for proactive on-site mitigation has been identified.

It should however be stressed that if any suspect items are encountered during the proposed works, 1st Line Defence should be contacted for advice/assistance, and to re-assess the risk as necessary. Furthermore, we would recommend that ground personnel are always made aware of the potential for encountering UXO, what to look out for and what to do in the unlikely event that a suspect item is encountered, and that a UXO Risk Management Plan is put together for the proposed works. We would be happy to provide a template and guidance for this – contact us on 01992 245020. Should the scope of works change or additional works be proposed, 1st Line Defence should be contacted to re-evaluate the risk.

APPENDIX – PART 2

Ground Movement Assessment

SOIL DISPLACEMENT MODEL RESULTS

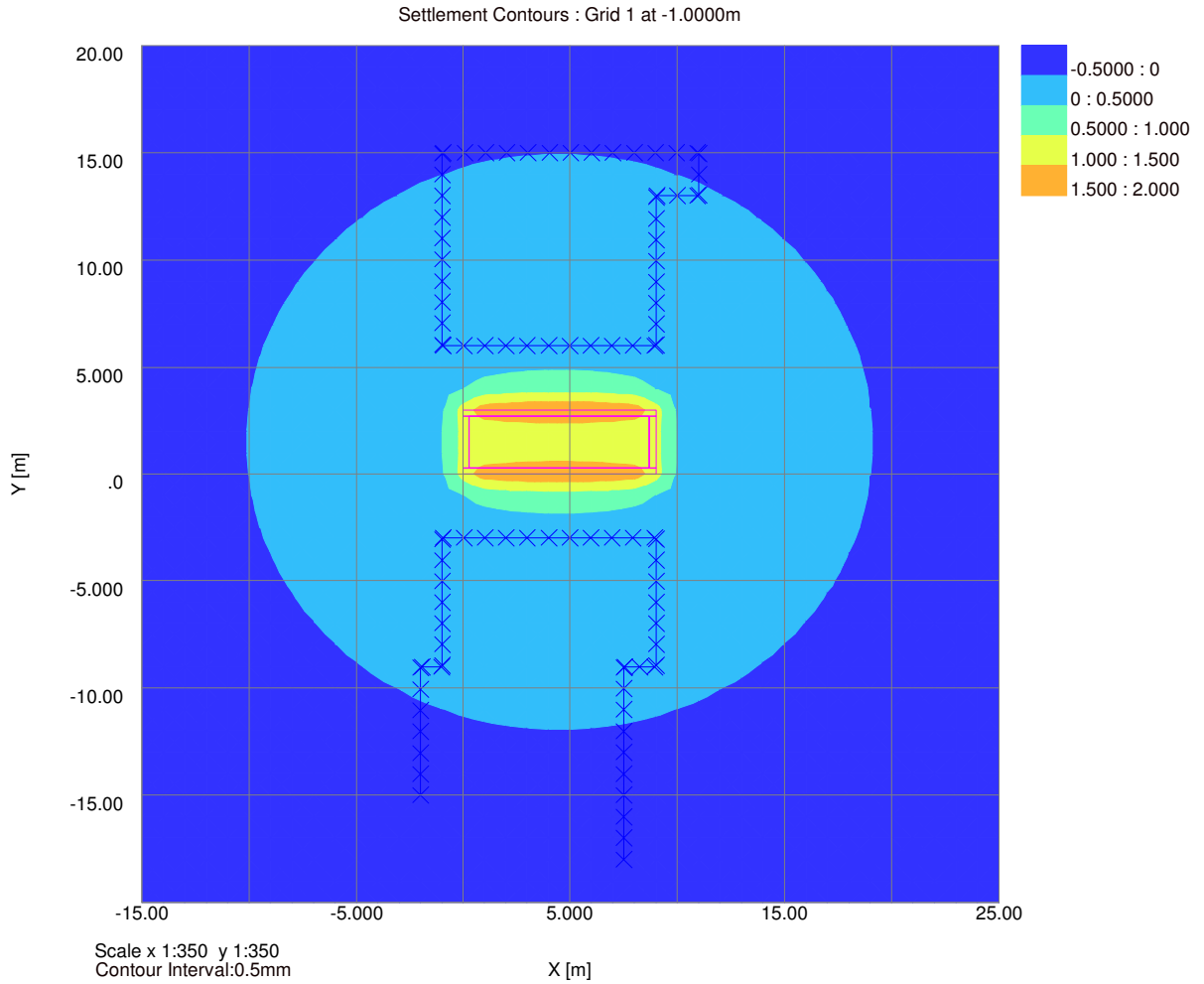
P-DISP ANALYSIS

Short Term Movement
(Contour Plots and Tabular Output)

Total Movement
(Contour Plot and Tabular Output)

BUILDING DAMAGE ASSESSMENT (X-DISP)

Tabular Output of Results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10.00
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Contour Interval:0.5mm

