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Cover Pages

Project	NOMA Marketing Suite
Subject	NOMA Marketing Suite – Use of 2&3 Angel Square Planning Documents
Project no	043434
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00	For planning	PH	19/2/21	PH

1.1 Introduction

Buro Happold have been appointed by MEPC to provide technical planning support and advice for the proposed NOMA Marketing Suite (NMS). The site is located in the southwestern corner of the wider 2&3 Angel Square site (Figure 1 refers). The proposed development comprises a new build single storey building with associated infrastructure leading to the existing Miller Street Car Park.



Figure 1: Extract of Simpson Haugh drawing 10341-Z1-A-B5D8-G100-XP-XX-001 with NMS boundary (red) & 2&3 Angel Square boundary (blue).

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1.2 Existing Desk Study Report

The 2&3 Angel Square Ground Engineering Desk Study (2&3 AS DS) report has been submitted as part of the planning application for the NMS for the following reasons:

- The 2&3 AS DS report was completed in 2019. The document is considered to be valid and suitable for use within the timeframes of acceptability for submission in this planning application for Manchester City Council.
- The NMS site boundary is entirely within the wider 2&3 Angel Square site boundary. Therefore the 2&3 AS DS report covers the area of land within this application.
- There have been no major changes to the site or the immediate vicinity since the 2&3 AS DS was completed, therefore:
    - The site history (Section 3.4) covers the NMS site boundary & remains the same
    - The ground conditions (Section 4) and preliminary conceptual model (Section 7) beneath the site remain the same
    - The potential sources of contaminants (Section 7.2), receptors & pathways (Section 7.3) and risk assessment (Section 7.4 & Table 7-3) within the report remain the same.

1.3 Conclusion

The 2&3 AS DS is suitable for submission within the planning application for the NMS.

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NOMA, 2&3 Angel Square

Ground Engineering Desk Study Report

043434

4 September 2019

Revision 00

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Revision	Description	Issued by	Date	Checked
00	Ground Engineering Desk Study Report	LR	04/09/19	PH

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date	**04 September 2019**

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1 Executive Summary

Buro Happold Limited were appointed by NOMA (GP) Ltd to undertake a Phase I Desk Study to provide an initial assessment of the likely ground conditions specific to the proposed development at for 2 & 3 Angel Square Plots (M & N) within the NOMA Masterplan, Manchester. The site area is currently occupied by public car parking areas, managed by RCP Parking Ltd, with the main access from Angel Street. The immediate surrounding area comprises urban development including residential, warehouses, offices and manufacturing facilities.

The Proposed Development involves the redevelopment of plots M and N of the adopted NOMA Masterplan (to be known as 2&3 Angel Square) to deliver office-led development (Use Class B1a), with ground floor retail and commercial units, external terraces at upper levels, car parking and cycle facilities. The Proposed Development will comprise two buildings, one of lower and upper ground plus 10 storeys (2 Angel Square) and one of lower and upper ground plus 11 storeys (3 Angel Square) and will also include a comprehensive public realm scheme with hard and soft landscaping, access and highways and other associated works.

Reviews of historical maps indicate that the proposed development site has undergone a rich industrial history including the remains of cotton mills and associated reservoirs (Arkwright's Mill (Shudehill Mill), an iron foundry, a saw mill and timber yard, a brewery, a public baths and wash house, public houses, shops and housing of various types.. The past and present uses of the site and its surroundings indicates the potential for a variety of contaminants to be present.

During 2014, Arkwright's Mill was subject to an intrusive archaeological excavation by Oxford Archaeology North which comprised an evaluated excavation of the majority of the main footprint of the building as well as the Engine House. Full and detailed photographic records were taken as well as surveying to Ordnance Datum with the remains left insitu. The study concluded that the site is 'of considerable archaeological and historical significance on a regional level', however the 'overall group value is reduced by extensive loss of the component buildings and infrastructure' over the years that followed its use. Reference to the findings of this study should be made in conjunction with this report. Please note, the Greater Manchester Archaeological Advisory Service (GMAAS) should be consulted to advise if any further archaeological excavations are required.

A scheme specific intrusive ground investigation has been undertaken which comprised a number of exploratory holes to determine the depth and properties of any Made Ground, superficial deposits and the bedrock; soil, rock and groundwater sampling and testing, monitoring of ground gas and groundwater and assessment of contamination risk specific to the development and current guidelines. The ground conditions comprise a variable depth of Made Ground, overlying superficial deposits (Glacial Till – sand, gravel and clay), underlain by the Chester Formation (Sherwood Sandstone Group). The Sherwood Sandstone Group is classified as a 'Principal Aquifer' (formerly a 'Major Aquifer').

The ground gas concentrations and flow rates obtained from the installations (SSL GI 2009 for 1 Angel Square and the SSL 2013 GI for Angel Gardens) have been assessed against the classification scheme presented in CIRIA C665 with results classifying the ground gas regime and any associated ground gas protection requirements as Characteristic Situation 1. Given the environmental setting of the Site and based on the historical information available, ground gas is not considered to be a risk at this stage.

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The Preliminary Contamination Risk Assessment has identified that there are potential active pollutant linkages at the site which may require mitigation/remediation prior to occupation of the site.

The Zetica Unexploded Bomb Risk Map shows the Site to be in an area of 'Moderate' risk. It is known that Arkwrights Mill on/adjacent to the western site boundary was bombed in 1940 during the 'Manchester Blitz' and post-war historical maps show a number of 'Ruins' on site and immediately to the east. In addition these maps do not record many buildings which were recorded on site pre-war (World War II). UXO risk mitigation is likely to be required during any intrusive works.

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2 Introduction

BuroHappold Engineering has been appointed by NOMA (GP) Ltd to undertake site investigation works for the proposed development of two new build office developments on 2&3 Angel Square (Plots M and N) within the NOMA Masterplan. Please note, for the purposes of this Desk Study report, 2&3 Angel Square have been evaluated as one proposed development site herein referred to as 'the Site'.

The Site is located to the north of Manchester City Centre and approximately 220 m east of Manchester Victoria Railway Station. It is also in the immediate vicinity of the existing Co-operative Insurance Society (CIS) Tower which lies just beyond the corner of the western boundary. The site area is currently occupied by public car parking areas, managed by RCP Parking Ltd, with the main access from Angel Street. The immediate surrounding area comprises urban development including residential, warehouses, offices and manufacturing facilities. A site location plan is included as Figure 1 and an aerial photograph is included as Figure 2.

The Proposed Development involves the redevelopment of plots M and N of the adopted NOMA Masterplan (to be known as 2&3 Angel Square) to deliver office-led development (Use Class B1a), with ground floor retail and commercial units, external terraces at upper levels, car parking and cycle facilities. The Proposed Development will comprise two buildings, one of lower and upper ground plus 10 storeys (2 Angel Square) and one of lower and upper ground plus 11 storeys (3 Angel Square). The Proposed Development will include a comprehensive public realm scheme with hard and soft landscaping, access and highways, and other associated works.

The redevelopment options for the area surrounding the site are also being considered as part of a masterplanning exercise for NOMA, but this is outside the scope of this study. The old masterplan area with the Site positioned for overall context is presented in Figure 3. An architect's impression of the proposed development and associated layout is included as Appendix A.

A desk study has been undertaken to allow an appropriate ground investigation to be designed and to optimize, as far as possible, the positioning of the exploratory holes. The purpose of this report is to collate and summarize the information for the Site and immediate surrounding area, including:

- The general physical constraints of the Site such as topography, landscape and existing structures;
- An assessment of the generalized past and present usage of the Site;
- An assessment of the anticipated ground conditions in respect of geology, hydrology, hydrogeology, mining activity and geohazards, if any;
- An assessment of the environmental setting of the Site, including the possibility of encountering ground gas as well as potentially contaminating substances; and
- A summary of current development proposals.

The principal source of information relied upon is a Groundsure® Report[1], which provides a database of information within a 1 km radius of the site as supplied by different statutory authorities and other relevant bodies.

[1] Groundsure Report Order Number GS-6225239 (August 2019) NOMA 2&3 Angel Square.

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A summary of all the information sources used in this report is included as Appendix B. Other references typically include:

- Wessex Archaeology Report[2] entitled *'Arkwright's Mill, NCP Car Park, Miller Street, Manchester'* (Report No. 59471.01), dated April 2006, on behalf of Videotext Communications Limited;
- Gifford Report[3] *entitled 'Land off Miller Street, Manchester: An Archaeological Desk-Based Assessment'* (Report No. 14039.R01), dated May 2007, on behalf of The Cooperative Group Limited;
- EOD Contracts Limited Report[4] Entitled *'Explosive Ordnance Desk Top Study, Miller Street Manchester for the Co-operative Group'* (Ref: No: ECL/09/10360/DTS/MillerStManchester/Rev2), dated March 2009, on behalf of The Co-operative Group Limited;
- Buro Happold Report[5] entitled *'Ground Engineering Desk Study Report – The Co-Operative Group HQ Building, Manchester'* (Ref: 023842), dated July 2009, on behalf of The Co-operative Group Limited;
- Structural Soils Report[6] entitled *'Report on Ground Investigation at the co-operative Head Office, Manchester'* (ref: 761072), dated September 2009, on behalf of The Co-operative Group Limited;
- Buro Happold Report[7] entitled *'Ground Engineering Interpretative Report – The Co-Operative Group Head Office, Manchester'* (Ref: 023842), dated October 2009, on behalf of The Co-operative Group Limited;
- Buro Happold Report entitled *'Ground Engineering Desk Study Report – NOMA Plot L, Manchester'* (Ref: 032922), dated November 2013, on behalf of The Co-operative Group Limited;
- Buro Happold Report entitled *'Ground Engineering Interpretative Report – NOMA Plot L, Manchester'* (Ref: 023922), dated November 2013, on behalf of The Co-operative Group Limited;
- Structural Soils Report[8] entitled *'Factual Report on Ground Investigation at NOMA Plot L, Manchester'* (ref: 762850), dated January 2014, on behalf of The Co-operative Group Limited;
- Oxford Archaeology North Report[9] entitled *'NOMA Regeneration, Miller Street, Manchester'* (Report No. L10460), dated February 2013, on behalf of The Co-operative Group Limited;
- Oxford Archaeology North Report[10] *entitled 'NOMA Plot L, Miller Street, Manchester – Archaeological Evaluation'* (Report No. L10761), dated July 2014, on behalf of NOMA Plot L Limited;
- Oxford Archaeology North Report[11] entitled *'NOMA Plot L, Angel Square, Miller Street, Manchester – Archaeological Desk-based Assessment'* (Report No. L10812), dated December 2014, on behalf of Moda Living;

[2] Wessex Archaeology, Report No. 59471.01 'Arkwright's Mill, NCP Car Park, Miller Street, Manchester', April 2006.
[3] Gifford, Report No. 14039.R01 'Land off Miller Street, Manchester: An Archaeological Desk-Based Assessment'. May 2007.
[4] EOD Contracts Limited, Report No: ECL/09/10360/DTS/MillerStManchester/Rev2 'Explosive Ordnance Desk Top Study, Miller Street Manchester for the Co-operative Group'. March 2009.
[5] Buro Happold Report No. 023842 'Ground Engineering Desk Study Report – The Co-Operative Group HQ Building, Manchester'. July 2009.
[6] Structural Soils Report No. 761072 'Report on Ground Investigation at the co-operative Head Office, Manchester'. September 2009.
[7] Buro Happold Report No. 023842 'Ground Engineering Interpretative Report – The Co-Operative Group Head Office, Manchester'. October 2009.
[8] Structural Soils Report No. 762850 'Factual Report on Ground Investigation at NOMA Plot L, Manchester'. January 2014.
[9] Oxford Archaeology Report No. L10460 'NOMA Regeneration, Miller Street, Manchester'. February 2014.
[10] Oxford Archaeology Report No. L10761 'NOMA Plot L, Miller Street, Manchester'. July 2014.
[11] Oxford Archaeology Report No. L10812 'NOMA Plot L, Angel Square, Miller Street, Manchester'. December 2014.

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- Oxford Archaeology North Report[12] entitled *'NOMA Plot M, Miller Street, Manchester – Archaeological Desk-based Assessment'* (Report No. L10755), dated June 2014, on behalf of NOMA;
- Oxford Archaeology North Report[13] entitled *'Arkwright's Shudehill Mill, Miller Street, Manchester – Archaeological Assessment'* (Report No. L10772), dated September 2014, on behalf of NOMA;
- Oxford Archaeology North Report[14] entitled *'Shudehill Mill, Miller Street, Manchester – Archaeological Excavation, Written Scheme of Investigation'*, dated January 2015, on behalf of NOMA & Moda Living;
- Sanctus Report[15] entitled *'Angel Square – Site Investigation Report'* (Report No. S1933-001), dated May 2015, on behalf of NOMA;
- Sanctus Limited report[16] entitled 'Contract Completion Report, Angel Square, Manchester' (Report No. S1918), dated June 2015, on behalf of NOMA;
- Buro Happold Report[17] entitled *'Ground Engineering Desk Study Report – 2&3 Angel Square, Manchester'* (Ref: 033536), dated June 2015, on behalf of NOMA;
- Structural Soils Limited Report[18] entitled 'Factual Report on Ground Investigation – *2&3 Angel Square, Manchester* (Ref: 763315 Rev 2 Final), dated July 2015, prepared on behalf of the Co-operative Group Limited;
- Sanctus testing[19] – 6 No. samples SS1 - SS4, EMB1 - EMB2: plan and chemical results only, dated September/October 2015, on behalf of Turner & Townsend Limited;
- W.Maher testing[20] - 6 No. samples Stockpile 1 – Stockpile 4, Embankment 1 – Embankment 2: plan and chemical results only, dated October/November 2015, on behalf of Turner & Townsend Limited;
- Churchill Enviro Limited report[21] entitled '*Validation Report For Works Carried Out By W Maher and Sons At Angel Gardens, Manchester',* dated March 2016, on behalf of Turner & Townsend;
- RSK Report[22] entitled *'NOMA Angel Gardens, Manchester – Geo-environmental site assessment'* (Report No. 322162), dated January 2016, on behalf of Moda Living (Angel Gardens) Limited;
- Churchill Enviro Limited report[23] entitled '*Validation Report For Remediation Work Carried Out as Part of the Enabling Works Contract by W Maher and Sons at Angel Gardens, Manchester*', dated October 2016, on behalf of Turner & Townsend;
- The British Geological Survey (BGS);
- The Coal Authority;

[12] Oxford Archaeology Report No. L10755 'NOMA Plot M, Miller Street, Manchester'. June 2014.
[13] Oxford Archaeology Report No. L10772 'Arkwright's Shudehill Mill, Miller Street, Manchester'. July 2014.
[14] Oxford Archaeology Report No. L10772 'Shudehill Mill, Miller Street, Manchester - Manchester – Archaeological Excavation, Written Scheme of Investigation'. July 2014.
[15] Sanctus Report No. S1933-001. 'Angel Square – Site Investigation Report'. May 2015.
[16] Sanctus Report No. S1918. 'Contract Completion Report, Angel Square, Manchester'. May 2015.
[17] Buro Happold Report No.033536. '*Ground Engineering Desk Study Report – 2&3 Angel Square, Manchester*'. July 2009.
[18] Structural Soils Report No. 763315 'Factual Report on Ground Investigation at *2&3 Angel Square, Manchester*'. July 2015.
19 Sanctus Tests results – 6 No. samples. October/November 2015.
20 W.Maher results - 6 No. samples. October/November 2015.
[21] Churchill Enviros Report. 'Validation Report For Works Carried Out By W Maher and Sons At Angel Gardens, Manchester'. March 2016.
[22] RSK Report No.322162. 'NOMA Angel Gardens, Manchester – Geo-environmental site assessment'. January 2016.
[23] Churchill Enviros Report. 'Validation Report For Remediation Work Carried Out as Part of the Enabling Works Contract by W Maher and Sons at Angel Gardens, Manchester'. October 2016.

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- Published technical reports;
- Historical literature;
- Documents found during internet searches; and
- Any information provided by the Client i.e. previous desk study or ground investigation / utilities information.

A site specific geotechnical and geoenvironmental ground investigation has been scoped and is contained within Section 8 of this report. The proposed ground investigation will provide information on the ground conditions, degree of ground contamination (if any), groundwater and ground gas regimes for the site area. Based on the currently available data a preliminary assessment of the likely ground conditions has been undertaken in order to assess potential foundation solutions and to identify key issues likely to affect the groundworks associated with the current development proposal.

It should be noted that the preliminary assessment is based on some information in respect of works undertaken in the general vicinity of the Site as opposed to the specific site area. Such information has been taken to be representative of the ground conditions underlying the footprint of the Site supported by the site specific data, thus some of the assumptions made may need to be reviewed after the site specific ground investigation has been undertaken.

In addition it should be noted that groundwater conditions summarized are those observed as part of previous ground investigations and take no account of fluctuations due to seasonal, local drainage, the River Irwell or any other localised effects.

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3 The Site

3.1 Site Location

The Site is located north of Manchester City Centre, approximately 220 m east of Manchester Victoria Railway Station and to the east of the CIS Tower. The Ordnance Survey (OS) National Grid Reference (NGR) for the centre of the site is ^{3}84400 E, ^{3}99053 N. The site location is shown in Figure 1.

3.2 Site Description

The Site is trapizoidal in shape and measures approximately 110 m to 145 m in length and 50 m to 85 m in width, with the widest section in the southwest of the Site. The Site measures approximately 0.83 hectares of previously developed land. The Site is bound by 1 Angel Square (the Co-operative Group headquarters), Miller Street, Angel Gardens residential scheme (under construction and due for completion late 2019) and Angel Street. The Site currently comprises two development plots, identified as Plots M&N on the endorsed NOMA Masterplan, which are in temporary use as surface car parking. The public car park is operated by RCP Parking Ltd, which occupies the area between Angel Street and Miller Street over a number of terraced levels with retaining structures or trees and vegetation on the slopes separating the various levels. Access to the Site is currently from the west via an entrance on Angel Street. The Site is located to the northern edge of Manchester city centre, and the range of retail, office, leisure, residential and transport infrastructure associated with the City.

The existing site layout is presented in Figure 2 and the site boundaries can be described as follows:

- To the northeast - Angel Street with commercial & residential buildings beyond.
- To the southeast - Existing car parking (53˚ NOMA - Plot L) with Rochdale Road beyond.
- To the southwest - Miller Street with car parking beyond.
- To the northwest - No.1 Angel Square with existing car parking beyond.

There is a substantial change in level across the Site, falling away from Angel Street down to Miller Street. Overall, the proposed development site generally slopes in a westerly direction towards the western corner of the Site midway along Miller Street. The Site can be split into two areas separated by an existing rough S Shaped embankment, namely:

- The eastern area predominantly comprises the former archaeological excavation for Arkwrights Mill. The majority of the platform is between 46 – 47 m AOD, however, the maximum elevation (to the nearest metre) is ~48 m AOD in the far eastern corner of the platform, with a minimum elevation of ~45 m AOD in the northern corner.
- The western area currently comprises existing car parking, however, during the construction of 1 Angel Square this area of site was utilised as a site compound with two temporary buildings. The area slopes to the southwest from a maximum elevation of ~44.5 m AOD in the northern corner, with a minimum elevation of ~41 m AOD in the western corner.