Oasys

GEOTECHNICAL AND ENVIRONMENTALASSOCIATES LTD

40 Ornan Road, London, NW3 4QB

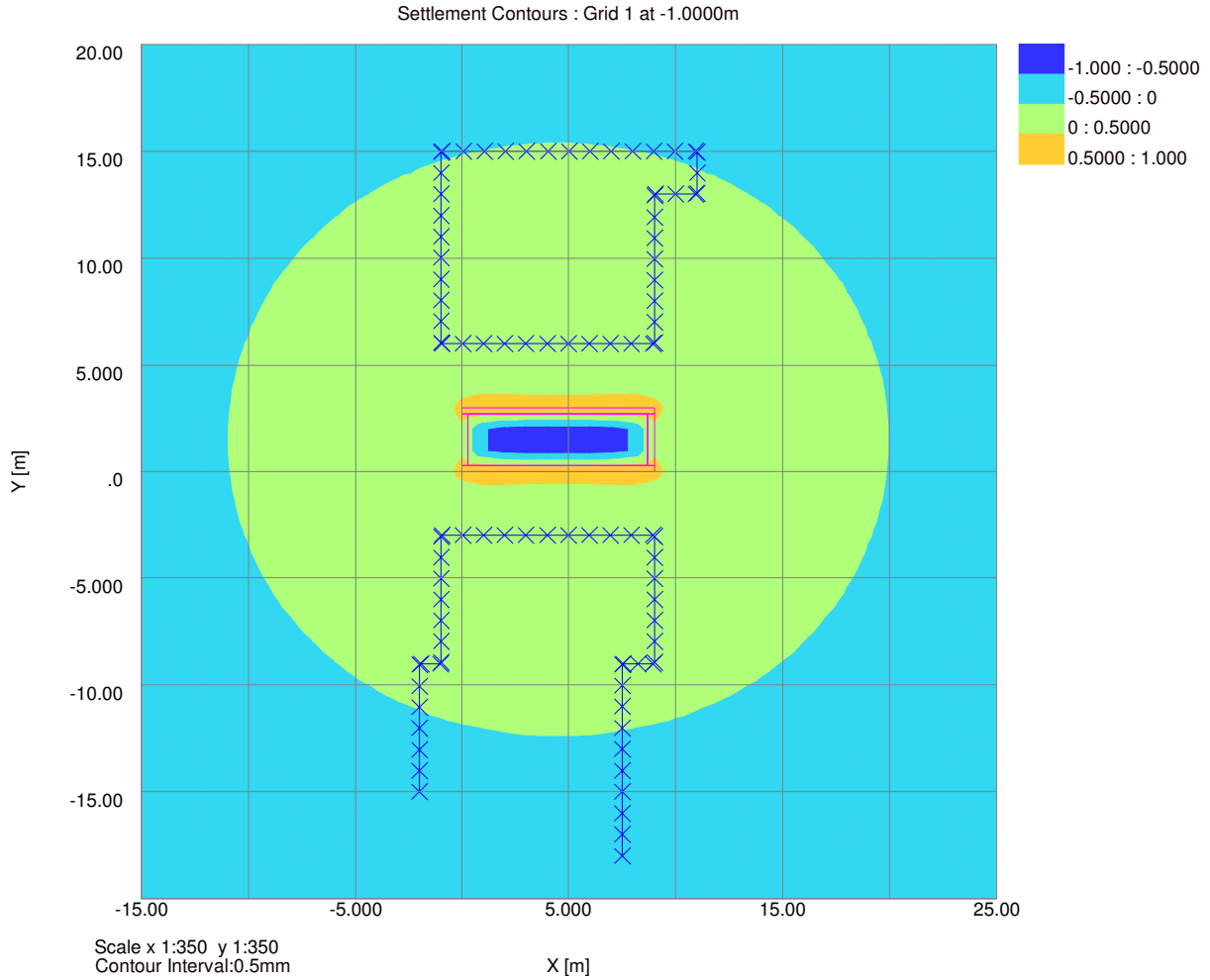
Ground Movement Assessment

Stage 2 - Short-term movements due to underpinning and basement excavation

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP		



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40 Ornan Road, London, NW3 4QB

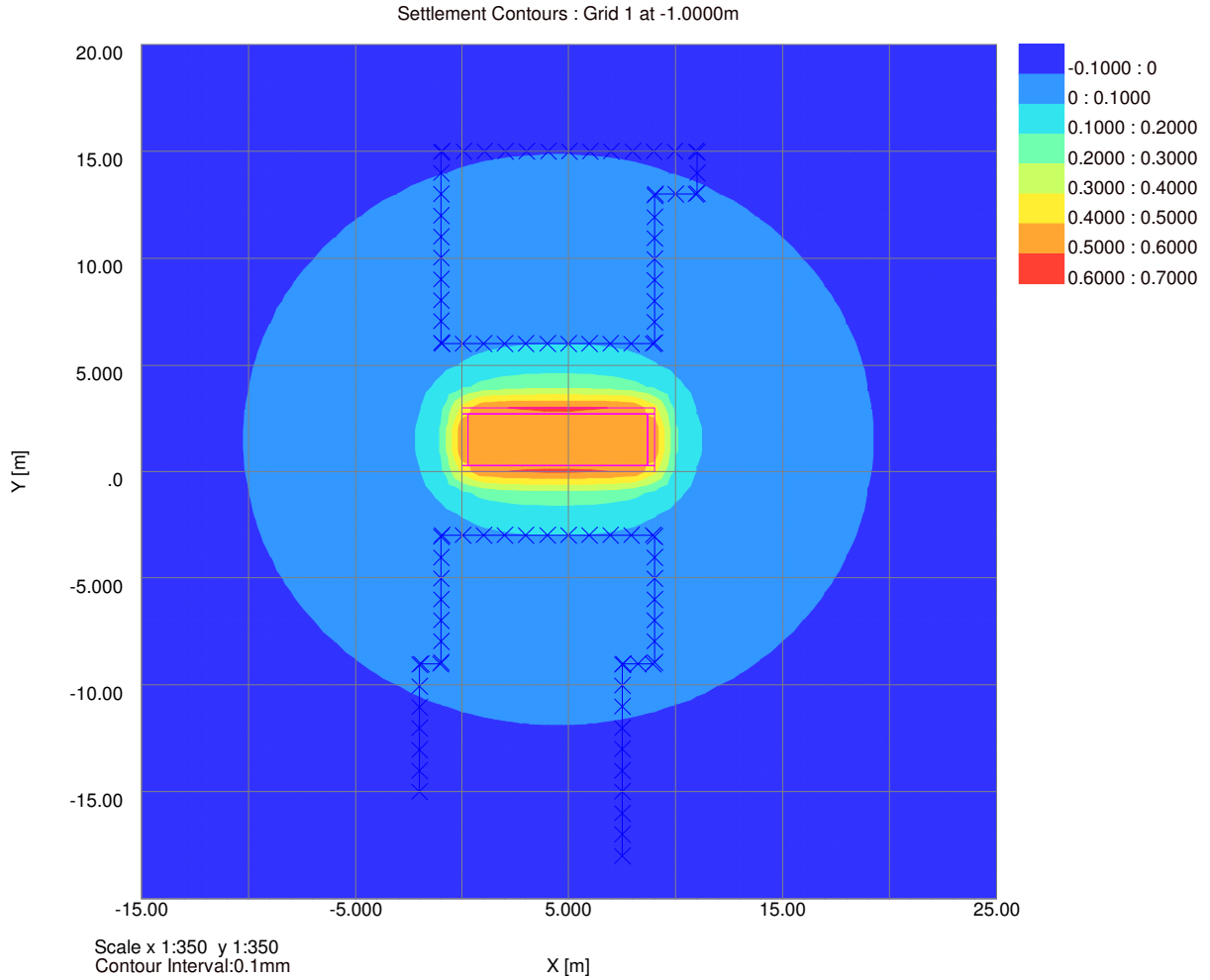
Ground Movement Assessment

Stage 3 - Short-term movements following construction of basement raft

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP		



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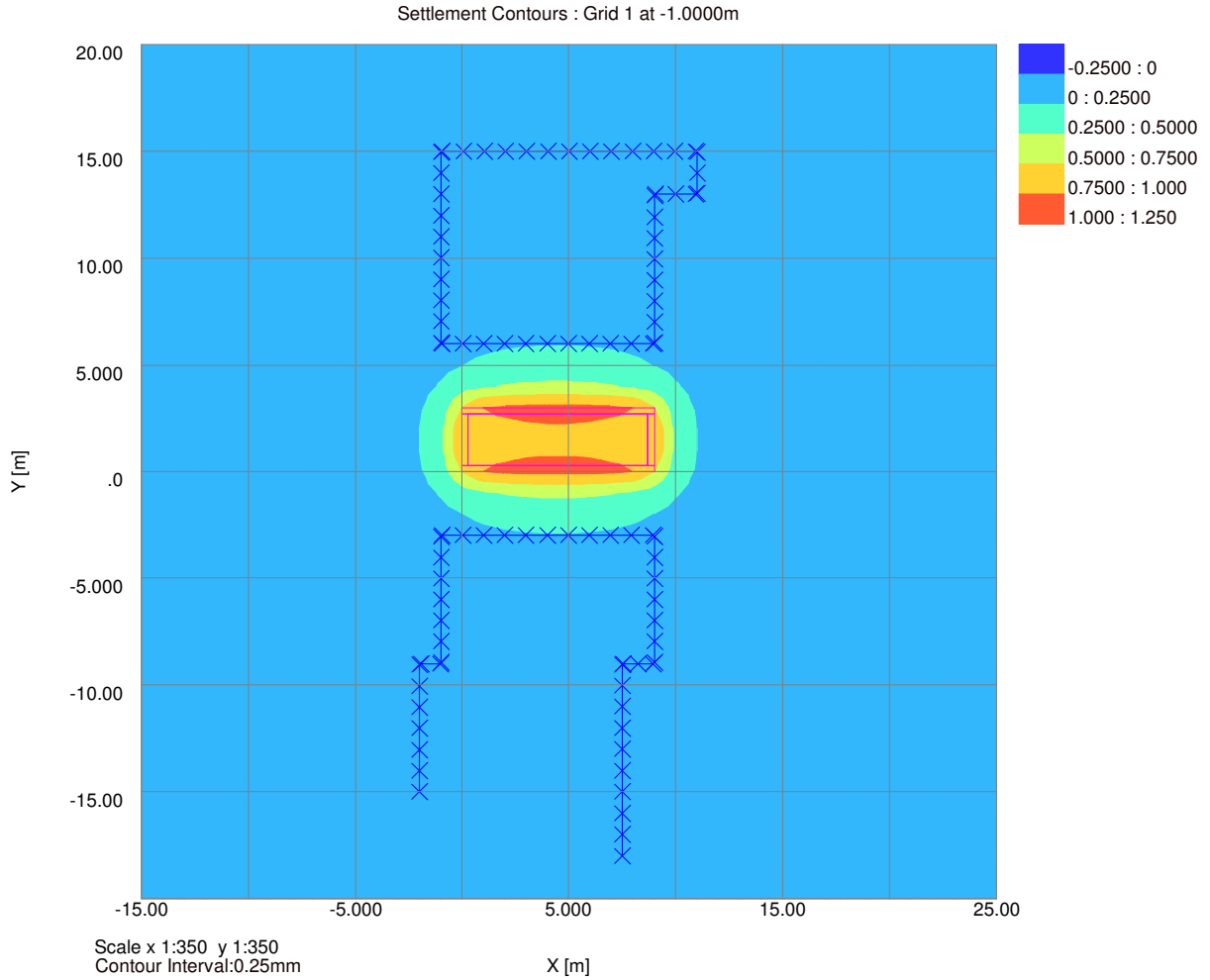
40 Ornan Road, London, NW3 4QB
Ground Movement Assessment
Stage 4 - Total Movements following construction

Job No.	Sheet No.	Rev.
J19259		
Drg. Ref.		
Made by MP	Date	Checked



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GEOTECHNICAL AND ENVIRONMENTALASSOCIATES LTD

40 Ornan Road, London, NW3 4QB

Ground Movement Assessment

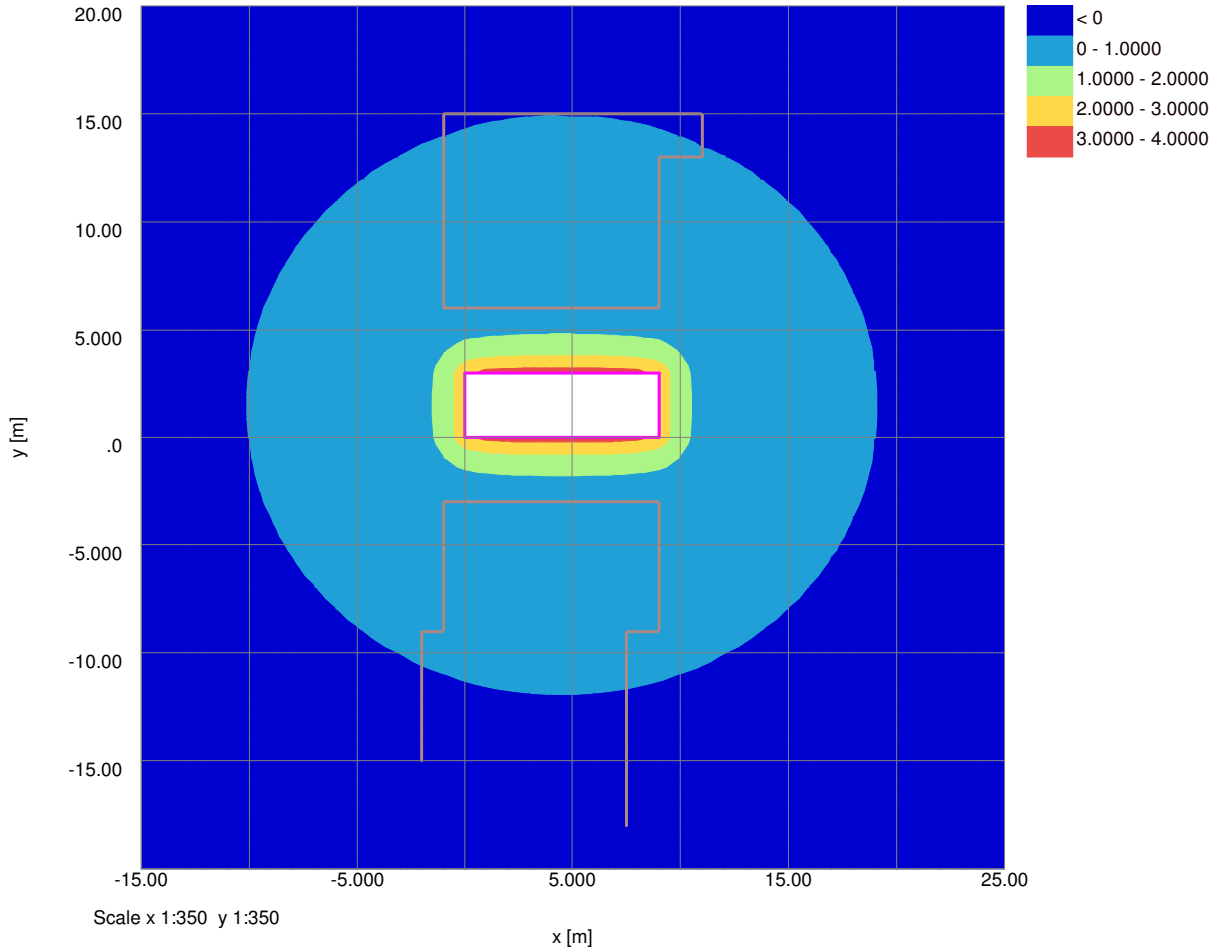
Stage 1 - Short-term movements due to wall installation

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP	15-Nov-2019	

Vertical Settlement Contours: Grid 1 (level -1.000m) (Interval 1mm)



Scale x 1:350 y 1:350

Oasys

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Ground Movement Assessment

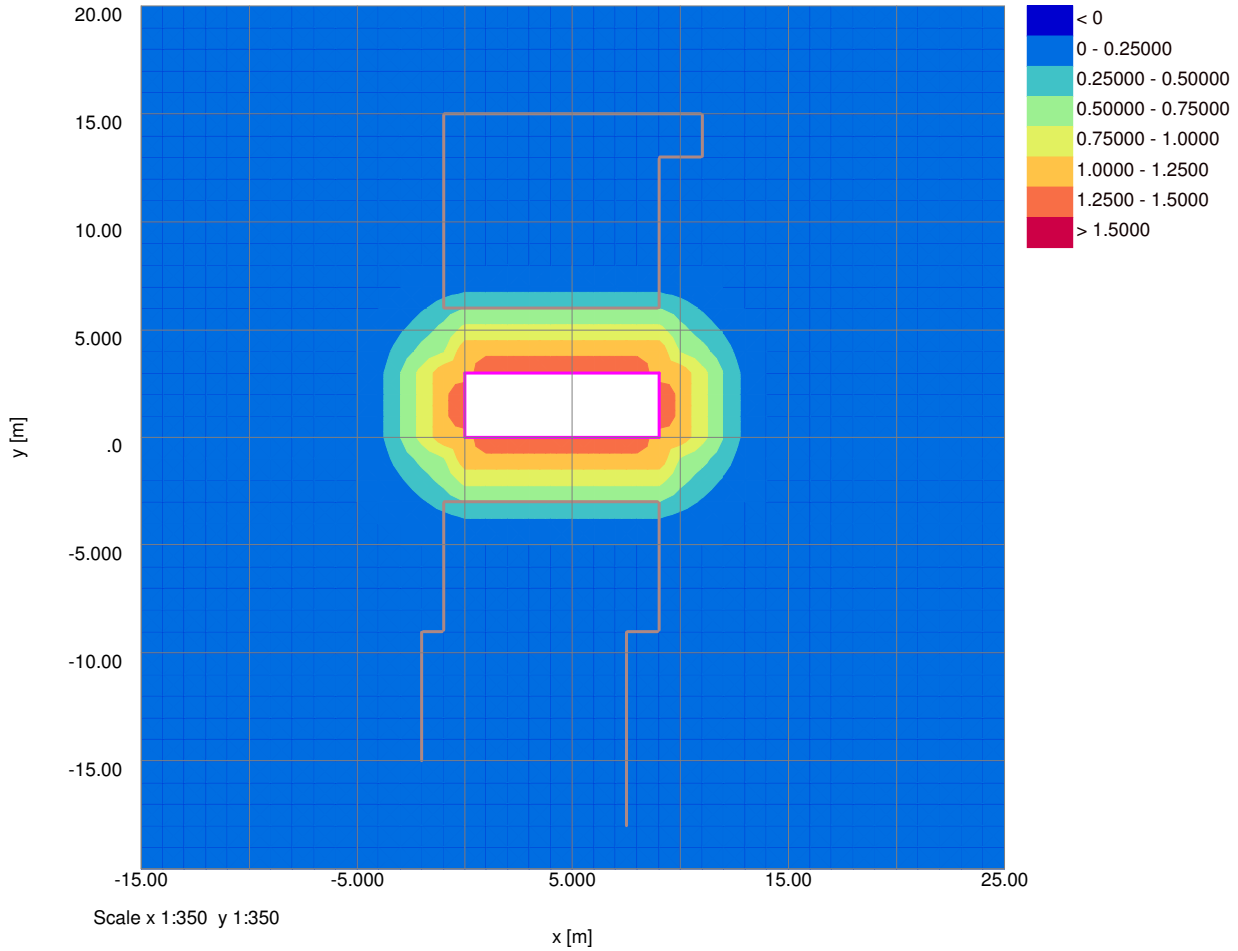
Stage 1 - Short-term movements due to wall installation