There is thus currently a ~7 m difference in height across the Site separated by slopes with localised or potentially buried retaining structures.

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3.3 Site Utilities

Service plans have been obtained from the relevant utility companies in order to obtain information on the expected position and extent of buried and overground cables, pipes, wires etc, which may present constraints on future site development works. These plans have been consolidated and are included as Appendix C. It should be noted that the service plans issued by the various utility companies generally only record the public mains locations and do not include individual private supply routes. As such, the information available for most development sites is usually restricted to the periphery (unless public roads or rights of way cross the site) and, therefore, the absence of service routes beneath the footprint of the proposed development site on such drawings is not confirmation that the site is clear of services. Any additional private service routes connecting the mains to existing buildings need to be identified and located. It should be noted, however, that drawing no: WDA 56_UMP_(A)_01 Rev 2 (dated 14/05/19) in Appendix C is in the process of being revised with new information at the time of writing this report.

Given the foregoing, it is normally recommended that a full utilities survey (typically including ground penetrating radar techniques) is undertaken prior to the commencement of any site works. Such a survey not only improves the health and safety aspects of any site works subsequently undertaken but also has the added advantage of the early identification of site specific service routes that may need to be diverted. Such early identification allows suitable provisions to be made in the scheme specific cost plan and also avoids delay and disruption of the future construction works which could arise from the presence of an unforeseen service route. A full utilities survey thus facilitates improvements in respect of health and safety, cost planning and project/construction management.

The following key points should be noted in respect of 2&3 Angel Square:

- The record mapping for Miller Street as recorded on WDA 56_UMP_(A)_01 Rev 2 (dated 14/05/19) is in the process of being revised with new information at the time of writing this report.
- The Miller Street site boundary may extend out to the new back of pavement line i.e. 2 lane highway configuration. All existing utilities are located at the original back of pavement line i.e. to suit the 4 lane highway configuration. The extended site boundary on Miller Street can only be delivered if the existing utility infrastructure is diverted / relocated forward of the existing location.

Guidance issued by the individual service providers should be followed at all times when excavating in the vicinity of buried services. Where appropriate, the service providers should be consulted to mark their equipment in the vicinity of any proposed excavation works.

3.4 Site History

Historical Ordnance Survey (OS) maps covering the Site have been studied to detail the historical development of the Site and the immediate surrounding area (~ 100 m radius of the site). Extracts of historical maps as provided in the Groundsure Report[1] are included in Appendix D. Key features are identified in the following paragraphs in chronological order.

OS maps covering the Site have been studied to detail the historical development of the Site and the surrounding area. In addition, a number of reports have been completed by Oxford Archaeology North[9,10,11,12,13,14] as well as a historical archaeological desk study[3] and a report of an investigation by Channel Four's Time Team[2], which include several earlier maps (1650 to 1848) as discussed below. Extracts of historical maps are included in Appendix D with key features identified in the following paragraphs. It should be noted that historical maps and data included within

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the archaeology reports are not reproduced herein. Reference should be made to these reports and these should be read in conjunction with this report.

The earliest map available is a plan of Manchester[10,11] dating to c 1650 and shows the proposed development site as open fields.

The 1741 map[3,11] records the Site as open fields. In the immediate vicinity, '*Mill Lane*' is recorded along the southern boundary of the Site.

The 1793 map[3] records '*Simpson's Factory*' along the southeast border of the Site and its associated reservoirs in the centre of the Site. In the immediate and surrounding area, '*Mill Lane*' is now recorded as '*Millers Street*' and '*Angel Street*' is recorded along the northern boundary of the Site. A number of unnamed industrial buildings are recorded surrounding the Site, in particular to the west of the site where associated infrastructure (including roads recorded as '*Factory Court, Factory Lane, Joiner Street*') are recorded. '*Alms Houses*' are recorded immediately to the south of the Site on the opposite side of '*Millers Street*'.

The 1794 map[3,,9,10,11] records '*Simpsons Factory*' is now recorded as '*Mr Simpsons Cotton Works*' and the reservoir is shown to be slightly reduced in size. There are no significant changes to the immediate surrounding area.

The 1822 plan[3] of Arkwright's Mill (thought to be formerly '*Mr Simpsons Cotton Works'*) shows a mill in the western corner of the site bordering Miller Street with '*Cottages*' to the north of the main mill building.

The 1831 map[3,10,9,10,11] (Banck's and Co's) records a number of residential properties along the northeastern boundary and there is an unnamed industrial building along the southern section of the northwestern boundary of the Site. '*Mr Simpsons Cotton Works*' is now recorded as '*Norris & Hodgess Cotton Mill*' and the reservoir to the west of the mill is indicated to be larger in size. In the immediate surrounding area, the road adjacent to the unnamed industrial building is recorded as '*Ropery*' and the '*Alms Houses*' are no longer recorded.

The earliest OS map available is dated 1848 (extract of 60 inch map[3,9]), which shows '*Norris & Hodgess Cotton Mill*' is now recorded as a '*Warehouse*' and is part of a complex labelled '*Manchester Mills (Cotton)*'. The far western mill is now recorded as a '*Warehouse*' and the western extent of the '*Manchester Baths & Wash Houses*' is recorded in the south corner of the Site. In the immediate vicinity, '*Ropery*' is now recorded as '*Rope Walk*' with predominantly residential housing and a '*Timber Yard*' beyond. A '*Brewery*' is recorded immediately west of the far western '*Warehouse*'. To the east of the Site, '*Manchester Foundry*' and 2 No. associated '*Boilers*', a '*Saw Mill*' and associated '*Reservoir*', '*The Brewery Arms Public House*', a '*Timber Yard*' and '*Keynon Street*' are recorded. Two '*Timber Yards*' and a '*Saw Mill*' are recorded to the south of the Site over '*Miller Street*'. '*Victoria Station*' is also recorded approximately 220 m to the east of the Site.

The 1848 1:10,560 map identifies a number of industrial sites in the wider surrounding area, including a railway line and a '*Gas Works*' approximately 250 m and 300 m to the northeast respectively.

The 1892/1893 1:2,500 edition map records the reservoir associated with '*Manchester Mills (Cotton)*' has decreased in size with only the northern extent remaining. A number of unnamed industrial buildings are recorded to the south of the remaining reservoir. The far western '*Warehouse*' has expanded to the west and north and '*Rope Walk*' is no longer recorded. '*Manchester Baths & Wash Houses*' are also no longer recorded. A network of small roads (one of which is recorded as '*Factory Yard*') are recorded to the east of Arkwrights Mill leading to the new industrial buildings.

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In the immediate surrounding area, '*Manchester Foundry*' and 2 No. associated '*Boilers*', '*Saw Mill*' and associated '*Reservoir*', '*Brewery*' and the eastern, western and southern '*Timber Yards*' are no longer recorded.

The 1894/1896 1:10,560 edition map no longer records the '*Reservoir*' on site. There are no significant changes to the immediate surrounding area.

The 1908 1:2,500 edition map records the far western '*Warehouse*' has expanded to the east and further north. In the immediate surrounding area, the former reservoir appears to have been infilled and two small unnamed buildings are now located there. An '*Iron Works*' is now recorded immediately to the east of Arkwrights Mill and a '*Printing Works*' is recorded on New Mount Street approximately 40 m to the northeast.

The 1909 1:10,560 and the 1923/1938 1:10,560 edition maps record no significant changes to the Site or the immediate surrounding area.

The 1922/1933 1:2,500 edition map records no major changes to the Site. In the immediate surrounding area, the '*Iron Works*' is now recorded as '*Disused*'.

The 1949 1:1,250 edition map only shows the northern extent of the Site and records a '*Warehouse*' on the site of the northern extent of the former reservoir and the residential houses along '*Angel Street*' are no longer recorded. There are no significant changes to the immediate surrounding area that is shown.

The 1951/1952 1:2,500 edition map no longer records Arkwrights Mill, the far western '*Warehouse*' and a number of unnamed buildings on Site. In the immediate surrounding area, three '*Ruins*' and a '*Warehouse*' are recorded to the southwest of '*Keynon Street*'. A smaller 'Ruin' is recorded at the junction of '*Naples Street*' & '*Angel Street*'. A '*Garage*' is also recorded 30 m to the north.

The 1948-1953 1:2,500 edition map records 3 No. small '*Ruins*' to the south of the '*Warehouse*'.

The 1952/1955 1:1,250 edition map does not cover the majority of the site. There are no significant changes to the site or immediate surrounding area that is shown.

The 1956 1:10,560 edition map records the eastern part of a new unnamed T-shaped building in the western corner of the Site (considered to be Baxendale's Iron Works based on archive photographic evidence). There are no major changes to the immediate surrounding area.

The 1953/1958 & 1954-1959 1:2,500 edition maps does not record any significant changes to the Site. In the immediate surrounding area, the small '*Ruins*' to the south of '*Kenyon Street*' are no longer recorded.

The 1958/1963 1:1,250 edition map records a '*Car Park*' to the west of '*Factory Road*'. In the immediate surrounding area, the '*Printing Works*' is now recorded as a '*Works*' and the nearby '*Ruin*' is no longer recorded.

No major changes are recorded on subsequent maps until the 1978-1980 1:1,250 edition map which no longer records the Baxendales Building and records the entire site as a '*Car Park*' – its current condition. In the immediate surrounding area, the map no longer records the '*Warehouse*' and '*Kenyon Street*' is now recorded as '*Kenwright Street*'.

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The 1984-1988 1:1,250 edition map records that Miller Street has been widened along the southern boundary of the Site.

The 1985/1988 and 1988/1991 1:10,000 edition maps does not record any significant changes to the Site or the immediate surrounding area.

The 1992/1995 1:1,250 edition map only shows the northern extent of the Site but does not record any significant changes to the Site or the immediate surrounding area.

No further major changes are recorded to the Site or the surrounding area until the 2002 1:10,000 edition map which records no significant changes to the Site itself but an *'Arena'* is now recorded adjacent to '*Victoria Station*' approximately 300 m to the northwest (the Manchester Evening News Arena, opened 1995 [24]) and two Metrolink tram lines are recorded running northeast and southeast from '*Victoria Station*'.

The 2010 1:10,000 edition map records no significant changes to the Site or surrounding area.

For ease of reference, the key points of site history likely to affect the proposed development are summarised as site constraints in Figure 4.

3.5 Archaeology

Manchester is an area of archaeological interest with developments taking place within the city from the Roman period, but the major interest is in industrial archaeology. A number of recent archaeological reports for the Site and surrounding area have been completed by Oxford Archaeology North[9,10,11,12,13,14] as well as a historical Desk Based Assessment[3] by Gifford on behalf of the Co-operative Group in May 2007 and another report produced by Wessex Archaeology[2] in April 2006 following an investigation by Channel Four's Time Team (filmed by Videotext Communications Ltd). Reference should be made to these reports and they should be read in conjunction with this report. An overview of the items detailed in the reports are outlined in the following paragraphs, however, it should be noted that the detailed interface between proposed construction and existing archaeology are beyond the scope of this report.

The potential archaeological remains that exist on or adjacent to the Site may include the remains of cotton mills and associated reservoirs, an iron foundry, a saw mill and timber yard, a brewery, a public baths and wash house, public houses, shops and housing of various types. Although some evidence of features along Miller Street are likely to have been destroyed either during the Manchester Blitz or during road widening works in the early 1990s, the Time Team investigation and Oxford Archaeology Norths recent works shows that evidence of Arkwright's Mill both on site and to the west of the proposed development site is well preserved and close to the surface (Figure 5 refers). Existing foundations may also be present within the Site.

During 2014, Arkwright's Mill was subject to an intrusive archaeological excavation by Oxford Archaeology North[13] which comprised an evaluated excavation of the majority of the main footprint of the building as well as the Engine House. Full and detailed photographic records were taken as well as surveying to Ordnance Datum with the remains left insitu. The study concluded that the site is '*of considerable archaeological and historical significance on a regional level*', however the '*overall group value is reduced by extensive loss of the component buildings and infrastructure*' over

[24] www.men-arena.com.

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the years that followed its use. Reference to the findings of this study[13] should be made in conjunction with this report. Please note, the Greater Manchester Archaeological Advisory Service (GMAAS) should be consulted to advise if any further archaeological excavations are required.

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4 Ground Conditions

4.1 General

The anticipated ground conditions underlying the Site have been assessed on the basis of both published and unpublished data available for the Site and the immediate surrounding area. The available data has been summarised in the following sections and has been combined to establish as accurate a ground model as possible.

4.2 Published Geology

The British Geological Survey (BGS) Maps[25] [26], and Regional Geology Guides [27] have been obtained and reviewed as part of this study, with relevant information presented below. The geological information from the Groundsure report is included in Appendix E and also presented below.

The geological map indicates the Site is directly underlain by Boulder Clay overlying Triassic Chester Pebble Beds Formation (CPB - Sherwood (Bunter) Sandstone Group). No Made Ground is recorded within the site boundary on the map.

The Groundsure report states that the Site is underlain by Glacial Till (Diamicton) overlying the Chester Formation (former name CPB). In addition, 'Made Ground (undivided)' is also recorded on site. Given the urban setting and development history of the site, including numerous buildings of different ages and reprofiling of the Site to create terraced levels for car parking, a reasonable thickness of Made Ground is anticipated. Made Ground material due to its nature is likely to be very variable in both composition and characteristics.

4.2.1 Drift Geology

The 1" to 1 mile and 1:50,000 geological maps were studied to determine the probable nature and extent of any drift deposits under the site and in the surrounding area. The maps indicate that the site is underlain by Quaternary Boulder Clay. The total thickness of the drift deposits is not recorded on the geological map.

It is also worthy of note that Recent Terrace deposits are recorded in the Irk Valley approximately 300 m to the north and west of the Site.

4.2.2 Solid Geology

The Groundsure report states that the Site is underlain by the Chester Pebble Beds Formation (CPB). The 1" to 1 mile and 1:50,000 British Geological Survey (BGS) maps indicate the solid geology on site to be Triassic Sherwood Sandstone (formerly Bunter Sandstone). The Sherwood Sandstone Group typically comprises well cemented medium and coarse grained sandstones and pebbly sandstones/conglomerates with occasional red brown mudstones. The Sherwood Sandstone is indicated to be underlain by the Manchester Marls (mudstone) over the Collyhurst Sandstone lying unconformably over Carboniferous Warwickshire Group which is underlain by the Carboniferous Upper Coal

[25] BGS (1970). Manchester. England and Wales Sheet 85. Solid and Drift Geology. 1" to 1 mile. British Geological Survey.
[26] BGS (1975). Manchester. England and Wales Sheet 85. Solid Geology, 1: 50,000, British Geological Survey.
[27] BGS (2002) British Regional Geology: The Pennines and Adjacent Areas, (4th Ed), British Geological Survey Nottingham.

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Measures (Westphalian C) typically comprising a mixture of mudstones, siltstones and sandstones with coal seams. Four named coal seams (Openshaw, Charlotte, Bradford Three-quarter and Bradford Four Foot) are indicated to outcrop between 1 km and 1.5 km northwest of the Site. The geological map cross-section indicates that productive coal measure strata are at least 250 m beneath the Site.

The Site is located between two faults both trending northwest-southeast, namely, the Ardwick Fault which is indicated to run 400 m southwest of the Site, downthrown to the northeast by approximately 100 m, and an unnamed fault approximately 100 m northeast of the Site, downthrown to the northeast by an unknown magnitude. The angle and direction of dip of the bedrock strata between these faults is not recorded but the regional dip is indicated to be to the south and southwest.

4.3 Unpublished Geology

As part of this study the BGS Geoscience Database has been consulted to ascertain whether any exploratory hole records exist for the site or the immediate surrounding area. Borehole records from this source have been obtained and examined as part of this study.

In addition the Structural Soils Limited (SSL) ground investigation (GI) for the adjacent Co-Op Head Office (1 Angel Square) and Angel Gardens sites have also been reviewed. The Co-Op Head Office (1 Angel Square) GI works were undertaken during April and May 2009 and comprised 22 No. hand dug trial pits, 7 No. machine dug trial pits and 2 No. cable percussive boreholes with rotary follow on, along with associated testing. The Angel Gardens GI works were undertaken during September 2013 and comprised 6 No. machine dug trial pits, 3 No. percussive boreholes with rotary follow on, along with associated testing. Please note, during the recent archaeological excavation of Arkwrights Mill, the presence of asbestos within the Made Ground was recorded.

Taking into account the available historical ground investigation a site specific GI was scoped and completed by SSL to obtain further information in respect of the ground conditions beneath the proposed development site and allow foundation options to be assessed. The SSL GI was undertaken during January 2015 and comprised 13 No. machine excavated trial pits (TP1 - TP4, TP4A, TP5 – TP10, TP10A and TP11) across the Site and its surrounds, along with associated chemical testing including asbestos identification and quantification. Groundwater and ground gas monitoring was also carried out in historical borehole BHL01 (Section 5.5.1.1refers). All other historical borehole installations could not be found.

It should be noted that a strategy for dealing with this asbestos contamination within the footprint of Arkwrights Mill has been completed comprising the removal of all Asbestos Containing Material (ACM) off site.

Table 1: Summary of BGS/SSL Borehole Data

Record Type	BGS/SSL Reference	Location	Ground Level (m AOD)	Depth (m BGL)	Year
Borehole	SJ89NW/3644a	~30 m SE of the site.	45.70	29.26	1968
Borehole	SJ89NW/3645	Southern corner of the site.	45.40	13.70	1968
Borehole	SJ89NW/3647	Southern portion of the site.	45.70	11.20	1968
Borehole	SJ89NW/3652	Central southeastern boundary.	47.00	8.70	1968
Borehole	SJ89NW/3653	~20 m SE of the site.	48.50	30.50	1968
Borehole	TPBH01	~60m NW of the site.	40.80	24.80	2009

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Record Type	BGS/SSL Reference	Location	Ground Level (m AOD)	Depth (m BGL)	Year
Borehole	TPBH02	~30m W of the site.	42.90	30.50	2009
Borehole	BHL01	Northern portion of the site.	45.47	30.00	2013
Borehole	BHL02A	~65 m SE of the site.	48.72	30.00	2013
Borehole	BHL03	Southern portion of the site.	46.81	29.80	2013

The relevant BGS records and the deeper SSL exploratory hole records are listed in Table 1 and included as Appendix E herein. The stratigraphic succession and indicative depths and thicknesses encountered by the boreholes listed in Table 1 are summarised in Table 2.