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP	15-Nov-2019	

Horizontal Displacement Contours: Grid 1 (level -1.000m) Interval 0.25mm



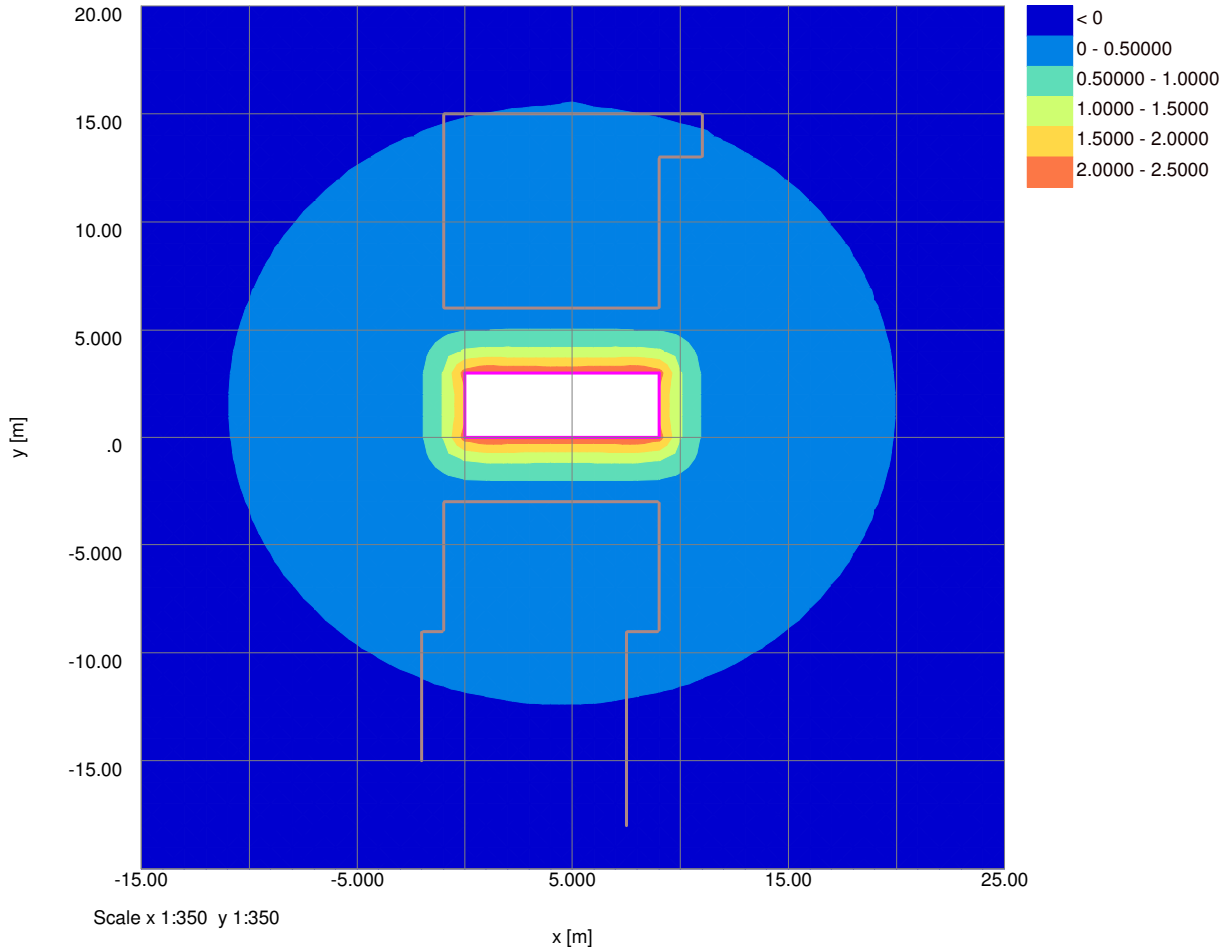
Scale x 1:350 y 1:350

Specific Building Damage Results - Detail

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature [m]	Damage Category
0	Base Model	1	36/38 Ornan Road	A	0.0	1	0.0	2.1541	Sagging	662.57E-6	-0.0040881	904.33E-6	88.960E-6	-63.094E-6	33120. 0	(Negligible)
						2	2.1541	1.6727	Sagging	252.63E-6	0.0	251.59E-6	0.0	-28.910E-6	16067. 0	(Negligible)
						3	3.8268	2.2409	Sagging	0.012827	0.0	0.012730	0.0	-295.59E-6	6547.5 0	(Negligible)
						4	6.0677	1.7189	Sagging	239.80E-6	0.0	238.72E-6	0.0	18.636E-6	16077. 0	(Negligible)
						5	7.7867	2.1123	Sagging	242.22E-6	0.0	240.58E-6	0.0	37.404E-6	102700. 0	(Negligible)
		2	36/38 Ornan Road	B	0.0	1	0.0	0.98571	None	0.0	0.033333	0.033333	-333.22E-6	147.69E-6	10230. 0	(Negligible)
		3	36/38 Ornan Road	C	0.0	All vertical displacements are less than the limit sensitivity.										
		4	36/38 Ornan Road	D	0.0	All vertical displacements are less than the limit sensitivity.										
		5	36/38 Ornan Road	E	0.0	All vertical displacements are less than the limit sensitivity.										
		6	36/38 Ornan Road	F	0.0	1	7.9111	0.98789	None	0.0	0.025054	0.025054	-250.47E-6	-114.56E-6	13059. 0	(Negligible)
		7	17A Belsize Lane	A	0.0	1	0.0	2.1541	Sagging	662.57E-6	-0.0040881	901.47E-6	88.960E-6	-63.094E-6	33120. 0	(Negligible)
						2	2.1541	1.6727	Sagging	252.63E-6	0.0	249.02E-6	0.0	-28.910E-6	16067. 0	(Negligible)
						3	3.8268	2.2409	Sagging	0.012827	0.0	0.012498	0.0	-295.59E-6	6547.5 0	(Negligible)
						4	6.0677	1.7189	Sagging	239.80E-6	0.0	236.14E-6	0.0	18.636E-6	16077. 0	(Negligible)
						5	7.7867	2.1123	Sagging	242.22E-6	0.0	236.71E-6	0.0	37.404E-6	102700. 0	(Negligible)
		8	17A Belsize Lane	B	0.0	1	0.0	2.6708	Hogging	0.0028941	0.018097	0.018939	-333.22E-6	147.82E-6	11275. 0	(Negligible)
						2	2.6708	0.27923	Sagging	0.0	0.0	35.763E-9	0.0	80.880E-6	60593. 0	(Negligible)
		9	17A Belsize Lane	C	0.0	All vertical displacements are less than the limit sensitivity.										
		10	17A Belsize Lane	D	0.0	All vertical displacements are less than the limit sensitivity.										
		11	17A Belsize Lane	E	0.0	All vertical displacements are less than the limit sensitivity.										
		12	17A Belsize Lane	F	0.0	All vertical displacements are less than the limit sensitivity.										
		13	17A Belsize Lane	G	0.0	1	4.9167	0.98233	None	0.0	0.025043	0.025043	-250.37E-6	-114.75E-6	14354. 0	(Negligible)

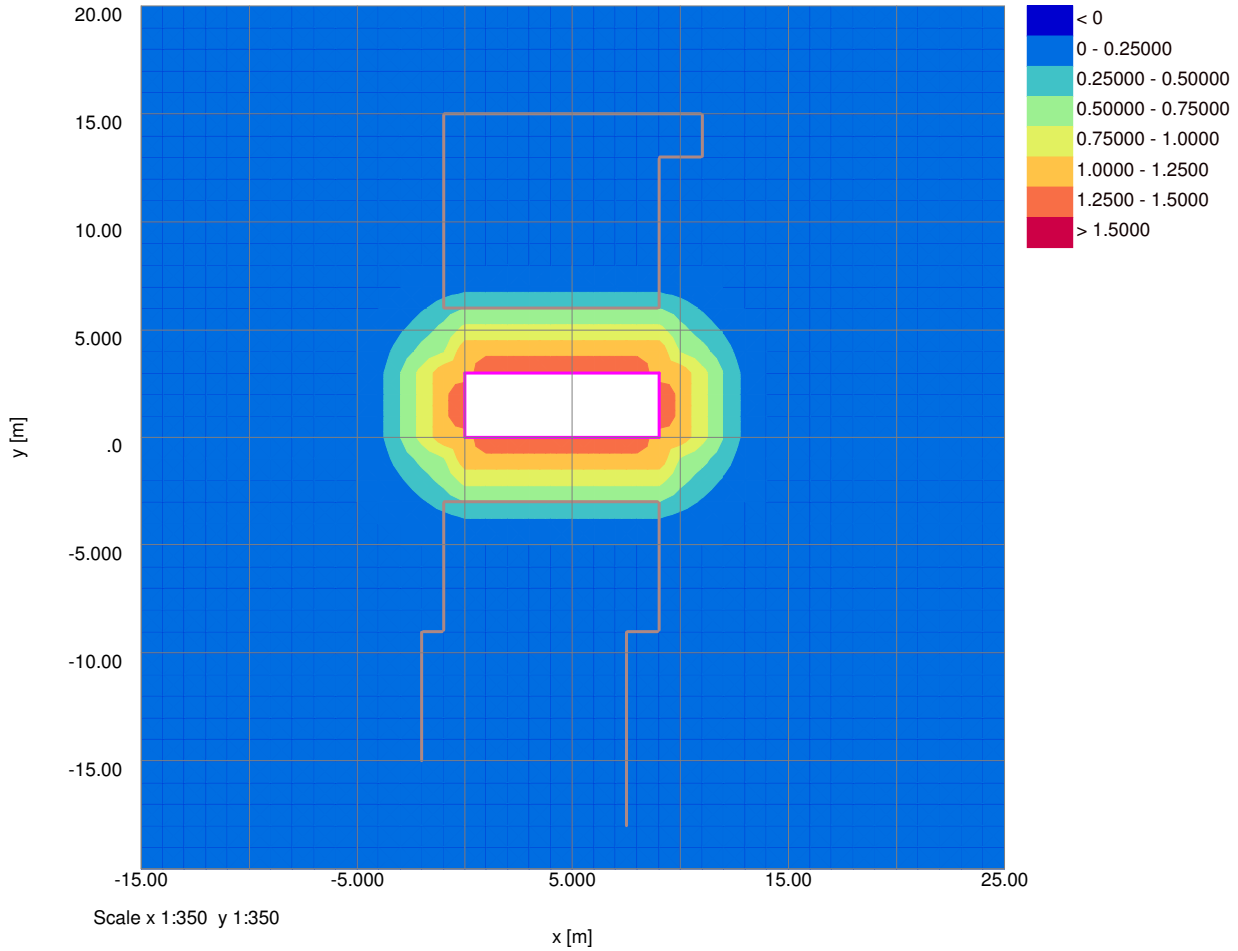
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Vertical Settlement Contours: Grid 1 (level -1.000m) (Interval 0.5mm)



Scale x 1:350 y 1:350

Horizontal Displacement Contours: Grid 1 (level -1.000m) Interval 0.25mm



Specific Building Damage Results - Detail

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature [m]	Damage Category
0	Base Model	1	36/38 Ornan Road	A	0.0	1	0.0	2.3529	Sagging	639.02E-6	-0.0037428	836.24E-6	88.960E-6	-34.010E-6	32505. 0	(Negligible)
						2	2.3529	1.5201	Sagging	72.636E-6	0.0	72.348E-6	0.0	-4.5825E-6	65555. 0	(Negligible)
						3	3.8730	2.0974	Sagging	0.0034077	0.0	0.0033851	0.0	-72.526E-6	27105. 0	(Negligible)
						4	5.9704	1.8037	Sagging	31.008E-6	0.0	30.863E-6	0.0	1.5352E-6	60027. 0	(Negligible)
						5	7.7740	2.1250	Sagging	114.36E-6	0.0	113.62E-6	0.0	8.7607E-6	218900. 0	(Negligible)
		2	36/38 Ornan Road	B	0.0	1	0.0	0.0	None	0.0	0.0	35.763E-9	-333.22E-6	107.83E-6	11830. 0	(Negligible)
		3	36/38 Ornan Road	C	0.0	All vertical displacements are less than the limit sensitivity.										
		4	36/38 Ornan Road	D	0.0	All vertical displacements are less than the limit sensitivity.										
		5	36/38 Ornan Road	E	0.0	All vertical displacements are less than the limit sensitivity.										
		6	36/38 Ornan Road	F	0.0	1	8.8990	0.0	None	0.0	0.0	35.763E-9	-250.47E-6	-85.339E-6	14645. 0	(Negligible)
		7	17A Belsize Lane	A	0.0	1	0.0	2.3529	Sagging	639.02E-6	-0.0037428	832.88E-6	88.960E-6	-34.010E-6	32505. 0	(Negligible)
						2	2.3529	1.5201	Sagging	72.636E-6	0.0	71.776E-6	0.0	-4.5825E-6	65555. 0	(Negligible)
						3	3.8730	2.0974	Sagging	0.0034077	0.0	0.0033311	0.0	-72.526E-6	27105. 0	(Negligible)
						4	5.9704	1.8037	Sagging	31.008E-6	0.0	30.506E-6	0.0	1.5352E-6	60027. 0	(Negligible)
						5	7.7740	2.1250	Sagging	114.36E-6	0.0	111.69E-6	0.0	8.7607E-6	218900. 0	(Negligible)
		8	17A Belsize Lane	B	0.0	1	0.0	0.0	None	0.0	0.0	35.763E-9	-333.22E-6	107.94E-6	12426. 0	(Negligible)
		9	17A Belsize Lane	C	0.0	All vertical displacements are less than the limit sensitivity.										
		10	17A Belsize Lane	D	0.0	All vertical displacements are less than the limit sensitivity.										
		11	17A Belsize Lane	E	0.0	All vertical displacements are less than the limit sensitivity.										
		12	17A Belsize Lane	F	0.0	All vertical displacements are less than the limit sensitivity.										
		13	17A Belsize Lane	G	0.0	1	5.8990	0.0	None	0.0	0.0	35.763E-9	-250.37E-6	-85.506E-6	15433. 0	(Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