Table 2: Summary of Ground Conditions in BGS Boreholes and from the SSL 2009, 2013 & 2015 GI's

Depth to Top of Strata (m BGL)	Typical Thickness (m)	Generalised Description
0.00	0.15 – 4.00	Black brown slightly clayey slightly sandy angular to subangular GRAVEL of brick and ash with high cobble and medium boulder content. Gravel comprises various materials including sandstone, mudstone, limestone, glass, tarmac, coal, slag, concrete, slate, clinker, brick, rare granite and ceramic fragments. AND Black sandy fine to coarse GRAVEL in clayey matrix with pottery and snail shells (1.80 - 2.20 m BGL in TP5 only – former reservoir) [MADE GROUND]
0.00 - 4.30	>0.20 -14.80	Firm to very stiff brown/red brown slightly sandy silty gravelly CLAY. Gravel is fine to coarse angular to rounded of sandstone & mudstone. AND Orange brown, slightly clayey, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, subangular to rounded of quartzite, limestone, sandstone and ironstone. Occasional layers of brown, sandy, gravel. [GLACIAL TILL – BOULDER CLAY]
10.20 – 18.50	>20.30	Soft becoming medium hard, red/brown, medium to coarse grained sandstone with occasional layers of marl. [CHES- SHERWOOD SANDSTONE]

Note: During the SSL (2009) ground investigation groundwater was recorded in TPBH02 'seepage' at 1.00 m BGL (41.90 m AOD), TPCPT10 'seepage' at 1.00 and 3.00 m BGL (45.90 and 43.90 m AOD respectively) and TPCPT04 'locally damp' below 2.50 m BGL (37.40 m AOD). Groundwater was not encountered in any other exploratory holes or boreholes prior to the introduction of water as a rotary drilling flushing medium.

During the SSL 2013 GI groundwater was only encountered during drilling at depths ranging between 19.90 m BGL and 23.10 m BGL (25.67 m AOD and 26.37 m AOD).

During the SSL 2015 GI groundwater was recorded in TP1, TP5 and TP7 as 'slight seepage' at 1.10, 1.80 and 0.50 m BGL (44.56, 45.57 and 44.24 m AOD respectively).

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It is considered that the succession recorded in Table 2 generally accords with the published geology insofar as Made Ground overlying Boulder Clay overlying sandstone strata becoming more competent with depth.

4.4 Hydrology

The hydrology relevant to the Site has been reviewed based on information provided on current and historical OS maps. The nearest surface water feature to the Site is the River Irk located approximately 250 m north of the Site, flowing to the southwest to its confluence with the River Irwell on the south side of Manchester Victoria Railway Station. The River Irk is understood to be culverted beneath the railway station.

The Site is not indicated to be within Flood Zone 2 or 3 as presented in the Groundsure Report[1], based on the relevant Environment Agency information and reproduced in Appendix F.

4.5 Hydrogeology

4.5.1 Groundwater Vulnerability

The Environment Agency Groundwater Vulnerability Map Sheet 17 (Derbyshire and North Staffordshire) indicates that the Site is underlain by a '*Major Aquifer*' with '*Soils of High Leaching Potential (U)*' (Appendix G refers). It should be noted that the site is labelled 'U' for urban and a note is normally included on the maps explaining that such a classification means that '*Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) is assumed until proved otherwise*'.

The Groundsure Report[1] records that the Site is underlain by a 'Principal Aquifer' (formerly termed a 'Major Aquifer') with soils of 'High Leaching Potential' defined as '*Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale*'. This is considered to refer to the Chester Formation (Sherwood Sandstone) beneath the Site.

The Groundsure Report[1] records no water abstractions within the site boundary or within 500 m of the Site. There are 6 No. abstractions locations within 1 km of the Site including: Interbrew Uk Ltd (520 & 524/5 m NW), British Telecommunications plc (639 m SW & 955 m NW), Joseph Holt Ltd (721 m NW), Lancashire Dairies Ltd (907 m NW).

4.5.2 Groundwater

Examination of the general topography and hydrology of the locality, based on the current and historic OS maps indicates that the prevailing direction of groundwater flow is likely to be to the northwest, towards and in the direction of flow of the nearest watercourses as summarised in Section 4.4.

It is considered likely that groundwater underlying the Site will be in hydraulic continuity with the River Irk due to the close proximity of this watercourse to the Site. Localised groundwater may be encountered in the Made Ground deposits perched on underlying low permeability Glacial Boulder Clay. Deeper groundwater conditions within the weathered and intact sandstone bedrock are likely to be controlled by the hydraulic conductivity of the sandstone (degree of cementation, degree of fissuring, faults etc).

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4.5.2.1 SSL GI - Groundwater

A total of 12 No. groundwater monitoring visits were undertaken as part of the SSL GI 2009 for 1 Angel Square and the SSL 2013 GI for Angel Gardens. A further 3 No. visits were carried out to monitor any historical installations left in situ, namely BHL01 (SSL 2013 GI).

The majority of the post fieldwork groundwater monitoring results for the Sherwood Sandstone show a typical range of between 25.49 m AOD and 26.20 m AOD. It should be noted that the shallow groundwater level recorded in BHL01 within the Made Ground (SSL 2013 GI) and in BH1 within the superficial sand (SSL 2009 GI) were close to the base of the installation - which could be water trapped in the bottom of the instrument and thus be an erroneous result. In addition, the installation within BHL03 (SSL 2013 GI) within the sand and gravel is recorded as 'Dry' on 3 out of the 4 No. available readings., however, 1 No. reading records groundwater at 14.42 m BGL (32.39 m AOD). Again, this is thought to be an anomalous reading.

Groundwater ingress is not considered to cause significant problems for envisaged excavation works. It is envisaged that any perched water seepages will be relatively minor and could be controlled by sump pumping methods. It should be noted, however, that where locally more significant water ingress is encountered then more substantial water control measures may be required.

4.5.3 Mining Activity

The Groundsure Report[1] states that the site is *'the site lies in or in proximity to the coal mining reporting area as defined by the Coal Authority'*. A Coal Authority (CA) Reports for each plot[28] (Appendix H refers) has been obtained for the proposed development as the Site overlies coal bearing strata and, as such, further assessment in respect of previous coal mining activity was considered necessary.

[28] Coal Authority CON29M Reports (51002015179001 & 51002015179002). (April 2019)

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The CA Report states that:

- The Site is within the likely zone of influence from workings in 1 No. seam of coal at 820 m depth which was last worked in 1965. Furthermore, reserves of coal do exist in the locality which could be worked in the future subject to feasibility, licences and planning consents.
- There are no recorded mine entries within the Site or within 20 m of the site boundary.
- In respect of opencast mining, the Site is not within the boundary of any past or present workings. In addition, there is no licence to extract or proposed licence to extract coal by opencast methods within the immediate vicinity of the Site.
- No subsidence, in respect of the Coal Mining Subsidence Act 1991, has been recorded in respect of the immediate site area.

Given the published and unpublished geology of the Site, the site history and the CA Report information it is considered that the risk arising from former coal mining operations can be considered to be low.

4.6 Ground Instability and Geo-Hazard

A summary of the anticipated risk in respect of typical causes of instability or geo-hazards specific to this Site which are not covered in other sections of this report is presented in Table 3.

Table 3: Summary of Natural Ground Subsidence Hazards at the Site

Subsidence Hazard Type	Applicable to this Site?		Comments
	No	*Yes*	
Collapsible Ground	✓	-	Groundsure states *'Very Low'*.
Compressible Ground	✓	-	Groundsure states *'Very Low'*.
Ground Dissolution	✓	-	Groundsure states *'Negligible'*.
Landslide	✓	-	Groundsure states *'Very Low'*.
Shrinking/Swelling Clay	✓	-	Groundsure states *'Very Low'*.
Running Sand	✓	-	Groundsure states *'Very Low'*.

On the basis of the desk study work undertaken and the nature of the strata likely to be encountered on site, collapsible or compressible ground, ground dissolution, landslides, shrinking/swelling clay and running sand are not considered to be issues for the proposed development.

4.7 Trees

The presence of existing trees and shrubs on the Site has been noted (particularly on embankments along the eastern boundary) and may need to be considered in the development proposals for the Site. An Ecological Survey and

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Assessment[29] was undertaken by ERAP (Consultant Ecologists) in August 2019. The presence of the existing trees may impact on the depth of the proposed foundations and service runs in the vicinity of any trees to be retained.

[29] ERAP (Consultant Ecologists) Ltd Report entitled "Ecological Survey and Assessment, 2 & 3 Angel Square, Manchester, M4 4AF" dated August 2019.

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5 Environmental Setting

5.1 General

The environmental setting of the Site has been reviewed on the basis of both published and unpublished data obtained for the Site and the immediate surrounding area. The available data is summarised in the following sections and has been combined to establish any ground or groundwater contamination as well as ground gas generation that may potentially be present to allow this to be targeted as part of the proposed site specific ground investigation.

5.2 Potential Contaminative Land Uses

A review of the historical development of the Site and surrounding area, as outlined in Section 3.4 of this report, has shown that the Site and the immediate surrounding area have been subject to a reasonable degree of historical development. Land uses considered to be potentially contaminative with respect to human health, controlled waters, ecosystems and/or the built environment can be summarised as follows.

Within the Site Boundary

- Simpsons Factory (later known as Mr Simpsons Cotton Works, Norris & Hodgess Cotton Mill, Manchester Mills & Warehouses) and associated reservoirs.
- Asbestos within Made Ground (beneath Arkwrights Mill footprint).
- Mill and associated cottages, Warehouse and Baxendale's Iron Works (name shown in historical photographs of the Site) in the far west of the Site.
- Residential properties along the northwestern boundary.
- Western extent of Manchester Baths & Wash Houses in the southern corner of the Site.
- Car park and any oil/petrol spills from car parking.

Outside the Site Boundary

- Manchester Foundry (Iron Works) and associated boilers to the east of the Site.
- Timber Yards (to the west, east and south of the Site), Saw Mills (to the east & south of the site) & associated reservoirs.
- The Brewery Arms Public House to the east of the Site.
- Ruins to the southwest of Kenyon Street (later recorded as Kenwright Street).
- Car parking to the east of the Site and any oil/petrol spills from car parking.
- Printing Works to the northeast of the Site.
- Garage to the north of the Site.
- Various industrial/commercial land uses in the vicinity of the Site including the railway infrastructure and associated goods warehouses etc.

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Given the types of land use specific to the Site and the close proximity of some off site facilities, it is considered possible that some contamination of the soils and groundwater may have occurred. The degree of contamination arising from previous land uses is typically a function of previous site practices, operational procedures and the degree/condition of any hardstanding that may have been in place when any specific land use was in operation. As such, the determination of the actual degree of contamination present, if any, will be assessed as part of the site specific investigation works.

5.3 Potential Contaminants of Concern

Due to the rich industrial site history of the proposed development site, it is considered likely that a significant thickness of Made Ground is present. Further information on the extent of this is currently being obtained as part of the site specific ground investigation works. Further information regarding other potential sources of contamination is presented in Section 7.2.

Made Ground typically comprises reworked site material due to former development or material that has been imported onto the site from an external source. As such, any Made Ground present may represent a potential source of contamination. Urban fill commonly contains heavy metals, arsenic, and polycyclic aromatic hydrocarbons (PAHs) in background concentrations and can include locally elevated 'hotspots' which may pose a risk to human health and/or controlled waters.

Potentially contaminative on-site historical land uses identified in Section 5.2 which are considered to have affected the Site include the infilled reservoirs, asbestos in Made Ground, Manchester Baths & Wash Houses, residential properties and the industrial land uses namely the Simpsons Factory (later known as Mr Simpsons Cotton Works, Norris & Hodgess Cotton Mill, Manchester Mills), Mill and associated cottages, Garage, Printworks, Warehouse and Baxendale's Iron Works, existing car park and any oil/petrol spills from car parking.

With the exception of asbestos, minor historical ground contamination is present within the Made Ground materials (Section 5.3.1.1 refers), however, at least half of the material is likely to be removed as part of the proposed basement excavation works with the remainder covered with an appropriate material (hardstanding or soft landscaping build up ~0.50m). Removal of material from site is a key consideration - further chemical testing may be required during groundworks for classification purposes.

Based on the chemical testing undertaken for the adjacent plots, the Site and the proposed end development, it is considered that the chemical concentrations in soils are not likely to pose a significant risk to end users of the Proposed Development.

It is worthy of note that Asbestos Containing Material (ACM) has been recorded within the Made Ground comprising visible fragments of ACM and loose fibres – generally below 0.1% (Hazardous Waste threshold). Gross asbestos removal has occurred in the former footprint of (Arkwrights Mill) and the former Manchester Foundry (on the adjacent site) via hand picking during archaeological works.

Potential offsite historical sources which are considered to be up hydraulic gradient (i.e. located to the southeast of the proposed development site) include a variety of former mill, factory and works sites.

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5.3.1 SSL GI 2015 Geoenvironmental Assessment

Chemical testing was carried out during the SSL 2015 GI in respect of end use, health and safety considerations in addition to waste disposal categorization as detailed below:

- 19 No. samples of Made Ground and natural material (BuroHappold General Suite – soil and leachate);
- 10 No. stockpile samples (Waste Acceptance Criteria only – soil and leachate);
- 6 No. samples of Made Ground and natural material (additional asbestos identification only); and
- 3 No. samples of Made Ground (Asbestos Quantification only).

5.3.1.1 Soil Results

All Made Ground sampled recorded concentrations of all determinants below commercial thresholds with the exception of Lead at a concentration of 3750 mg/kg in TP4A at 2.00 m BGL. In addition, waste materials including old shoes, plastic ties and fabrics were recorded in the Made Ground in TP10A between 0.50 – 2.00 m BGL. This material is proposed to be segregated and removed during the excavation for the basements for 2&3 Angel Square. Please note, TP4A & TP10A are not located within the confines of the proposed 2&3 Angel Square development boundary and as such are not discussed further.

All natural soils sampled recorded concentrations of all determinants below commercial thresholds.

5 No. samples of Made Ground recorded the presence of asbestos as detailed in Table 2 below. Please note, the Made Ground within the footprint of Arkwrights Mill (containing asbestos) has now been removed from Site, with the exception of *'a small area in the northern part of the site'* which was unable to be excavated and is still in situ. The excavation has been infilled (with 6F2). Please refer to the Sanctus report[16] for full details.

Table 5-1: Asbestos Results from SSL GI (2013).

Exploratory Hole	Sample Depth (m BGL)	Asbestos Type	Quantification (%)	Comments
TP1	0.30	Chrysotile fibres	-	Arkwrights Mill footprint. Removed
TP2	0.30	Chrysotile fibres	-	Arkwrights Mill footprint. Removed
TP4A	2.00	Chrysotile fibres	<0.001	Located offsite.
TP10A	1.00	Chrysotile fibres	<0.001	Waste material – easily segregated.
TP10A	2.00	Chrysotile cement	0.006	Waste material – easily segregated.

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5.3.1.2 Leachate Results

The leachate results record a number of minor exceedances (less than an order of magnitude) of lead, barium, antimony, sulphate and fluoride. Given the extremely limited number of exceedances, the magnitude of the exceedances, the low soil concentrations recorded on the respective samples and the fact that the assessment criteria used are considered to be overly onerous for the purpose of the analysis, it is considered that leaching of such determinands to controlled water receptors is unlikely and as such no further analysis on the associated leachate concentrations is considered necessary.

5.4 Landfill Entries

The Groundsure Report[1] identifies 2 No. waste treatment, transfer or disposal sites within a 250 m radius of the Site, as follows:

- 204 m NE of site. Breakers Yard. NGR: 384516, 399239. Date 1984.
- 209 m NE of site. Breakers Yard. NGR: 384493, 399247. Date 1990.

No landfill sites are recorded by the local authority or the BGS within a 500 m radius of the site. The nearest recorded landfill site is 698 m N of the Site:

- Queens Road Tip, Collyhurst. Deposited waste included Inert, Commercial, Industrial and Special Waste and Liquid Sludge. Input dates: 31 December 1955 to 31 December 1970. License status: Not supplied.

The above facilities are considered to be down or along hydraulic gradient of the Site and are typically in the Irk Valley or on the opposite side of the river, thus the risk of contamination to the proposed development site arising from these facilities is considered to be low.

5.5 Ground Gas

Ground gas typically consists of methane and carbon dioxide generated by the decomposition of organic materials. Although other gases are often associated with gas generation, methane and carbon dioxide are those which are typically measured during ground investigations, along with measurements for oxygen concentrations (to assess oxygen depletion) and flow rate. Ground gas is generally generated by and associated with the following ground conditions:

- Made Ground – typically non-engineered and poorly sorted material containing an organic component including soil, vegetation and timber;
- Alluvium/Peat – natural drift deposits often associated with river floodplains and generally having a high organic content sometimes with peat inclusions or peat layers;
- Coal Measures – 'mine' gas is often generated in such strata and can permeate through old workings and rock masses disturbed by mining activities; and
- Landfill – 'landfill' gas is often generated by the decomposition of organic materials placed in landfills. 'Inert' waste is similar to the Made Ground described above with the degree of gas generation dependent upon the

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amount of organic material present. Domestic waste, however, has a very high organic content and generates large quantities of gas over a sustained period (decades).

An appraisal of the likelihood of the above features affecting the proposed development is summarised below:

- There is Made Ground recorded within the unpublished geology as summarized in Section 4.3 which is of substantial thickness (0.30 to 4.00m). However, the Made Ground encountered is mainly comprised of rubble and ash, which are unlikely to represent a significant source of ground gas. It is worthy of note that timber is recorded locally within BGS logs. Based on the available data, it is reasonable to assume that the likelihood of ground gas being encountered within the Made Ground materials can be considered to be low.
- The published and unpublished geology as summarized in Sections 4.2 and 4.3 respectively do not indicate that peat or alluvial material is likely to be present across the Site and in the immediate surrounding area. As such, the likelihood of ground gas being encountered arising from alluvial materials can be considered to be low.
- The published and unpublished geology (Sections 4.2 and 4.3) indicate that productive coal bearing strata exist beneath the Site but are at significant depth. As such the likelihood of ground gas being encountered arising from coal mining activities can be considered to be low.
- The Groundsure Report[1] does not identify any landfill sites within 250 m of the Site – the nearest is 700 m to the north, on the far side of the River Irk. The report also identifies small Waste Transfer/Management sites within 500 m of the Site, however, given the distance of these facilities from the Site and their settings, the likelihood of ground gas being encountered arising from landfill sites can be considered to be low.

Given the environmental setting of the Site, ground gas is not considered to be a major issue at this stage. Notwithstanding this, ground gas monitoring should be undertaken as part of the site specific ground investigation to clarify the ground gas regime beneath the Site and allow appropriate protection measures to be assessed and incorporated into any substructure designs as necessary.

5.5.1.1 SSL GI – Ground Gas

A total of 12 No. ground gas monitoring visits were undertaken as part of the SSL GI 2009 for 1 Angel Square and the SSL 2013 GI for Angel Gardens. A further 2 No. visits were carried out to monitor any historical installations left insitu, namely BHL01 (SSL 2013 GI). The ground gas concentrations and flow rates obtained from the installations have been assessed against the classification scheme presented in CIRIA C665 with results classifying the ground gas regime and any associated ground gas protection requirements as Characteristic Situation 1.

Notwithstanding this, gas control measures are typically included within the structural requirements of the building equivalent to Characteristic Situation 2 as good practice and include the following elements:

- Ventilation of confined spaces within the building (basement ventilation system);
- Well constructed ground slab;
- Damp proof membrane; and
- Minimum penetration of ground slab by services.

Given the environmental setting of the Site and the historical ground gas results described above, ground gas is not considered to be a major issue at this stage.

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5.6 Radon Affected Areas

The Groundsure Report[1] records that '*the site is in an area where less than 1% of homes are above the action level*' and the corresponding BRE[30] guidance document indicates that no radon protection measures are required for development undertaken in this area.

5.7 Japanese Knotweed

We understand that Japanese Knotweed was cleared as part of the site wide operations extending from No. 1 Angel Square during 2010-2011. It is recommended that a Japanese Knotweed specialist is consulted with regards to identifying the extent of any infestation and appropriate measures for site management and/or removal of this material.

Japanese Knotweed is an invasive, non-native plant species. The Wildlife and Countryside Act (1981) made it illegal to spread Japanese Knotweed and guidance on the management of Japanese Knotweed on development sites is given in the Environment Agency's (EA) code of practice, 2001.

Currently available information indicates that the material is not hazardous but is highly invasive, destroying other flora and habitats for fauna. It spreads by root growth so can invade from neighbouring sites as well. There are a variety of methods available for treating infested areas including spraying with herbicides or digging, spraying and removal to landfill.

5.8 Unexploded Ordnance

The Zetica Unexploded Bomb Risk Map (Appendix I refers) shows the Site to be in an area of *'Moderate'* risk. It is known that Arkwrights Mill on/adjacent to the western site boundary was bombed in 1940 during the *'Manchester Blitz'* and post-war historical maps show a number of *'Ruins'* on site and immediately to the east. In addition these maps do not record many buildings which were recorded on site pre-war (World War II).

The Site has not been significantly redeveloped since World War II thus the risk from unexploded ordnance is considered to be reasonably high. A specialist explosive ordnance desktop study[31] has been prepared for the masterplan site and should be read in conjunction with this report. It recommended that UXO supervision is required for ground investigation and construction works.

5.9 Pollution Incidents

The Groundsure Report[1] records that there have been no pollution incidents on the Site itself, however, there have been 5 No. pollution incidents within 500 m of the Site as recorded below:

- Category Three – Minor Incident Water (Oils & Fuel - mixed waste oils) 282 m to the NW;
- Category Three – Significant Incident Land (Waste - Household) 411 m to the N;

[30] BRE 1999. Radon. Guidance on protective measures for new dwellings. British Research Establishment. 1999.
[31] EOD Contracts Limited, Report No: ECL/09/10360/DTS/MillerStManchester/Rev2 *'Explosive Ordnance Desk Top Study, Miller Street Manchester for the Co-operative Group'*. March 2009.

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- Category Three – Significant Incident Land (Waste - Commercial) 411 m to the N;
- Category Three – Significant Incident Land (Waste - Asbestos) 411 m to the N; and
- Category Three – Significant Incident Land (Waste - Tyres) 411 m to the N.

There are no recorded Substantiated Pollution Incidents within 500 m of the Site.

Given the minor categorisations of many of the impacts recorded, their distance from the Site and the fact that none are located directly up hydraulic gradient of the site (Section 4.4 refers), the potential impact of contamination from these sources on the proposed development site is considered to be low.

5.10 Radioactive Substances

1 No. Registered Radioactive Substances has been identified to be present within a 500 m radius of the Site:

- 31 m E of the Site, Brooke Edgeley Specialist Technical Services Ltd. Disposal of radioactive waste (was Rsa60 Section 6). Date: 7 August 2000. Status: Authorisation revoked or cancelled/Cancelled.

Brooke Edgeley Specialist Technical Services Ltd advised the following: The licence was for storage of old lightening conductor air terminals between 2000 and 2002 in a specialized metal cabin. The metal cabin was decommissioned by a radioactive specialist as part of the closure of the Angel Street premises in 2003. Subsequently the Site has been re-developed and new build flats now occupy the site. As such the risk to the proposed development site from this source can be considered to be low.

5.11 Nitrate Vulnerability

The Site is located in a Nitrate Vulnerability Zone (NVZ). Given the urban location of the proposed development site, nitrate vulnerability is not considered to pose a significant constraint on the proposed development.

5.12 Area of Conservation

The Groundsure Report[1] records that the Site is not located within a specific area of conservation, a National Park or a RAMSAR site. Nor is the Site recorded to be in a Site of Special Scientific Interest (SSSI). As such, it is not considered that this will pose a constraint on the Proposed Development.

5.13 Current Industrial Data

The Groundsure Report[1] indicates that there are 5 No. potentially contaminative industrial sites within 100 m of the Site, namely:

- Infrastructure & Facilities Electricity Substation Electrical Features 12 m to the SW.
- Transport, Storage & Delivery Warehouse Container & Storage 34 m to the E.
- Infrastructure & Facilities Electricity Substation Electrical Features 70 m to the SE.
- Industrial Products Business Comms Consultant Radar/Telecomms 71 m to the NE.

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- Repair & Servicing Computermend Electrical Eq. Repair/Service 12 m to the SW.

Given the commercial rather than industrial nature of the active facilities and their distance from the proposed development site, the risk of contamination arising from these sources can be considered to be low.

5.14 Fuel Station Entries

The Groundsure Report records 4 No. Fuel Stations within 500 m of the Site, namely:

- Unbranded (12 Rochdale Road) Obsolete 296 m to the E Up hydraulic gradient.
- Obsolete (95-109 Rochdale Road) Obsolete 408 m to the E Up/along hydraulic gradient.
- Texaco (58-76 Cheetham Hill Road) Open 426 m to the NW Down hydraulic gradient.
- Obsolete (37-41 Cheetham Hill Road) Obsolete 455 m to the NW Down hydraulic gradient.

There are 2 No. fuel stations considered to be up or up/along hydraulic gradient and 2 No. fuel stations down hydraulic gradient from the Site. Given the fact that the 2 No. which are located up or up/along are obsolete, the risk of contamination of the Site arising from the fuel stations can be considered to be low.

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6 Proposed Development

The current development proposals consist of the following main elements (Appendix A refers), namely:

6.1 2 Angel Square

- A new build split level office complex comprising lower and upper ground floors plus 10 storeys and lower level car parking.
- Landscaping of the periphery and public realm area.

6.2 3 Angel Square

- A new build split level office complex comprising lower and upper ground floors plus 11 storeys and lower level car parking.
- Landscaping of the periphery and public realm area.

Key Design Considerations

The key elements of the proposed development in respect of the ground investigation works undertaken can be summarized as follows:

- Column loadings associated with up to 11 storeys of commercial development including plant loadings.
- Retaining structures between split levels associated with current topographical considerations.
- Locally confined/restricted site boundary possibly requiring both temporary and permanent support.
- Material assessment for bulk earthworks.
- UXO risk mitigation procedures for any intrusive site or construction works.
- Excavation and removal of any buried obstructions.
- Hard and soft landscaping to the periphery and central part of the site.
- Ground gas and groundwater regime.
- Contamination assessment in respect of both human health and waste disposal, in particular in relation to asbestos.

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7 Preliminary Conceptual Site Model

7.1 Ground Model

The anticipated ground conditions underlying the Site based on the information available can be summarized as follows:

- Made Ground: recorded as black brown slightly clayey slightly sandy angular to subangular GRAVEL of brick and ash with high cobble and medium boulder content. Gravel comprises various materials including sandstone, mudstone, limestone, glass, tarmac, coal, slag, concrete, slate, clinker, brick, rare granite and ceramic fragments. Highly variable thickness and distribution (0.30 m and 4.00 m BGL). Please note, a black sandy fine to coarse GRAVEL in clayey matrix with pottery and snail shells was recorded at 1.80 - 2.20 m BGL in TP5 only – thought to be representative of a former reservoir.
- Glacial Till: recorded as firm to very stiff brown/red brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to rounded of sandstone & mudstone AND orange brown, slightly clayey, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, subangular to rounded of quartzite, limestone, sandstone and ironstone. Occasional layers of brown, sandy, gravel. Thicknesses varied between >0.20 -14.80 m.
- CPB - Sherwood Sandstone: Soft becoming medium hard, red/brown, medium to coarse grained SANDSTONE with occasional layers of marl. Rockhead between 10.20 and 18.50 m BGL.

The River Irk is situated approximately 250 m to the northwest of the Site and flows in a southwesterly direction towards Manchester Victoria Railway Station to its confluence with the River Irwell. It is considered likely that the groundwater underlying the Site may be in hydraulic continuity with the River Irk. Perched water may also be present within any Made Ground encountered particularly where there are buried obstructions. The hydraulic connectivity within the Made Ground materials is expected to be highly variable and any perched water is likely to be present in localised pockets of granular fill.

7.2 Potential Sources of Contaminants

Potential contamination sources from review of regulatory data and historical maps have been identified and are summarised in Table 7-1. The 'Contaminants of Concern' in this risk assessment are based primarily on information from the review of historical information.

Table 7-1: Potential Sources of Contamination

Potential Source	Location	Likely Age	Potential Contaminants of Concern
Made Ground	Onsite	From 1800s to present	Metals, sulphates, PAHs, solvents, fuel and oil waste and asbestos.
Fuel and oil spills from car parking retained within soils	On and off site	From 1970s to present	Petroleum hydrocarbon, fuel, oils.
Ground gas sourced from Made Ground and nearby infilled reservoir	On and off site	From 1800s to present	Methane, carbon dioxide.
Various commercial / industrial site uses	On and off site	From 1800 to present	Leachable contaminants: metals, PAHs, petroleum, hydrocarbons.

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7.3 Receptors and Pathways

Site specific pathway-receptor linkages have been identified in Table 7-2 with respect to the sources outlined in Table 7-3 and with respect to the anticipated future uses.

Table 7-2: Receptor and Pathways

Receptor		Pathway
Human Health	Future site users / visitors.	Direct / dermal contact. Inhalation of contaminated dusts, gas & vapour.
	Offsite land users.	Inhalation / ingestion of contaminated dust.
	Investigation and construction workers.	Direct / dermal contact. Ingestion / inhalation of contaminated soils. Inhalation of gas / vapour.
Controlled Waters	Principal Aquifer within the Chester Formation.	Leaching of contaminants through permeable strata.
Below Ground Infrastructure	Buried concrete foundations. Services pipework (if any).	Direct contact.

7.4 Risk Assessment

The qualitative risk assessment of the potential pollutant linkages described above is presented in Table 7-3. Based on the assessment, the likelihood of potential ground contamination affecting the Proposed Development is considered to be low to moderate. The qualitative risk assessment will need to be reviewed as the development proposals evolve. Further site specific ground investigation and associated laboratory testing is considered necessary for both geotechnical design purposes and to clarify the geo-environmental considerations in terms of the proposed development. The scope will be based on the specific development proposals once they are at a more detailed stage.

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Table 7-3: Qualitative Risk Assessment

Pollutant Linkage				**Risk Assessment**			**Description of source [bold text]** Comment on hazard realisation [normal text]
Source	Contaminants of Concern	Pathway	Receptor	Consequence	Probability	Risk	
Historic warehouses Made Ground material used to backfill basements Car parking Urban Made Ground material	Metals, cyanide, chlorides, phenols, PAHs, solvents, fuel and oil wastes and asbestos	**The site has a variety of historic uses**					
		Direct /dermal contact, ingestion, inhalation	Construction / Maintenance workers	Medium	Unlikely	Low	Potential for direct contact with contaminated materials during excavations / earthworks. Can be mitigated by good working practice, health and safety and use of PPE if necessary. Chemical concentrations within soils to be further defined during future site specific GI.
		Direct / dermal contact, ingestion, inhalation	Future site occupants and visitors	Medium	East of Cannon Place: Low Likelihood	Low / Moderate	Pathway likely be removed in the end use as the site is envisaged to be covered either by the building(s) or hard / soft landscaping with clean build-ups. To be finalised as the development proposals evolve.
					West of Cannon Place: Unlikely	Low	
		Ingestion / inhalation	Occupants and visitors of neighbouring properties	Medium	Unlikely	Low	Residential / commercial neighbours surrounding and adjacent to the site. Good working practices i.e. dust suppression will need to be in place.
		Migration via permeable strata	Groundwater (Principal A Aquifer – Chester Fm.)	Medium	Unlikely	Low	Downward leaching of contaminants into the Principal A Aquifer (Chester Fm) due to infiltration is considered unlikely – current information suggests that there is a thickness of low permeability clay (Glacial Till) above the Chester Fm. Further prevention will be provided in the end use by drainage networks and potentially cover by hardstanding (depending on exact development proposals – to be reviewed). Procedures must be taken to avoid the creation of pathways during construction.
		Direct contact	Below ground services / infrastructure	Mild	Low Likelihood	Low	Any new services likely to be in clean corridors / trenches. Underground substructure will be designed to withstand appropriate concentrations of any chemicals that may be encountered (e.g. sulphate).
Potentially contaminative historic land uses to east / northeast (mills, warehouses, existing car parking etc.)	Leachable contaminants – metals, fuels, PAHs, petroleum hydrocarbons	**Mills/Warehouses recorded from1848 until 1933. Existing car parking potential source contamination from petrol and oils spills.**					
		Direct / dermal contact, ingestion, inhalation	Construction / Maintenance workers	Medium	Unlikely	Low	Potential for exposure to contaminated waters during foundation / service run excavation and ground works. Capable of mitigation by good working practice and use of PPE.

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		Direct / dermal contact, ingestion, inhalation	Future site occupants and visitors	Medium	Unlikely	Low	Pathway likely be removed in the end use as the site is envisaged to be covered either by the building(s) or hard / soft landscaping with clean build-ups. To be finalised as the development proposals evolve.
Asbestos fibres and fragments within Made Ground	Asbestos	**Asbestos Containing Material (ACM) is likely to be present in Made Ground beneath the site because historic buildings were present.**					
		Inhalation	Construction / Maintenance workers	Severe	Unlikely	Moderate	It is likely that asbestos is present in Made Ground. Mitigation by good working practice and use of PPE will be required and potentially special protective measures. No asbestos fibres detected in chemical testing during historic GI, and no asbestos fragments noted on logs. Made Ground will need to be further assessed for asbestos during future GI, however.
			Future site occupants and visitors	Severe	Unlikely	Moderate	Pathway between any asbestos in Made Ground and receptors is likely to be removed in the end use as the site is envisaged to be covered by either a building, hard landscaping with clean build-up, or soft landscaping with clean topsoil. This will need to be reviewed as the development proposals evolve.
Made Ground	Gas and vapour	**A variable thickness of Made Ground is anticipated to be present onsite, and there is the potential for this to be contaminated and provide a source of hazardous gas and vapour beneath the site.**					
		Inhalation Explosion (methane)	Construction / maintenance workers	Severe	Unlikely	Low / Moderate	Potential for uncontrolled exposure to hazardous ground gas / vapour (if present) in confined unventilated excavations (if required). Capable of mitigation by gas monitoring to define the risks from ground gas and good construction practice e.g. avoiding works in confined spaces, where required PPE and air quality monitoring.

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8 Ground Investigation

8.1 Scope and Objectives

A number of site specific ground investigations have been undertaken on and in the immediate vicinity of the Site to obtain further information in respect of the ground conditions beneath the Site and to allow foundation assessments to be made. Based on the likely ground conditions and the nature of the engineering considerations of the proposed development, issues to be further clarified include the following:

- Contamination assessment (asbestos) in respect of end use, health and safety of workforce and waste disposal of arisings; and
- Manage UXO risk during intrusive investigations.

8.2 Methodology

Given the foregoing and considering the information available for the Site, the following ground investigation works have been undertaken to address the issues outlined above:

- Attendance of a UXO specialist engineer to manage UXO risk for investigatory works;
- 1/2 No. days machine dug trial pitting to allow an assessment of the ground conditions at targeted locations across the entire site to identify the presence of asbestos within the Made Ground and validate the fill placed in the excavation for Arkwright's Mill in respect of end use, health and safety considerations in addition to waste disposal categorization; and
- Chemical laboratory testing. To allow an assessment of any ground contamination (primarily asbestos identification/quantification) in respect of end use, health and safety considerations in addition to waste disposal categorization.

8.3 Constraints

The positions and programming of all exploratory holes during the historical GI's were agreed with NOMA and RCP Parking Ltd to minimise impact and disruption in the use of the car park. A similar strategy would be required for the above works. A site specific utilities survey has not yet been commissioned, however, this is still recommended to identify any services running through the site that are not recorded on the statutory service providers plans prior to the construction phase of the works.

In addition, as detailed above, UXO detection equipment and survey techniques were required as part of the ground investigation. It is anticipated that that similar techniques or geophysical surveys will be required to mitigate the UXO risk for the above GI and during the construction phase of works.

A Ground Engineering Hazard Checklist is included as Appendix J.