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GEOTECHNICAL AND ENVIRONMENTALASSOCIATES LTD

40 Ornan Road, London, NW3 4QB

Ground Movement Assessment

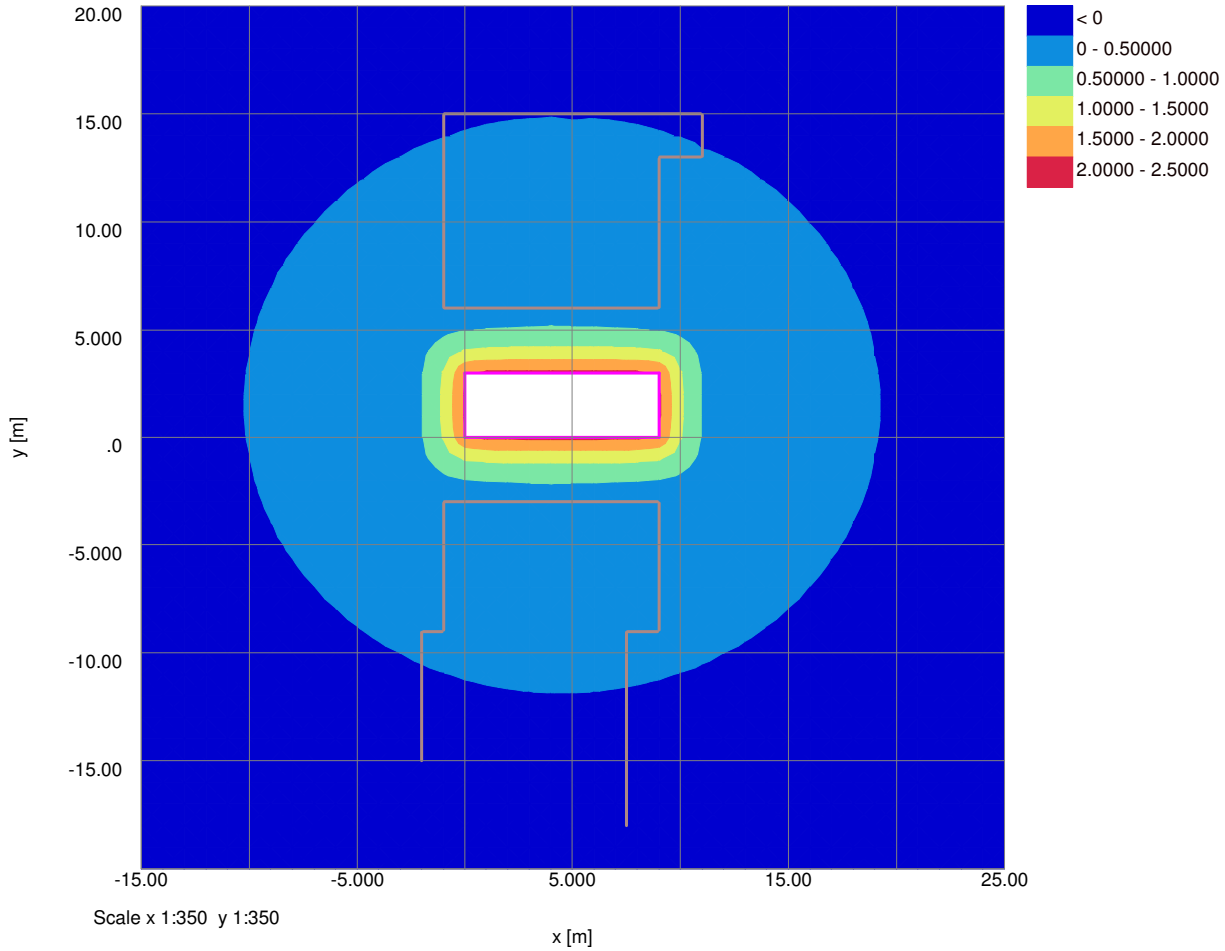
Stage 3 - Short-term movements following completion of constrcution and application of raft bearing pressure

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP	15-Nov-2019	

Vertical Settlement Contours: Grid 1 (level -1.000m) (Interval 0.5mm)



Scale x 1:350 y 1:350

Oasys

GEOTECHNICAL AND ENVIRONMENTALASSOCIATES LTD

40 Ornan Road, London, NW3 4QB

Ground Movement Assessment

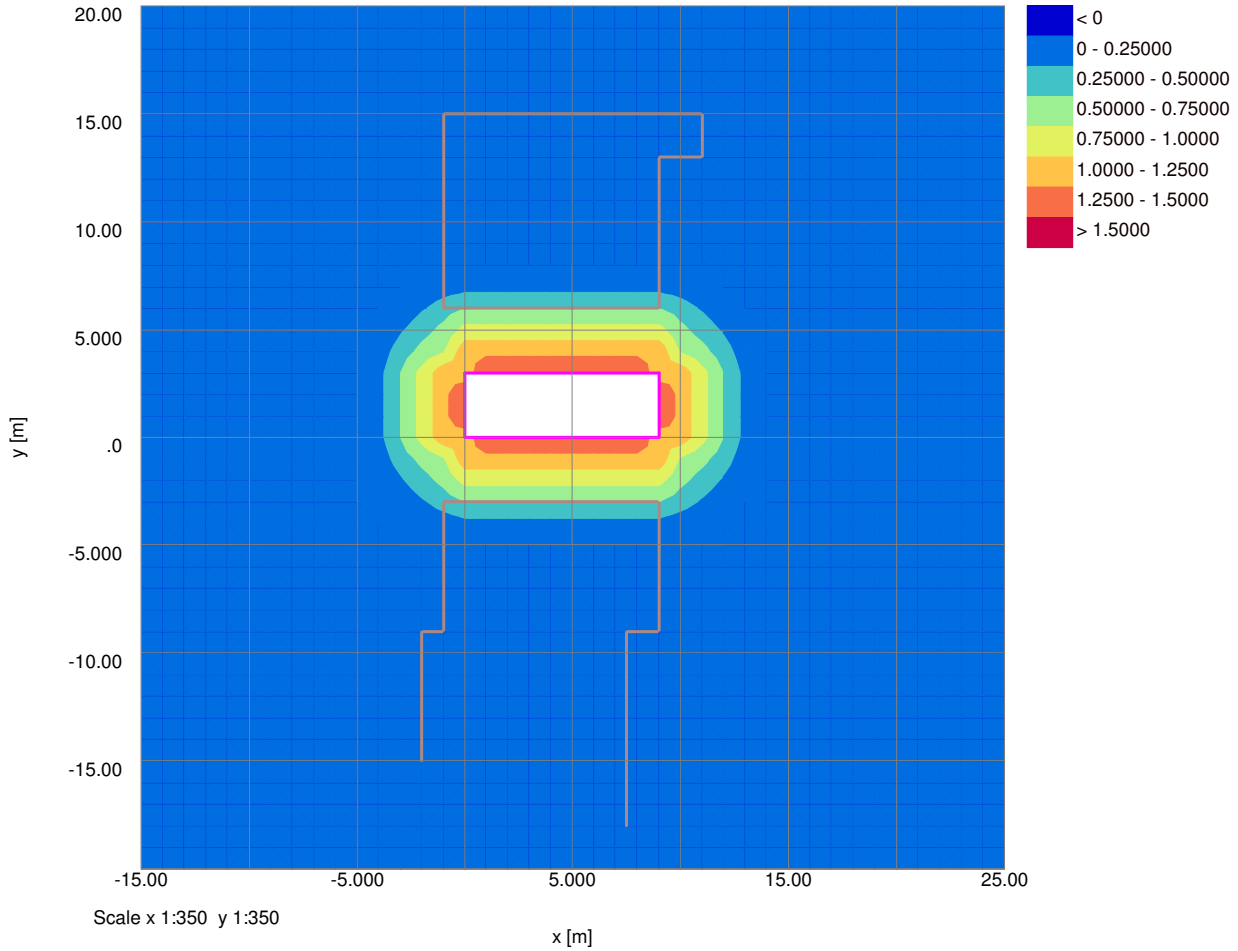
Stage 3 - Short-term movements following completion of constrcution and application of raft bearing pressure