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Figures

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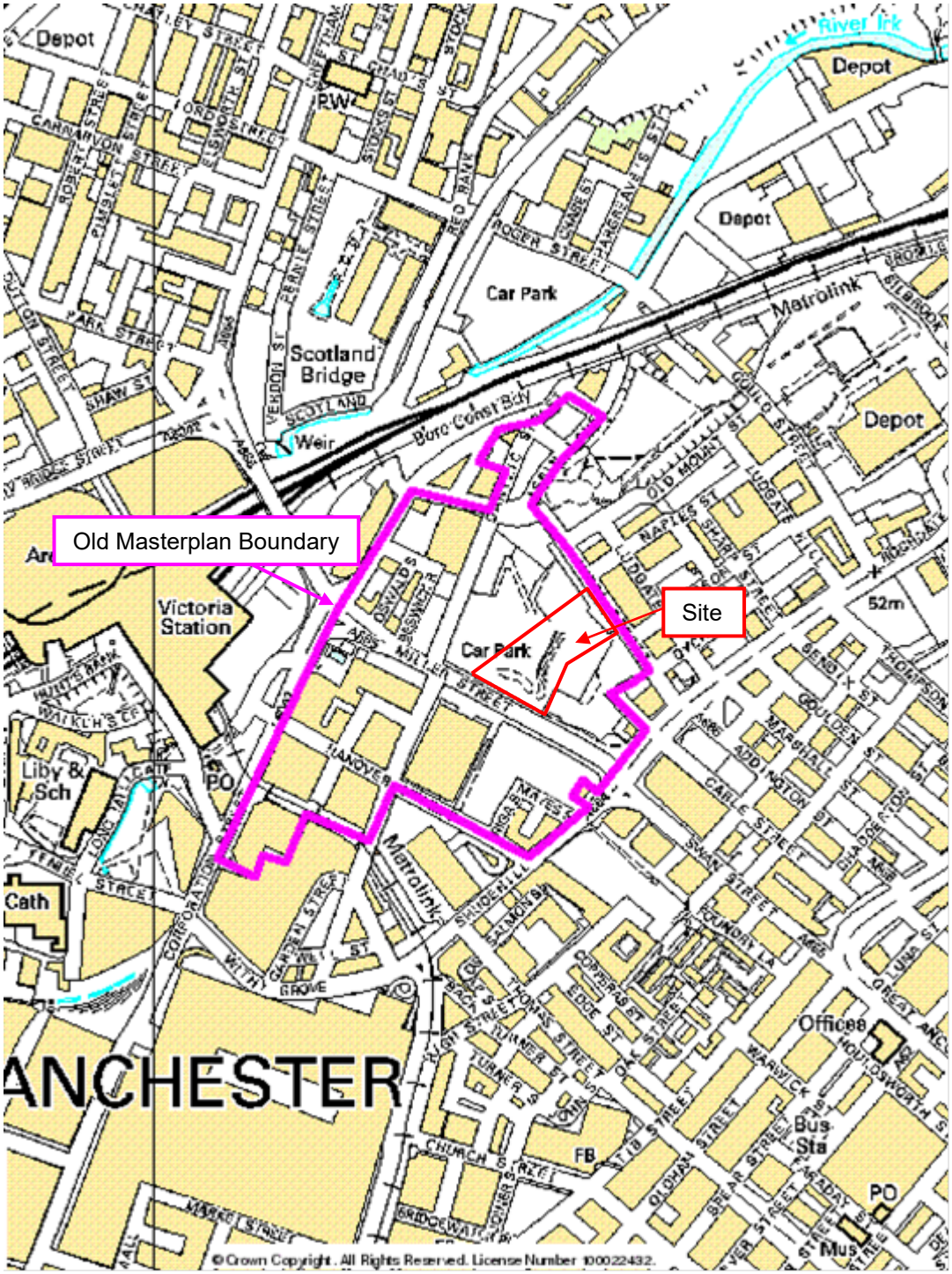
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Project Name : 2&3 Angel Square			BUROHAPPOLD ENGINEERING
Report Title : Ground Engineering Desk Study Report			
Figure Title : Site Location Plan			
Scale: NTS	**Date:** August 2019	**Job No:** 043434	**Fig:** 1



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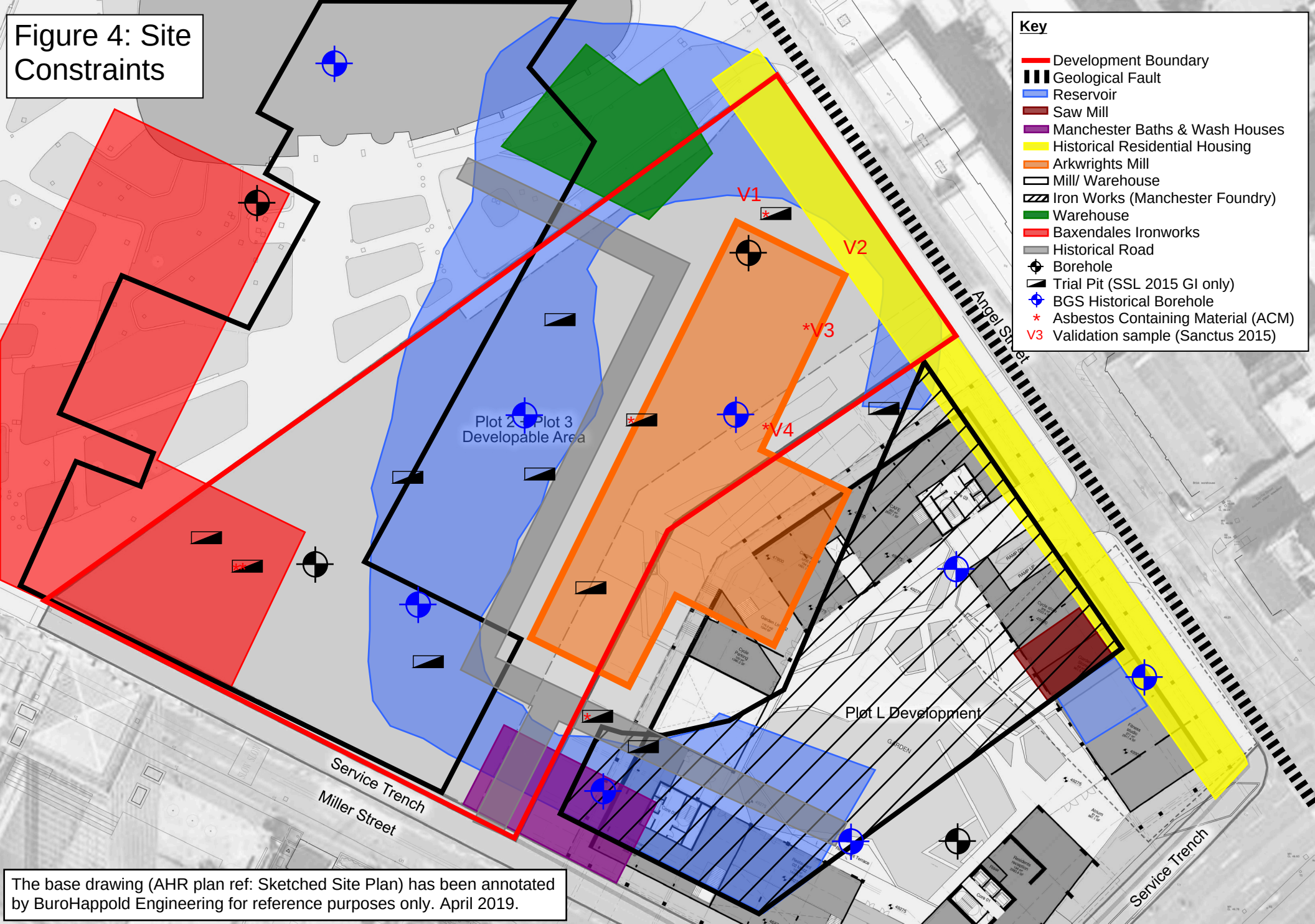
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Report Title : Ground Engineering Desk Study Report			
Figure Title : Aerial Photograph			
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Project Name : 2 & 3 Angel Square			BUROHAPPOLD ENGINEERING
Report Title : Ground Engineering Desk Study Report			
Figure Title : Old Masterplan and Site Development Boundary			
Scale: NTS	**Date:** August 2019	**Job No:** 043434	**Fig:** 3

Figure 4: Site Constraints



The base drawing (AHR plan ref: Sketched Site Plan) has been annotated by BuroHappold Engineering for reference purposes only. April 2019.

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Drawing Notes:

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1 ANGEL SQUARE

2 ANGEL SQUARE

3 ANGEL SQUARE

ANGEL GARDENS

Angel Square

CORPORATION STREET

MUNSTER STREET

OSWALD STREET

BESWICK ROW

STYLE STREET

ANGEL STREET

NAPLES STREET

NEW MOUNT STREET

LUDGATE STREET

SCHOOL STREET

SHARP STREET

SIMPSON STREET

MAYES STREET

HANOVER STREET

MILLER STREET

RIGA STREET

ROCHDALE ROAD

TCB

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Trench 2

Trench 2A

Trench 2B

Trench 3

Trench 4

Trench 5

Trench 6

Trench 7

Trench 8

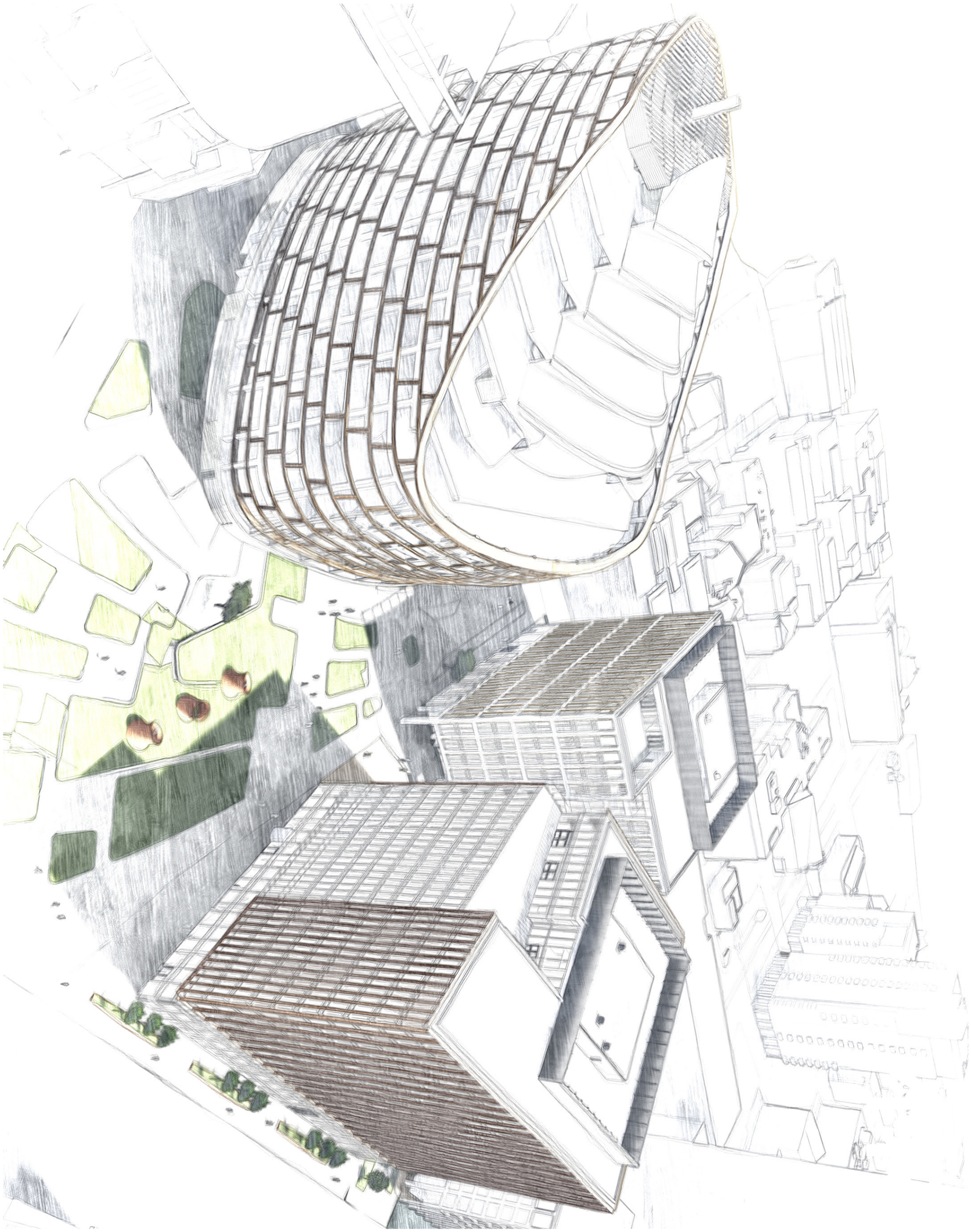
BUROHAPPOLD ENGINEERING	
GROUND ENGINEERING	
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Job Number: 043434	
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Date: APRIL 2019	Initials: PH

Appendix A – Proposed Development Details

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2 + 3 ANGEL SQUARE

DESIGN UPDATE 04.04.19





Rev	Description	Date	Dr by	App by
P6	Brief updates	18.03.19	GG	GG
P5	Brief updates	15.02.19	GG	GG
P4	Stage 3 Issue	22.10.15	GG	GG
P3	Stage 3 Preliminary Issue	16.10.15	GG	GG
P2	Section Lines Added	22.01.15	GG	CH
P1	General Update	09.01.15	GG	CH

original by	date created	approved by
CH	08/20/15	GG

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project
2 Angel Square

drawing
Lower Ground Floor Plan

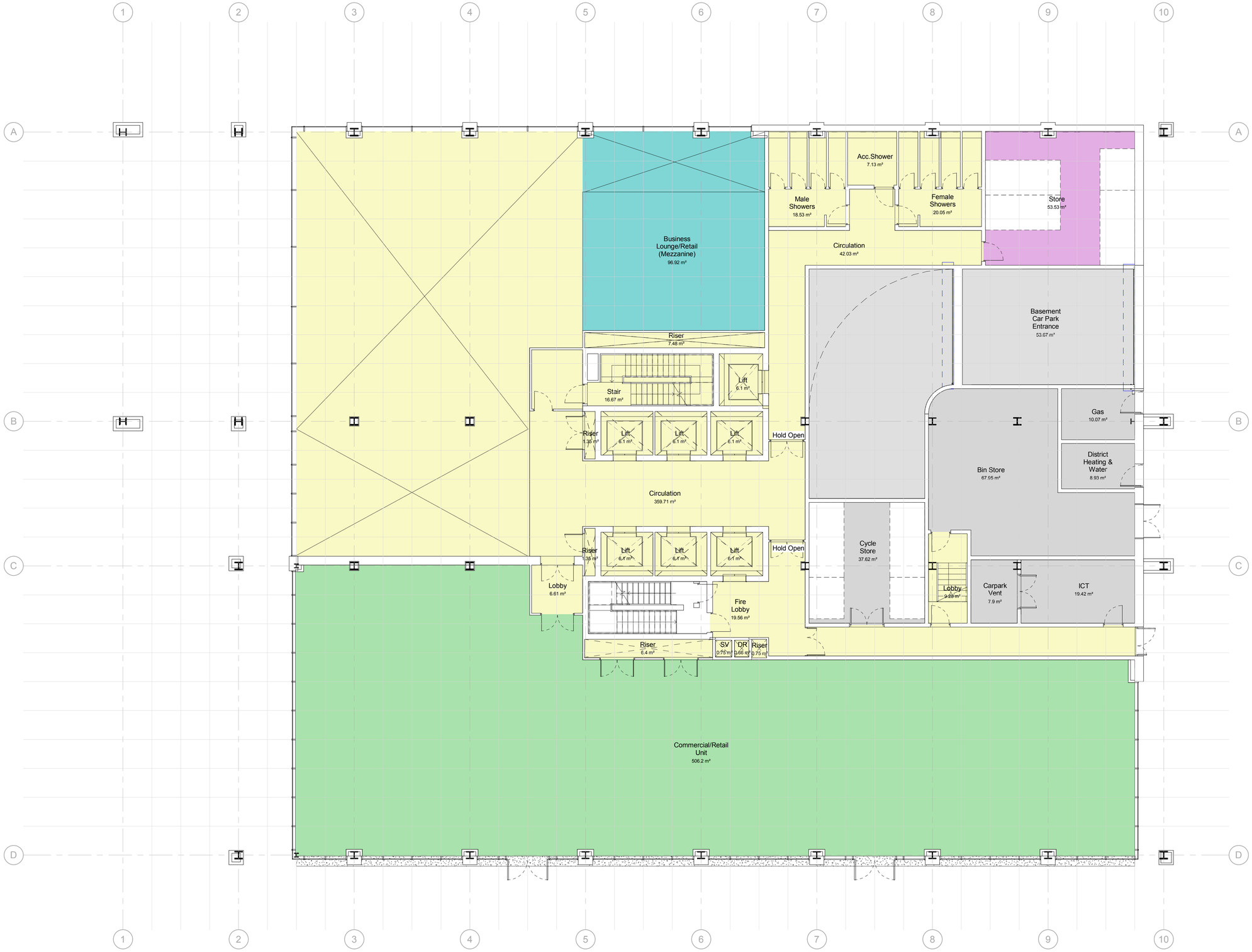
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P6	Brief updates	18.03.19	GG	GG
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drawing
Upper Ground Floor Plan

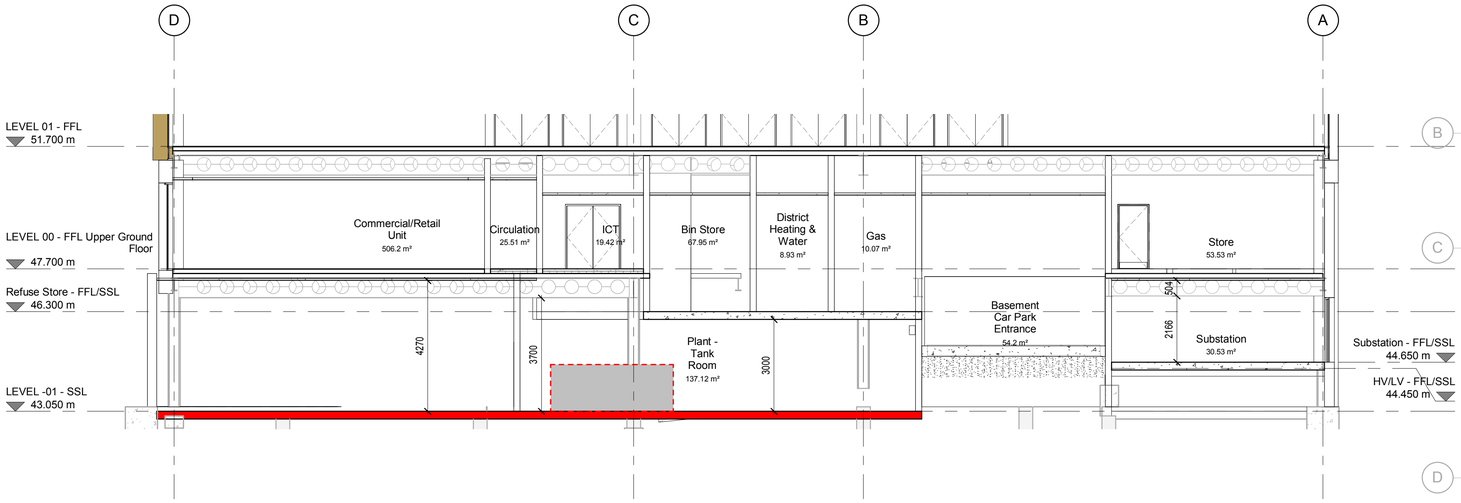
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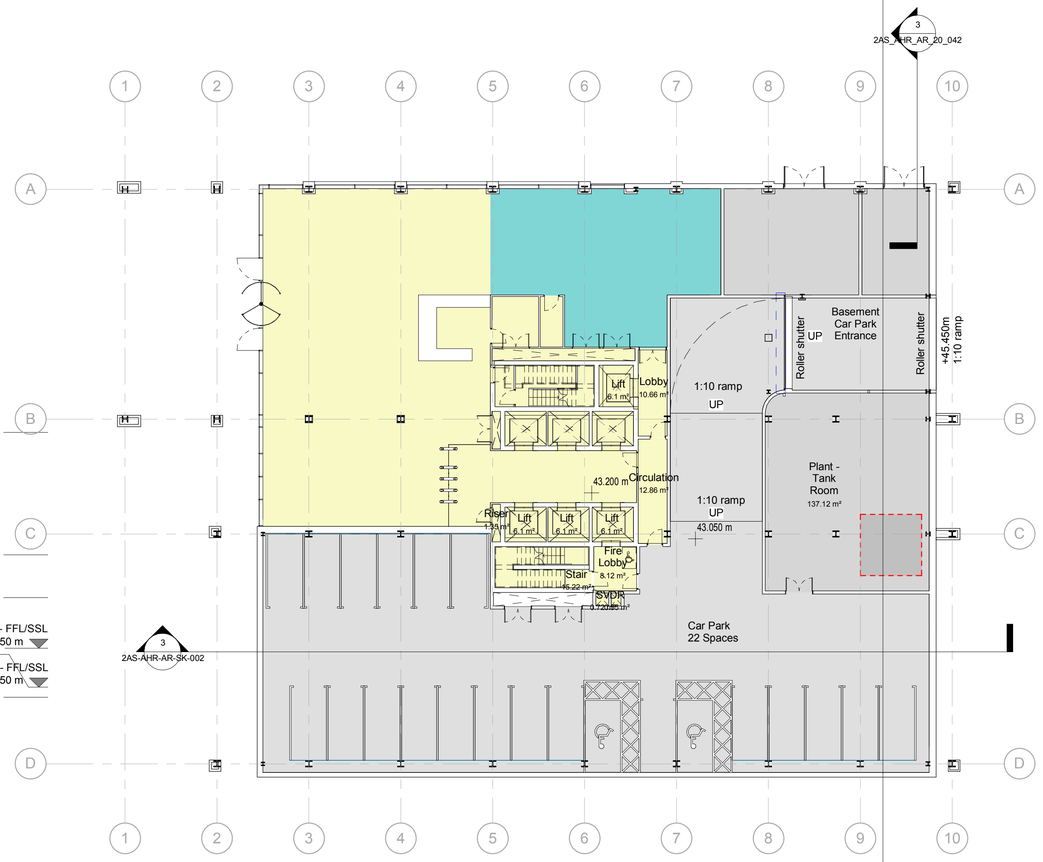
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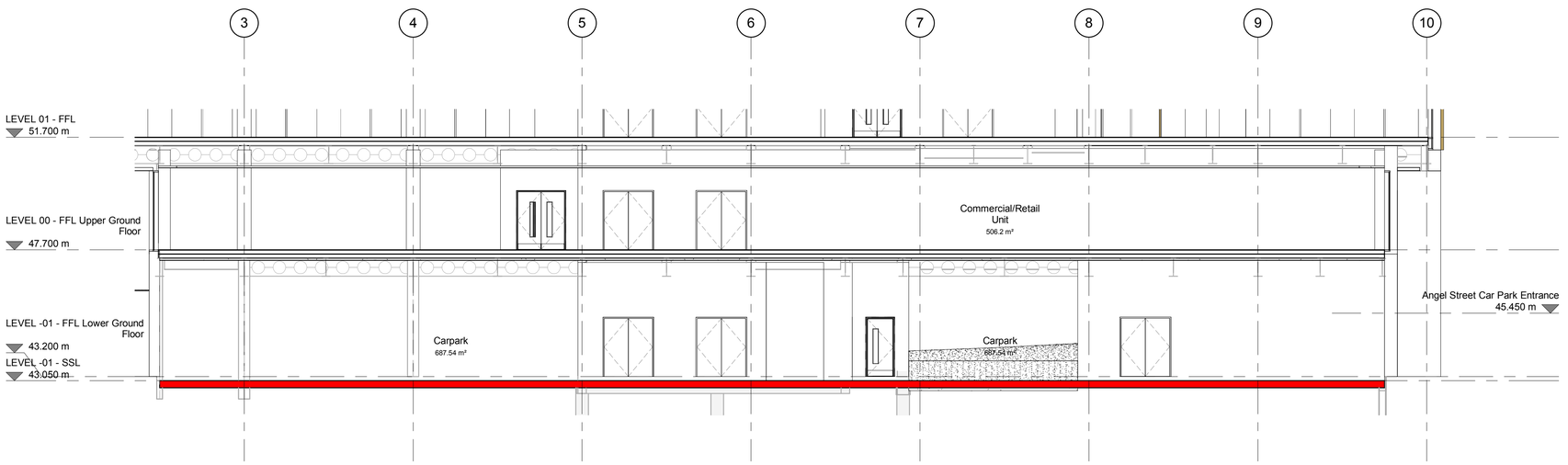
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1 Section 1
1 : 100



2 Lower Ground Floor Plan
1 : 200



3 Section 2
1 : 100

Rev	Description	Date	Dr by	App by

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GG	03/18/19	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
Car Park Sections

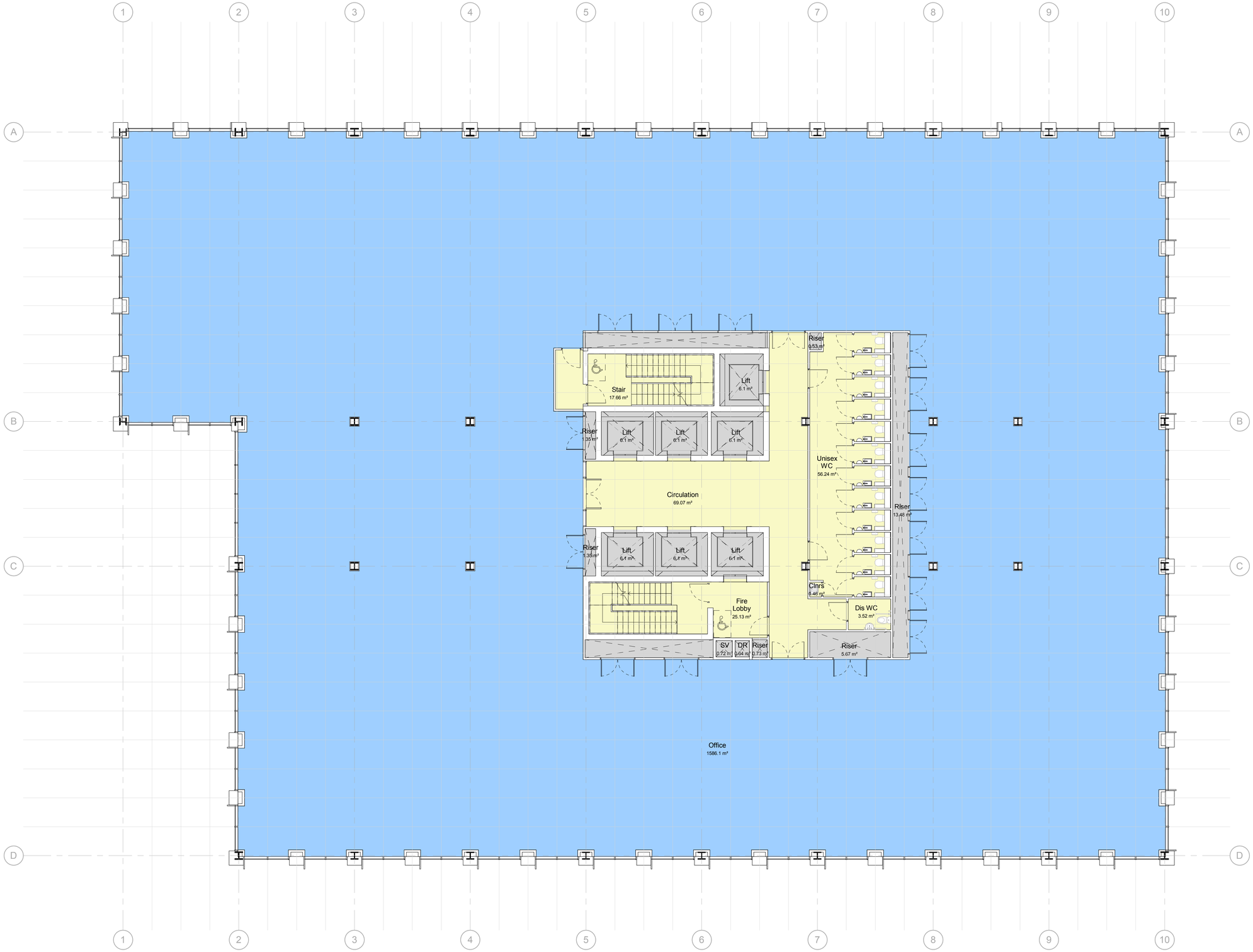
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P7	Design updates	03.04.19	GG	GG
P6	Brief updates	18.03.19	GG	GG
P5	Brief updates	15.02.19	GG	GG
P4	Stage 3 Issue	22.10.15	GG	GG
P3	Stage 3 Preliminary Issue	16.10.15	GG	GG
P2	Section Lines Added	22.01.15	GG	CH
P1	General Update	09.01.15	GG	CH

original by	date created	approved by
CH	08/20/15	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
First Floor Plan

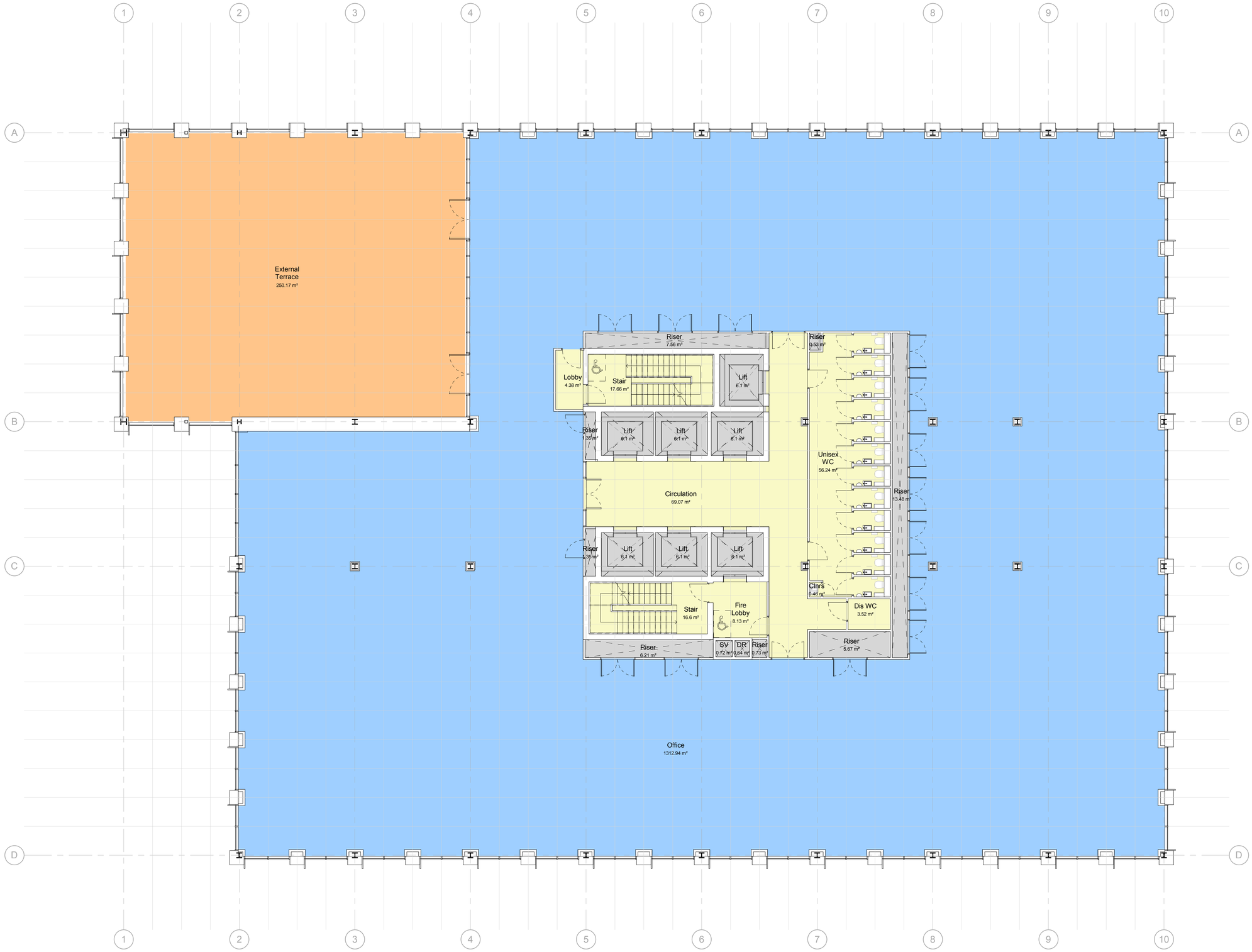
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plot date

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drawing number	rev	issue status
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Rev	Description	Date	Dr by	App by
P1	Design updates	03.04.19	GG	GG

original by	date created	approved by
CH	08/20/15	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
Ninth Floor Plan

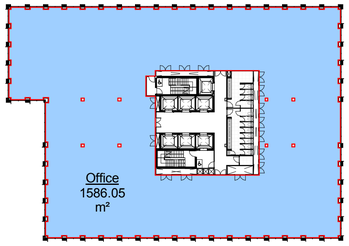
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plot date

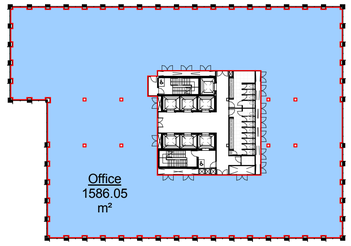
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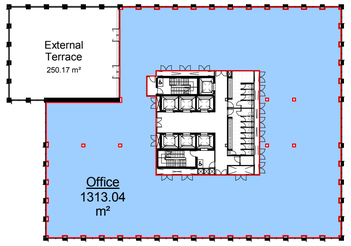
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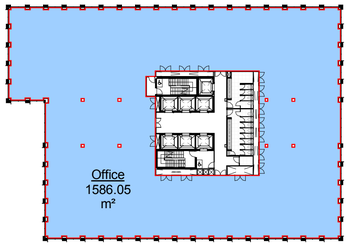
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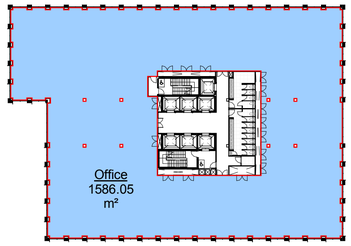
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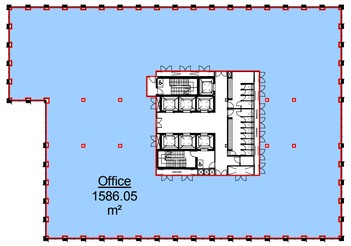
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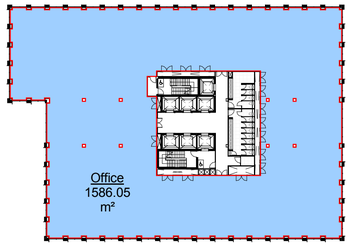
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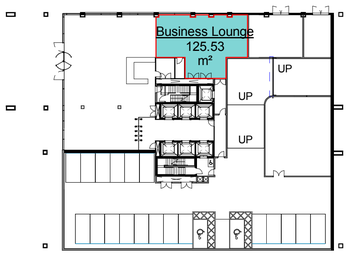
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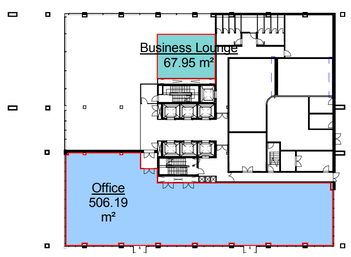
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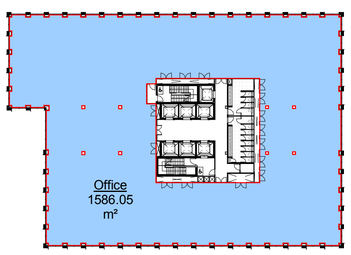
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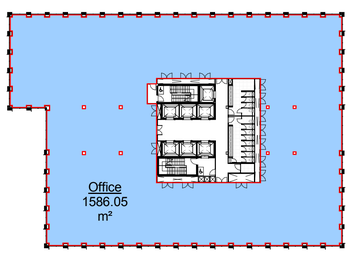
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2 LEVEL 00 - FFL Upper Ground Floor
1 : 500



3 LEVEL 01 - FFL
1 : 500



4 LEVEL 02 - FFL
1 : 500

Area Schedule (NIA)

Level	Name	Area (sqm)	Area (sqft)
LEVEL -01 - FFL Lower Ground Floor	Business Lounge	125.53	1351.22
LEVEL 00 - FFL Upper Ground Floor	Business Lounge	67.95	731.36
Business Lounge		193.48	2082.58
LEVEL 00 - FFL Upper Ground Floor	Office	506.19	5448.63
LEVEL 01 - FFL	Office	1586.05	17072.25
LEVEL 02 - FFL	Office	1586.05	17072.25
LEVEL 03 - FFL	Office	1586.05	17072.25
LEVEL 04 - FFL	Office	1586.05	17072.25
LEVEL 05 - FFL	Office	1586.05	17072.25
LEVEL 06 - FFL	Office	1586.05	17072.25
LEVEL 07 - FFL	Office	1586.05	17072.25
LEVEL 08 - FFL	Office	1586.05	17072.25
LEVEL 09 - FFL	Office	1313.04	14133.62
Office		14507.64	156160.24
Grand total		14701.12	158242.82

Rev	Description	Date	Dr by	App by
P2	Brief updates	18.03.19	GG	GG
P1	Brief updates	15.02.19	GG	GG

original by	date created	approved by
GG	08/07/17	DM

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client name: NOMA (GP) Limited

project: 2 Angel Square

drawing: NIA Plans

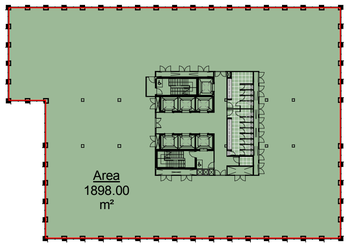
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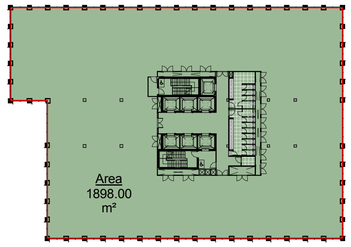
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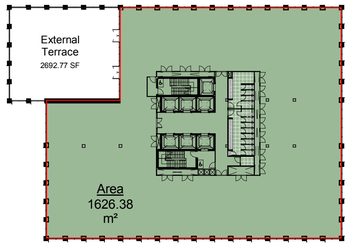
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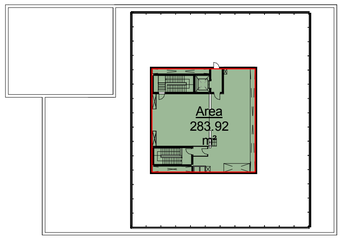
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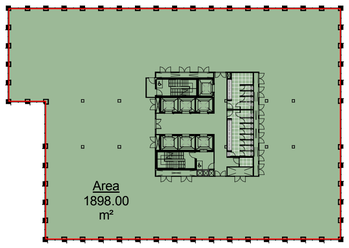
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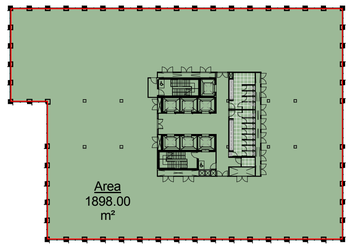
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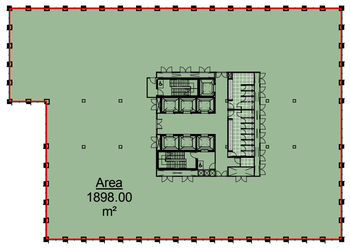
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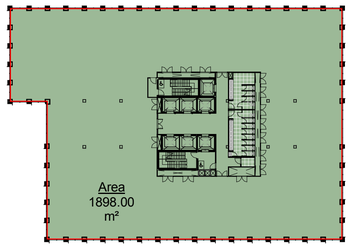
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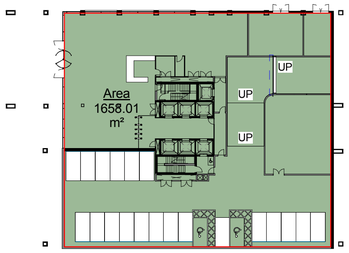
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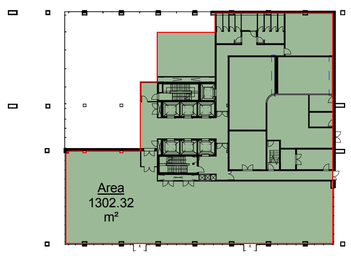
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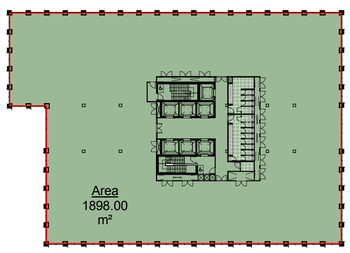
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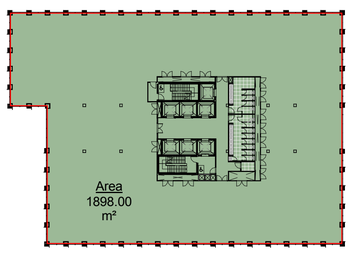
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3 LEVEL 00 - FFL Upper Ground Floor
1 : 500