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP	15-Nov-2019	

Horizontal Displacement Contours: Grid 1 (level -1.000m) Interval 0.25mm



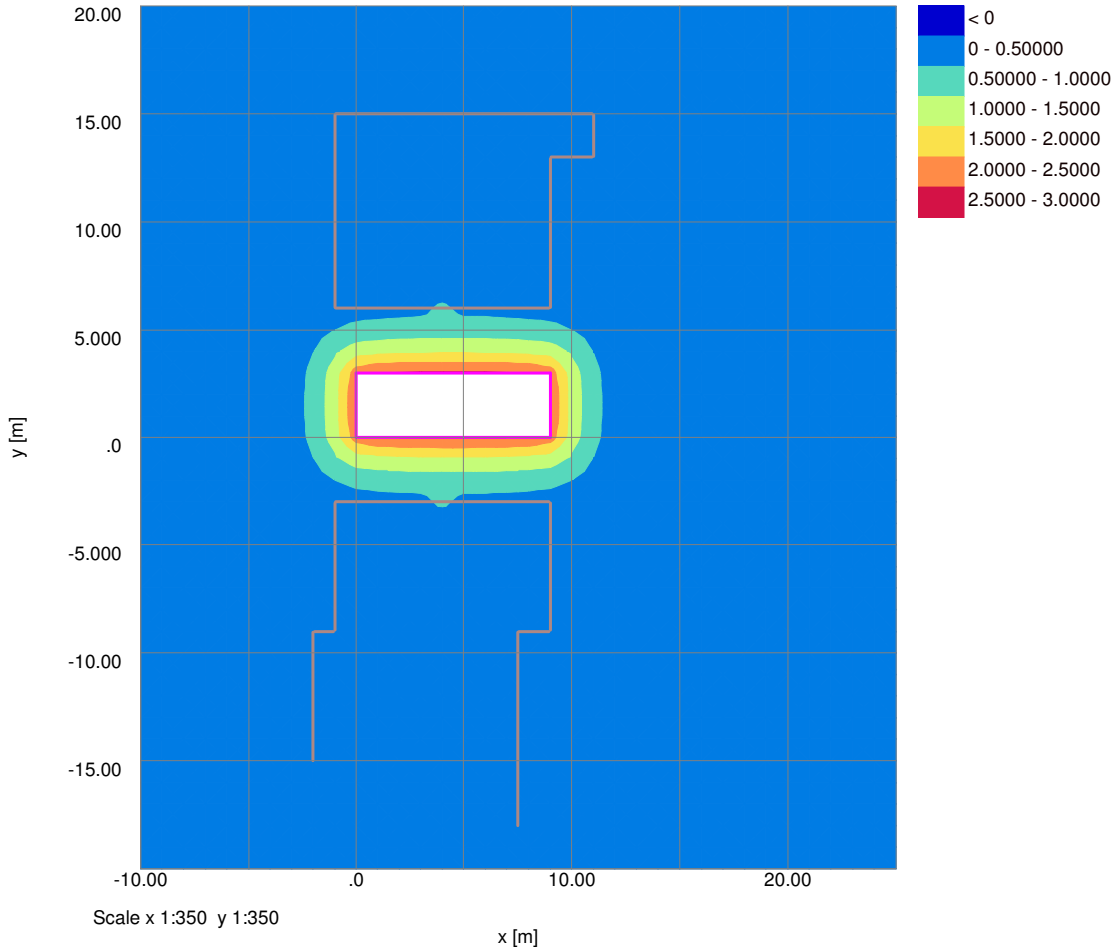
Scale x 1:350 y 1:350

Specific Building Damage Results - Detail

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature [m]	Damage Category
0	Base Model	1	36/38 Ornan Road	A	0.0	1	0.0	2.2538	Sagging	599.51E-6	-0.0039073	855.77E-6	88.960E-6	-36.349E-6	34046. 0	(Negligible)
						2	2.2538	1.5830	Sagging	84.042E-6	0.0	83.721E-6	0.0	-9.3651E-6	45379. 0	(Negligible)
						3	3.8368	2.2185	Sagging	0.0045437	0.0	0.0045100	0.0	-103.47E-6	18733. 0	(Negligible)
						4	6.0553	1.7373	Sagging	77.245E-6	0.0	76.926E-6	0.0	5.9264E-6	45055. 0	(Negligible)
						5	7.7926	2.1064	Sagging	86.486E-6	0.0	85.938E-6	0.0	12.441E-6	304150. 0	(Negligible)
		2	36/38 Ornan Road	B	0.0	1	0.0	0.0	None	0.0	0.0	35.763E-9	-333.22E-6	109.81E-6	11949. 0	(Negligible)
		3	36/38 Ornan Road	C	0.0	All vertical displacements are less than the limit sensitivity.										
		4	36/38 Ornan Road	D	0.0	All vertical displacements are less than the limit sensitivity.										
		5	36/38 Ornan Road	E	0.0	All vertical displacements are less than the limit sensitivity.										
		6	36/38 Ornan Road	F	0.0	1	8.8990	0.0	None	0.0	0.0	35.763E-9	-250.47E-6	-87.177E-6	14723. 0	(Negligible)
		7	17A Belsize Lane	A	0.0	1	0.0	2.2538	Sagging	599.51E-6	-0.0039073	853.12E-6	88.960E-6	-36.349E-6	34046. 0	(Negligible)
						2	2.2538	1.5830	Sagging	84.042E-6	0.0	82.934E-6	0.0	-9.3651E-6	45379. 0	(Negligible)
						3	3.8368	2.2185	Sagging	0.0045437	0.0	0.0044296	0.0	-103.47E-6	18733. 0	(Negligible)
						4	6.0553	1.7373	Sagging	77.245E-6	0.0	76.067E-6	0.0	5.9264E-6	45055. 0	(Negligible)
						5	7.7926	2.1064	Sagging	86.486E-6	0.0	84.507E-6	0.0	12.441E-6	304150. 0	(Negligible)
		8	17A Belsize Lane	B	0.0	1	0.0	0.0	None	0.0	0.0	35.763E-9	-333.22E-6	109.92E-6	12800. 0	(Negligible)
		9	17A Belsize Lane	C	0.0	All vertical displacements are less than the limit sensitivity.										
		10	17A Belsize Lane	D	0.0	All vertical displacements are less than the limit sensitivity.										
		11	17A Belsize Lane	E	0.0	All vertical displacements are less than the limit sensitivity.										
		12	17A Belsize Lane	F	0.0	All vertical displacements are less than the limit sensitivity.										
		13	17A Belsize Lane	G	0.0	1	5.8990	0.0	None	0.0	0.0	35.763E-9	-250.37E-6	-87.343E-6	15812. 0	(Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Vertical Settlement Contours: Grid 1 (level -1.000m) (Interval 0.5mm)



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GEOTECHNICAL AND ENVIRONMENTALASSOCIATES LTD

40 Ornan Road, London, NW3 4QB

Ground Movement Assessment

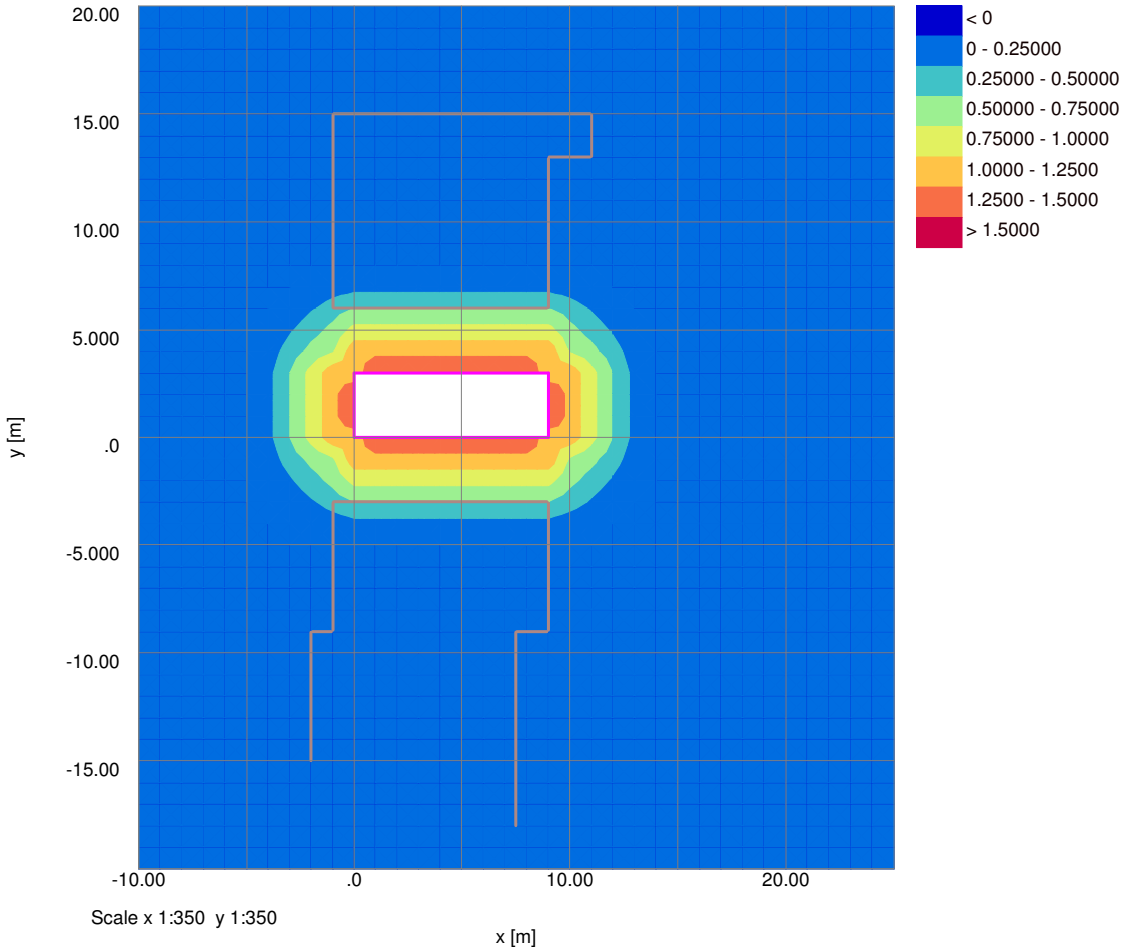
Stage 4 - Total movements following completion of construction and application of raft bearing pressure

Job No.	Sheet No.	Rev.
J19259		

Drg. Ref.

Made by	Date	Checked
MP	15-Nov-2019	

Horizontal Displacement Contours: Grid 1 (level -1.000m) Interval 0.25mm



Specific Building Damage Results - Detail

Stage: Ref.	Stage: Name	Specific Building: Ref.	Specific Building: Name	Sub-building Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max Tensile Strain [%]	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature [m]	Damage Category
0	Base Model	1	36/38 Ornan Road	A	0.0	1	0.0	2.1512	Sagging	652.87E-6	-0.0040936	902.83E-6	88.960E-6	-51.309E-6	32583. 0	(Negligible)
						2	2.1512	1.7024	Sagging	172.38E-6	0.0	171.63E-6	0.0	-19.481E-6	18521. 0	(Negligible)
						3	3.8537	2.1872	Sagging	0.011045	0.0	0.010965	0.0	-248.14E-6	7847.1 0	(Negligible)
						4	6.0409	1.7704	Sagging	160.76E-6	0.0	159.97E-6	0.0	12.455E-6	18423. 0	(Negligible)
						5	7.8113	2.0877	Sagging	173.61E-6	0.0	172.48E-6	0.0	25.697E-6	148580. 0	(Negligible)
		2	36/38 Ornan Road	B	0.0	1	0.0	0.98571	Hogging	0.0	0.033333	0.033333	-333.22E-6	132.28E-6	11025. 0	(Negligible)
		3	36/38 Ornan Road	C	0.0	All vertical displacements are less than the limit sensitivity.										
		4	36/38 Ornan Road	D	0.0	All vertical displacements are less than the limit sensitivity.										
		5	36/38 Ornan Road	E	0.0	All vertical displacements are less than the limit sensitivity.										
		6	36/38 Ornan Road	F	0.0	1	7.9111	0.98789	None	0.0	0.025054	0.025054	-250.47E-6	-104.52E-6	13783. 0	(Negligible)
		7	17A Belsize Lane	A	0.0	1	0.0	2.1512	Sagging	652.87E-6	-0.0040936	900.11E-6	88.960E-6	-51.309E-6	32583. 0	(Negligible)
						2	2.1512	1.7024	Sagging	172.38E-6	0.0	169.77E-6	0.0	-19.481E-6	18521. 0	(Negligible)
						3	3.8537	2.1872	Sagging	0.011045	0.0	0.010775	0.0	-248.14E-6	7847.1 0	(Negligible)
						4	6.0409	1.7704	Sagging	160.76E-6	0.0	158.18E-6	0.0	12.455E-6	18423. 0	(Negligible)
						5	7.8113	2.0877	Sagging	173.61E-6	0.0	169.77E-6	0.0	25.697E-6	148580. 0	(Negligible)
		8	17A Belsize Lane	B	0.0	1	0.0	2.5318	Hogging	0.0028070	0.019090	0.019865	-333.22E-6	132.40E-6	11450. 0	(Negligible)
						2	2.5318	0.41816	None	0.0	0.0	35.763E-9	0.0	95.088E-6	35923. 0	(Negligible)
		9	17A Belsize Lane	C	0.0	All vertical displacements are less than the limit sensitivity.										
		10	17A Belsize Lane	D	0.0	All vertical displacements are less than the limit sensitivity.										
		11	17A Belsize Lane	E	0.0	All vertical displacements are less than the limit sensitivity.										
		12	17A Belsize Lane	F	0.0	All vertical displacements are less than the limit sensitivity.										
		13	17A Belsize Lane	G	0.0	1	2.9500	0.46745	Hogging	0.0	0.0	35.763E-9	0.0	-84.204E-6	37820. 0	(Negligible)
						2	3.4174	2.4816	Hogging	0.0022530	0.013825	0.014435	-250.37E-6	-104.70E-6	14058. 0	(Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Geotechnical & Environmental Associates (GEA) is an engineer-led and client-focused independent specialist providing a complete range of geotechnical and contaminated land investigation, analytical and consultancy services to the property and construction industries.

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