4 LEVEL 01 - FFL
1 : 500



5 LEVEL 02 - FFL
1 : 500

Area Schedule (GIA)

Level	Name	Area (sqm)	Area (sqft)
LEVEL -01 - FFL Lower Ground Floor	Area	1658.01	17846.82
LEVEL 00 - FFL Upper Ground Floor	Area	1302.32	14018.2
LEVEL 01 - FFL	Area	1898	20430.1
LEVEL 02 - FFL	Area	1898	20430.1
LEVEL 03 - FFL	Area	1898	20430.1
LEVEL 04 - FFL	Area	1898	20430.1
LEVEL 05 - FFL	Area	1898	20430.1
LEVEL 06 - FFL	Area	1898	20430.1
LEVEL 07 - FFL	Area	1898	20430.1
LEVEL 08 - FFL	Area	1898	20430.1
LEVEL 09 - FFL	Area	1626.38	17506.38
LEVEL 10 - FFL	Area	283.92	3056.14
Grand total		20054.66	215868.34

Rev	Description	Date	Dr by	App by
P3	9th floor GIA updated	03.04.19	GG	GG
P2	Brief updates	18.03.19	GG	GG
P1	Brief updates	15.02.19	GG	GG

original by	date created	approved by
GG	08/08/17	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
GIA Plans

computer file
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Rev	Description	Date	Dr by	App by
P1	Design updates	03.04.19	GG	GG

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CH	08/20/15	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
Lower Ground Floor Plan

computer file
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drawing number	rev	issue status
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Rev	Description	Date	Dr by	App by
P1	Design updates	03.04.19	GG	GG

original by	date created	approved by
CH	08/20/15	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
Upper Ground Floor Plan

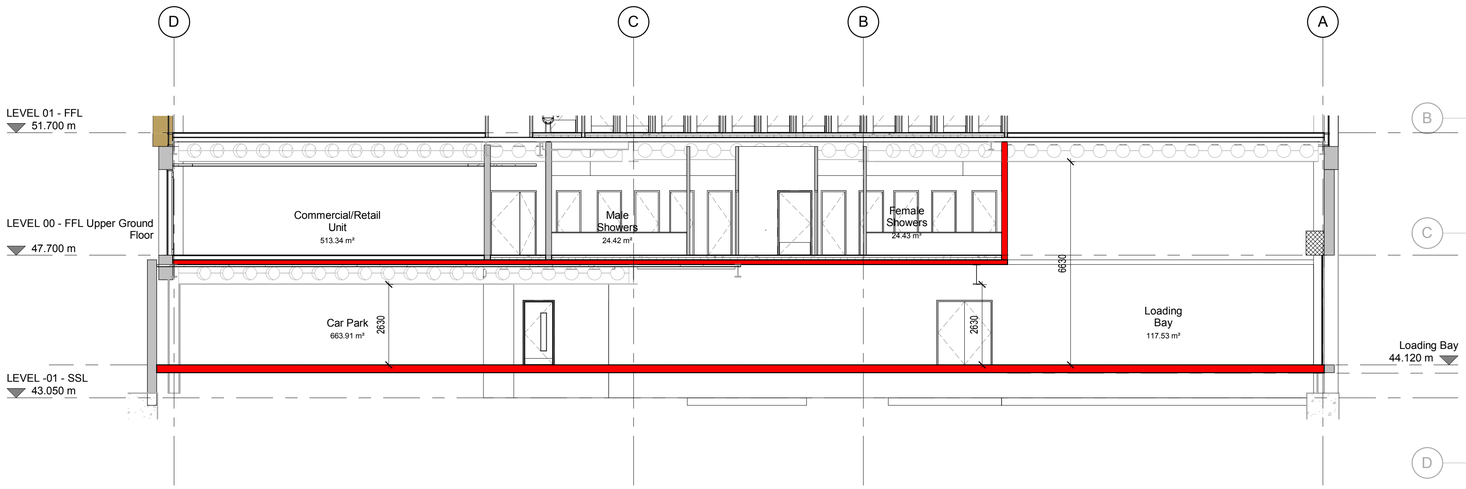
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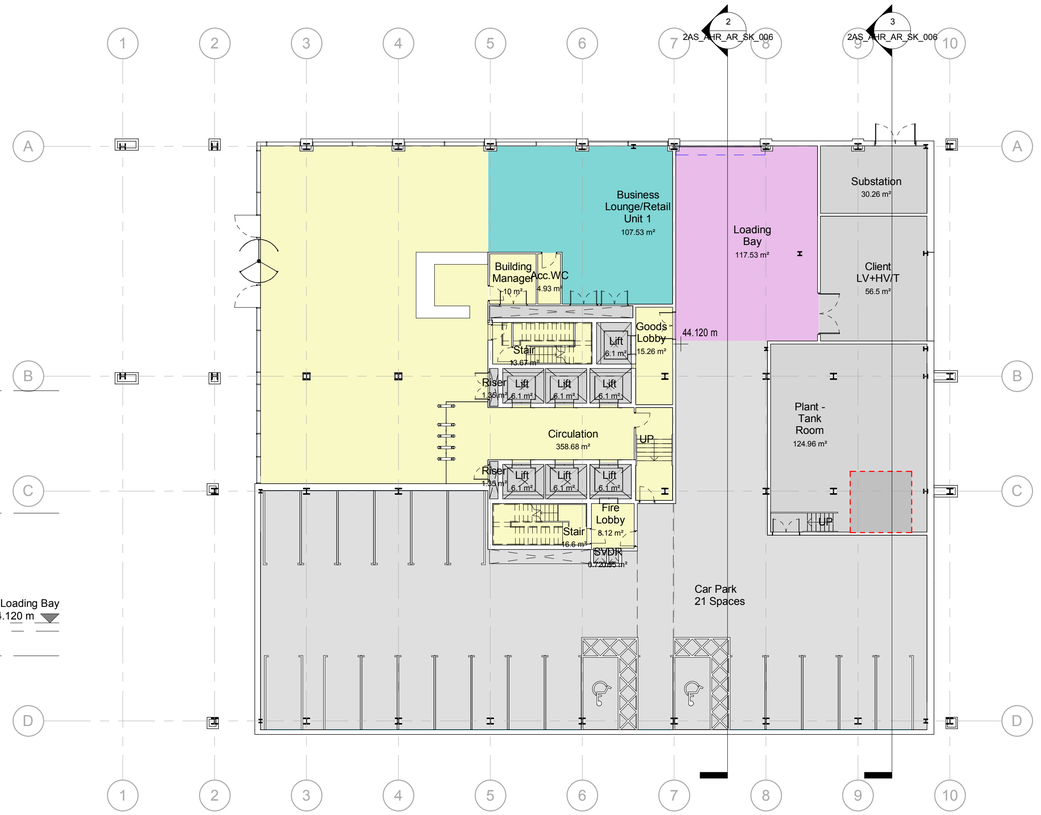
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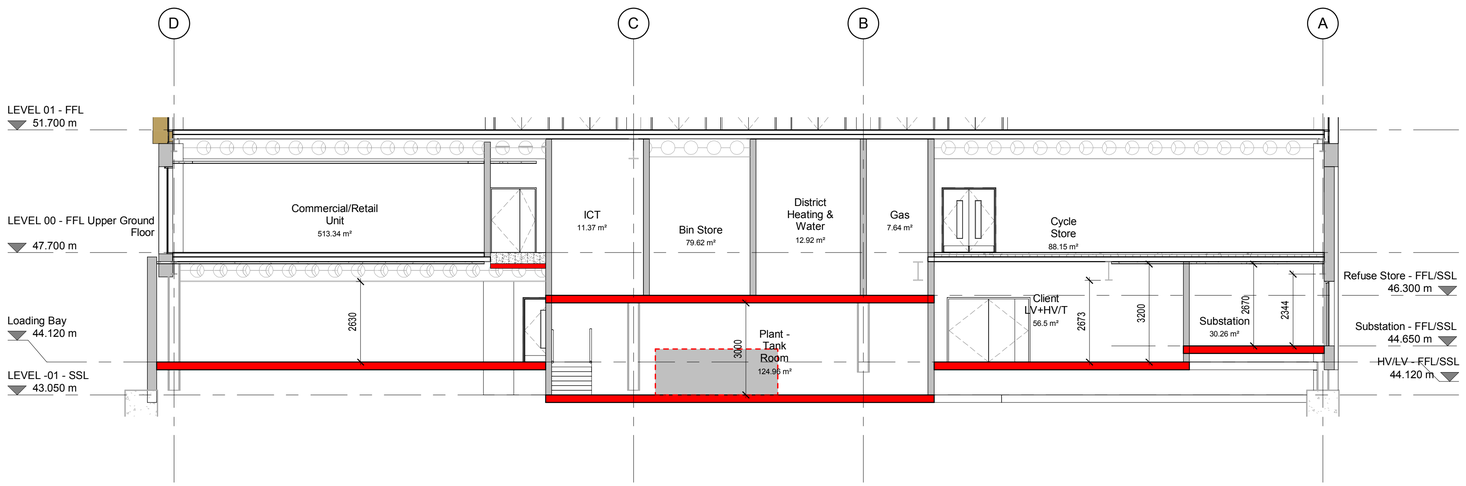
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2 Section 1
1 : 100



1 Lower Ground Floor Plan
1 : 200



3 Section 2
1 : 100

Rev	Description	Date	Dr by	App by
P1	Design updates	03.04.19	GG	GG

original by: GG
date created: 03/20/19
approved by: GG

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client name: NOMA (GP) Limited

project: 2 Angel Square

drawing: Car Park Sections

computer file: I:\fs1\projects\AR\MAN\2014\2014.00912.000 - 2 Angel Square, NOMA\10 BIM\10.0 WIP Data\00912-AHR-XX-XX-M3-A_No atrium_r17_CP Op2.rvt

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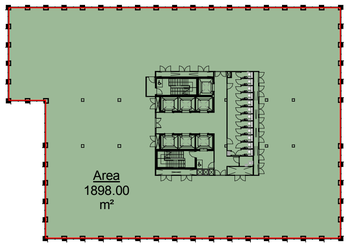
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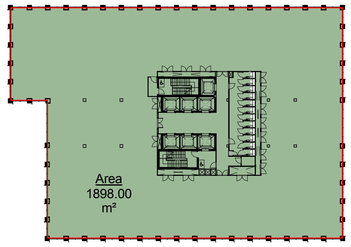
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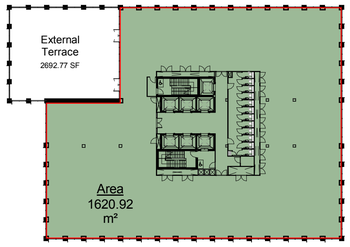
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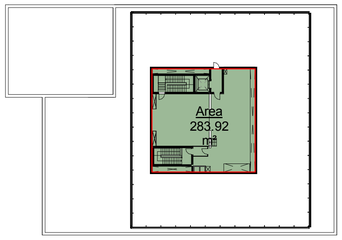
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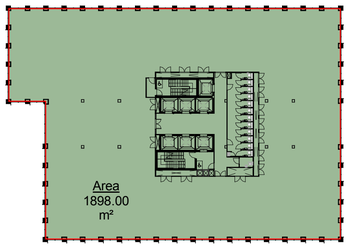
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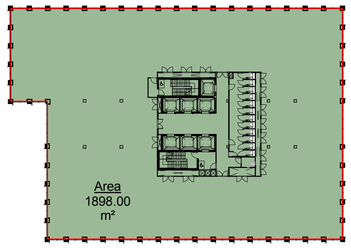
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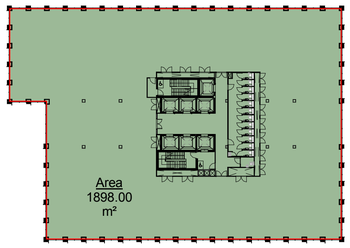
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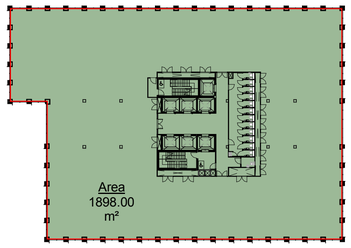
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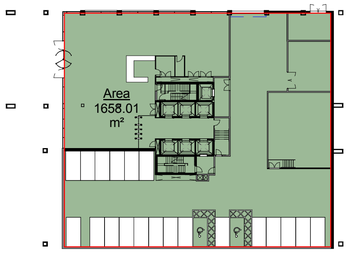
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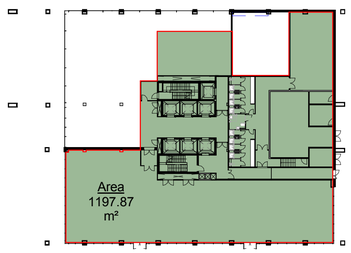
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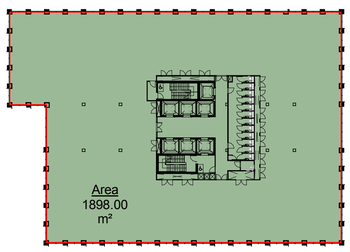
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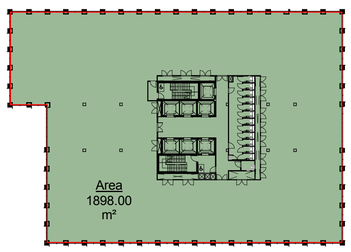
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1 : 500



3 LEVEL 00 - FFL Upper Ground Floor
1 : 500



4 LEVEL 01 - FFL
1 : 500



5 LEVEL 02 - FFL
1 : 500

Area Schedule (GIA)

Level	Name	Area (sqm)	Area (sqft)
LEVEL -01 - FFL Lower Ground Floor	Area	1658.01	17846.82
LEVEL 00 - FFL Upper Ground Floor	Area	1197.87	12893.83
LEVEL 01 - FFL	Area	1898	20430.1
LEVEL 02 - FFL	Area	1898	20430.1
LEVEL 03 - FFL	Area	1898	20430.1
LEVEL 04 - FFL	Area	1898	20430.1
LEVEL 05 - FFL	Area	1898	20430.1
LEVEL 06 - FFL	Area	1898	20430.1
LEVEL 07 - FFL	Area	1898	20430.1
LEVEL 08 - FFL	Area	1898	20430.1
LEVEL 09 - FFL	Area	1620.92	17447.61
LEVEL 10 - FFL	Area	283.92	3056.14
Grand total		19944.74	214685.2

Rev	Description	Date	Dr by	App by

original by	date created	approved by
GG	08/08/17	GG

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client name
NOMA (GP) Limited

project
2 Angel Square

drawing
GIA Plans

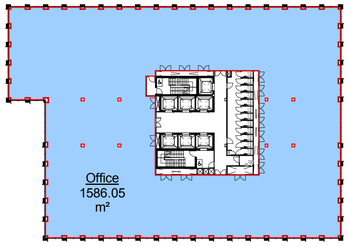
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plot date

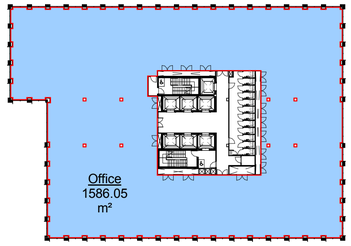
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drawing number	rev	issue status
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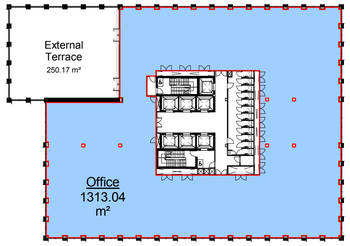
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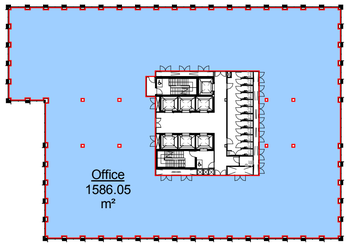
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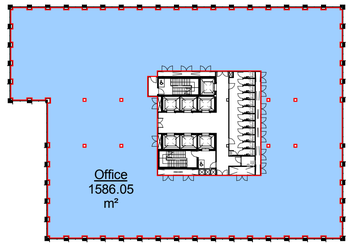
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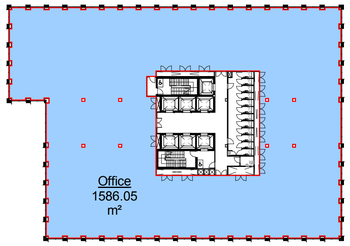
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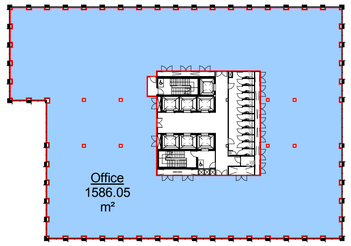
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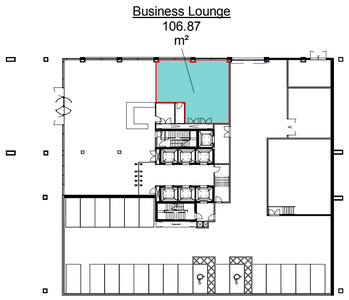
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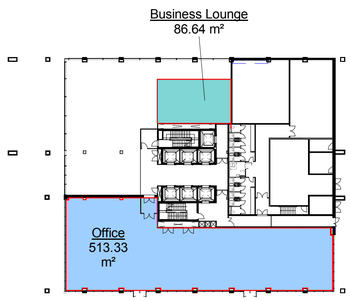
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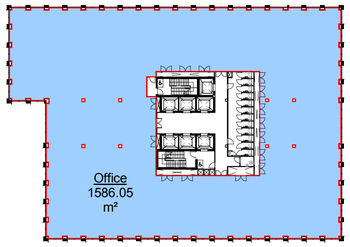
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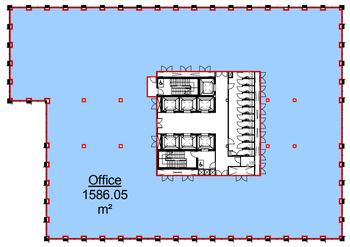
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2 LEVEL 00 - FFL Upper Ground Floor
1 : 500



3 LEVEL 01 - FFL
1 : 500



4 LEVEL 02 - FFL
1 : 500

Area Schedule (NIA)

Level	Name	Area (sqm)	Area (sqft)
LEVEL -01 - FFL Lower Ground Floor	Business Lounge	106.87	1150.3
LEVEL 00 - FFL Upper Ground Floor	Business Lounge	86.64	932.59
Business Lounge		193.5	2082.88
LEVEL 00 - FFL Upper Ground Floor	Office	513.33	5525.44
LEVEL 01 - FFL	Office	1586.05	17072.25
LEVEL 02 - FFL	Office	1586.05	17072.25
LEVEL 03 - FFL	Office	1586.05	17072.25
LEVEL 04 - FFL	Office	1586.05	17072.25
LEVEL 05 - FFL	Office	1586.05	17072.25
LEVEL 06 - FFL	Office	1586.05	17072.25
LEVEL 07 - FFL	Office	1586.05	17072.25
LEVEL 08 - FFL	Office	1586.05	17072.25
LEVEL 09 - FFL	Office	1313.04	14133.62
Office		14514.78	156237.05
Grand total		14708.28	158319.94

Rev	Description	Date	Dr by	App by

original by	date created	approved by
GG	08/07/17	DM

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client name: NOMA (GP) Limited

project: 2 Angel Square

drawing: NIA Plans

computer file: I:\fs1\projects\AR\MAN\2014\2014.00912.000 - 2 Angel Square, NOMA\10 BIM\10.0 WIP Data\00912-AHR-XX-XX-M3-A_No atrium_r17_CP Op2.rvt

plot date:

project number	scale	
2014.00912.000	1 : 500	@A1

drawing number	rev	issue status
2AS_AHR_AR_20_055		S0

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T	Stage 3 Issue	28.10.15	CH	GG
Rev	Description	Date	Dr by	App by

original by	date created	Approved by
Author	10/28/15	Approver

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Manchester
M3 2HN
United Kingdom

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E manchester@ahr-global.com
www.ahr-global.com

client name
NOMA (GP) Limited

project
2 + 3 Angel Square

drawing
Site Plan_Lower Ground Floor

computer file	plot date
H:\#1\3000\2014\2014.2000\2000 - 2 Angel Square, NOMA\10 SB\1010 WIP Sheet\2000-AHR-XX-XX-M3-A-SITE_REVA_117.rvt	

project number	scale
2012.000.000	1 : 200 @A0

drawing number	rev	issue status
MAS_AHR_AR_90_001	P1	For Information

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Rev	Description	Date	Dr by	App by
1	Stage 3 Issue	28.10.15	CH	GG

original by: CH

date created: 10/28/15

Approved by: Approver

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Manchester
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client name: NOMA (GP) Limited

project: 2 + 3 Angel Square

drawing: Site Plan_Upper Ground Floor

computer file: H:\all\3949\2014\2014-339\12.000 - 2 Angel Square, NOMA\10 BM\10.0 WIP Data\02012-AHR-XX-XX-M3-A-SITE_REVA_r17.rvt

plot date:

project number: 2012.000.000

scale: 1 : 200 @A0

drawing number: MAS_AHR_AR_90_002

rev: P1

issue status: For Information

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Appendix B – Information Source Summary

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Information Sources	Information Obtained?		Comments
	YES	NO	
Environment Agency (e.g. for information on landfill sites, water abstraction, pollution incidents)	✓		Groundsure® Report data.
The Local Authority (e.g. for information on environmental health & planning)	✓		Via internet searches.
Archaeological records	✓		Oxford Archaeology Reports, Gifford Report, Wessex Archaeology Report.
Local history sources (e.g. libraries, museums, societies)	✓		Via internet searches.
Coal Authority (coal mining records)	✓		Coal Authority Report Data
British Geological Survey (maps and information about the geology of the area)	✓		BGS maps and memoirs.
Historical borehole information	✓		BGS data.
Aquifers (major and minor, and groundwater vulnerability)	✓		Groundsure® Report data.
Hydrogeology (groundwater levels)	✓		Groundsure® Report data and BGS data.
Ordnance Survey (current & previous editions of plans)	✓		Groundsure® Report data.
Newspaper reports		✓	---
Waste, Hazardous Substances	✓		Groundsure® Report data.
Service/Utility Companies	✓		WDA 56_UMP_(A)_01 Rev 2 (dated 14/05/19)
Existing site investigations	✓	-	Onsite and adjacent site (SSL 2009, 2013 & 2015 data).

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Appendix C – Utilities Information

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A0

DO NOT SCALE FROM THIS DRAWING

Notes

All dimensions are taken from the FACE OF KERB

180mm MDPE - MEDIUM PRESSURE GAS MAIN INSTALLED FOR FUTURE DEVELOPMENT

ALL DIMENSIONS TAKEN FROM FACE OF KERB ON MILLER STREET. ALL DEPTHS OF COVER (D.O.C.) TAKEN FROM TOP OF KERB ON MILLER STREET.

ALL "SPURS" HAVE PURGE POINTS INSTALLED

MAIN HAS BEEN PRESSURE TESTED AND LEFT AT > ATMOS PRESSURE BUT IS NOT CONNECTED TO THE GAS NETWORK

DO NOT SCALE FROM THIS DRAWING

LEGEND

MEDIUM PRESSURE GAS MAIN

Issue	Date	Description	By	Chkd	Verfd
-	28.09.15	As-Built Record	SC	DH	OB

Project: NOMA PHASE 2 AND 3
MULTI UTILITY DIVERSIONS
MILLER STREET AND ROCHDALE ROAD

Client: THE CO-OPERATIVE GROUP
NOMA

Title: MULTI UTILITY DIVERSIONS
AS-BUILT RECORD
FOR MEDIUM PRESSURE GAS FUTURE PROOFING

Drawing No.	Drawing Status
UDP 3876	AS-BUILT
Job No.	Scale: 1:250 @ A0

Drawn By	Checked	Verified	Issue.
DJH	SC	OB	1

UTILITIES DESIGN & PLANNING LTD
33 COBDEN STREET
SALFORD
GREATER MANCHESTER
M6 6WF
t: 0161 907 1234
f: 0161 907 1254
e: info@udpltd.co.uk
w: www.udpltd.co.uk
Civil Engineering and Traffic Management
Design, Management and Installation Services



The Utility Information on this drawing has been taken from records supplied by each individual affected Utility Company under a C2 request and is given without warranty, the accuracy thereof cannot be guaranteed, nor can we guarantee the accuracy of the transfer of information to this drawing. No Liability of any kind whatsoever is accepted by WDA Ltd for any error or omission.
This drawing is solely for visual guidance.
Safe Digging practices in accordance with HS(G)47 must be used to verify and establish the actual position of each individual service.

RELATED DRAWINGS:

ELECTRIC SERVICES:	WDA 56_UMP(E)_01
GAS SERVICES:	WDA 56_UMP(G)_01
TELECOMS SERVICES:	WDA 56_UMP(T)_01
WATER SERVICES:	WDA 56_UMP(W)_01

UTILITY LEGEND

- Water Main
- Water Main
- Water-Trunk Main
- Surface Water Drain
- Foul Water Sewer
- Foul Water Sewer (Abandoned)
- 6.6kV Electricity Cable
- 6.6kV Electricity Cable (Abandoned)
- LV Electricity Cable
- LV Electricity Cable (Abandoned)
- Gas - Low Pressure
- Future Proofing Main laid by 3rd parties and not gas charged or connected into the NGG network
- British telecom Cable
- British telecom Cable (Planned)
- Private Telecom Cable
- CenturyLink Cable
- City Fibre
- Gamma
- Sky
- Virgin Media Cable
- Vodafone Cable
- Zayo Cable
- Trunk Water Main Easement No Work Permitted over or within 5M (Horizontal) of the asset
- 315mm Water Main Easement No Work Permitted over or within 5M (Horizontal) of the asset

Client(s) NOMA GP Ltd

Project NOMA, MANCHESTER

Drg Title RECORD UNDERGROUND UTILITIES ALL SERVICES

This Drawing No. WDA 56_UMP(A)_01 **Rev** 2

Original (Rev 0) Drawing details

Scale	Sheet	Drawn	Checked	Date
1:1000	A1	CP	WD	19/10/2018

Drawing revisions:

Revision	Event	Drawn By	Checked By	Date
1	Street Names added Private Gas & Telecomms added.	CP	WD	23.10.2018
2	5M Wide Easement added to Water Service	CP	WD	14.05.2019
3				
4				
5				
6				
7				
8				
9				

Utilities Infrastructure Consultants

William Downie Associates

Site Appraisals | Masterplanning | Diversions | New Infrastructure

t: 01803 865 518 | m: 07526 943 594 | e: info@wdassociates.co.uk
DS037, Dartington Space, Dartington Hall, Totnes TQ9 6EN

www.wdassociates.co.uk

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Appendix D – Historical Maps

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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

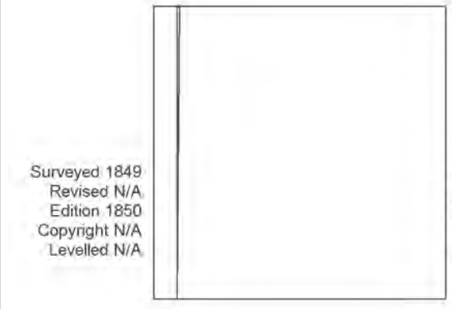
Map Name: 1056 Scale Town Plan

Map date: **1850**

Scale: 1:1,056

Printed at: 1:1,056

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Production date: 06 August 2019

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series Town Plan

Map date: **1891**

Scale: 1:500

Printed at: 1:1,000

N
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Surveyed 1891
Revised N/A
Edition 1891
Copyright N/A
Levelled N/A

Surveyed 1891
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1891
Revised N/A
Edition 1891
Copyright N/A
Levelled N/A

Surveyed 1891
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Edition 1891
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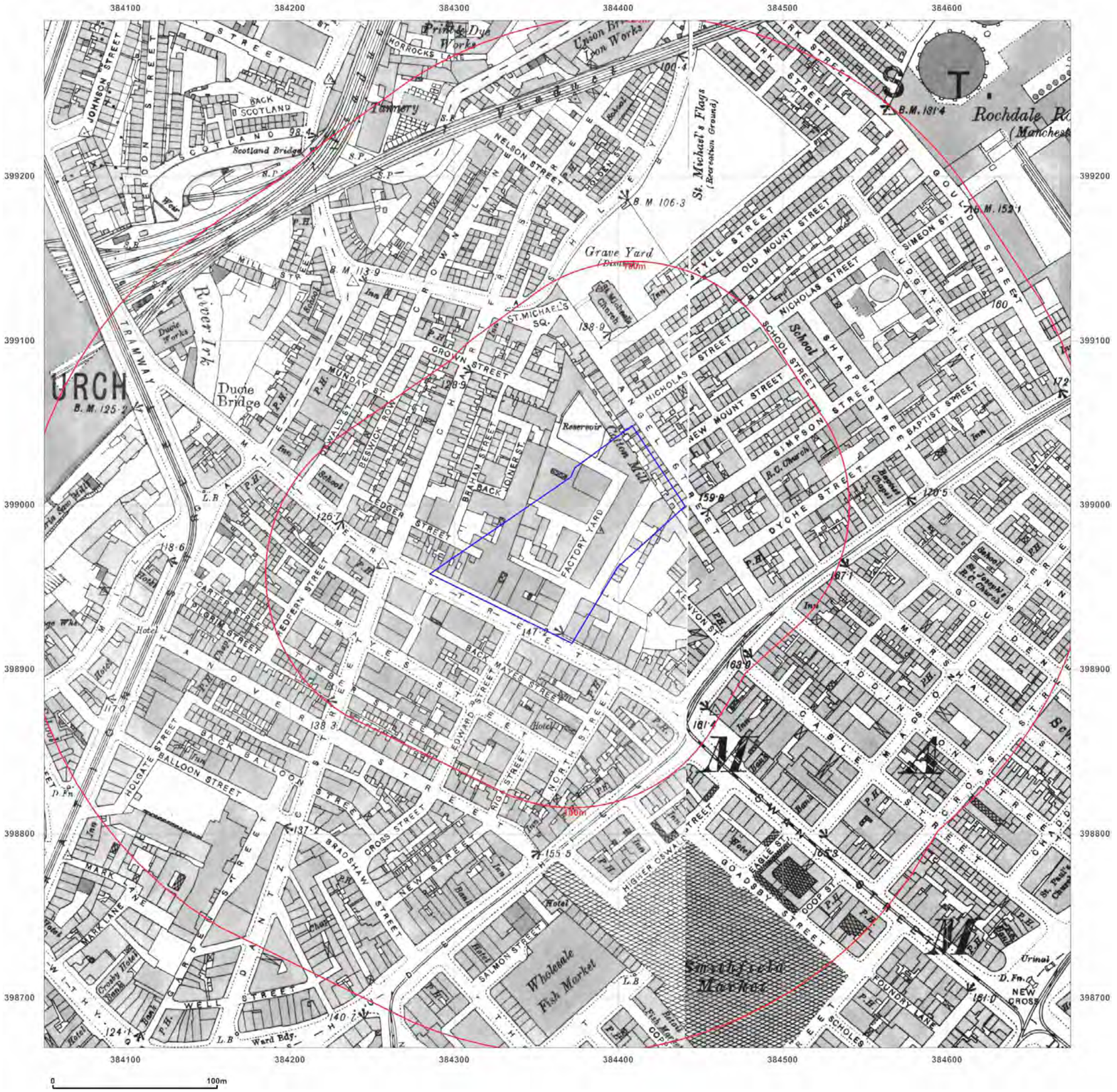
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1892-1893**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1892
Revised N/A
Edition 1892
Copyright N/A
Levelled N/A

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

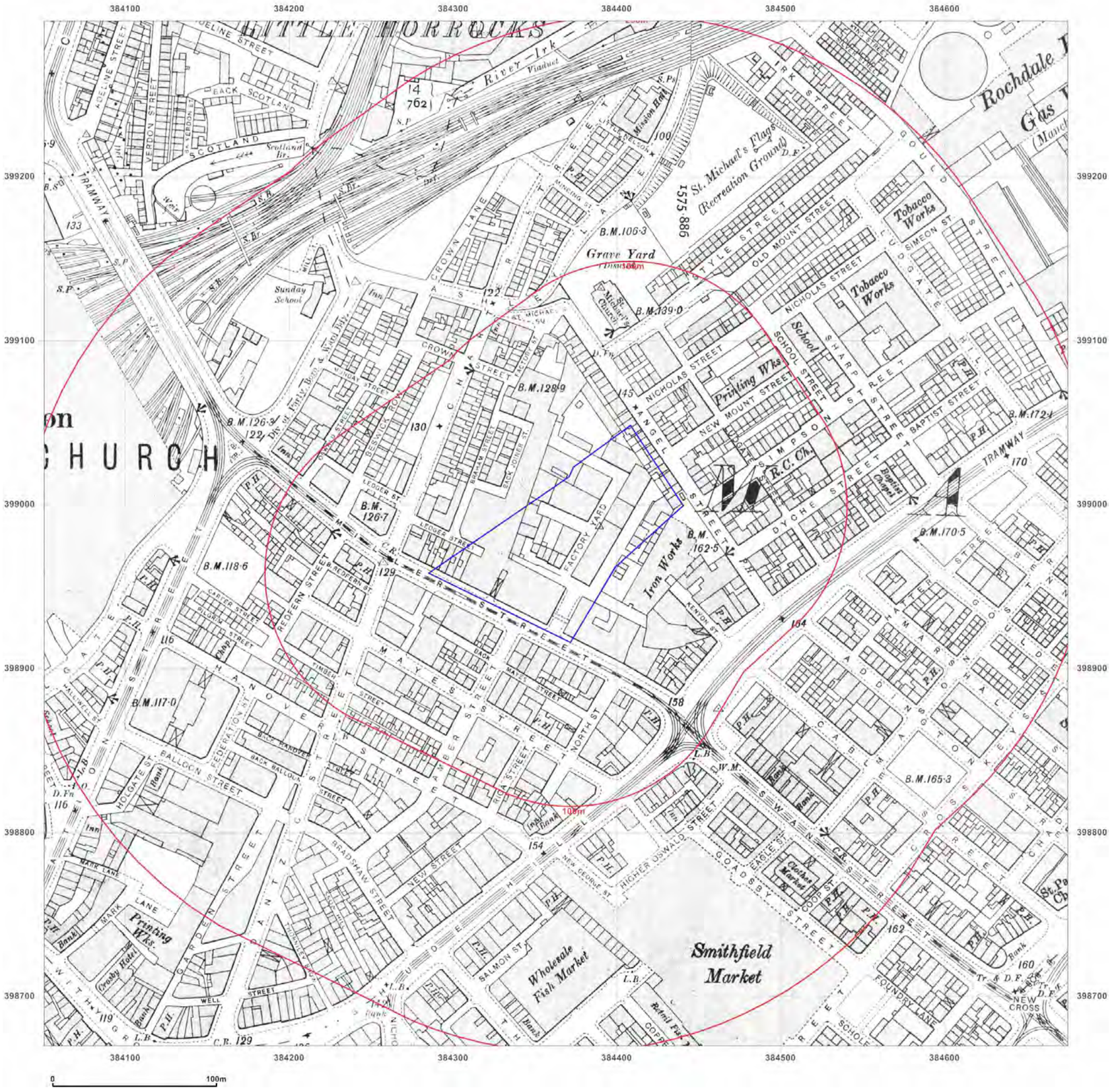
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Production date: 06 August 2019

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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1908**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1891
Revised 1905
Edition 1908
Copyright N/A
Levelled N/A

Surveyed 1891
Revised 1905
Edition 1908
Copyright N/A
Levelled N/A

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Production date: 06 August 2019

Map legend available at:
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1922**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1922
Revised 1916
Edition 1922
Copyright N/A
Levelled 1915

Surveyed 1922
Revised 1916
Edition 1922
Copyright N/A
Levelled 1915

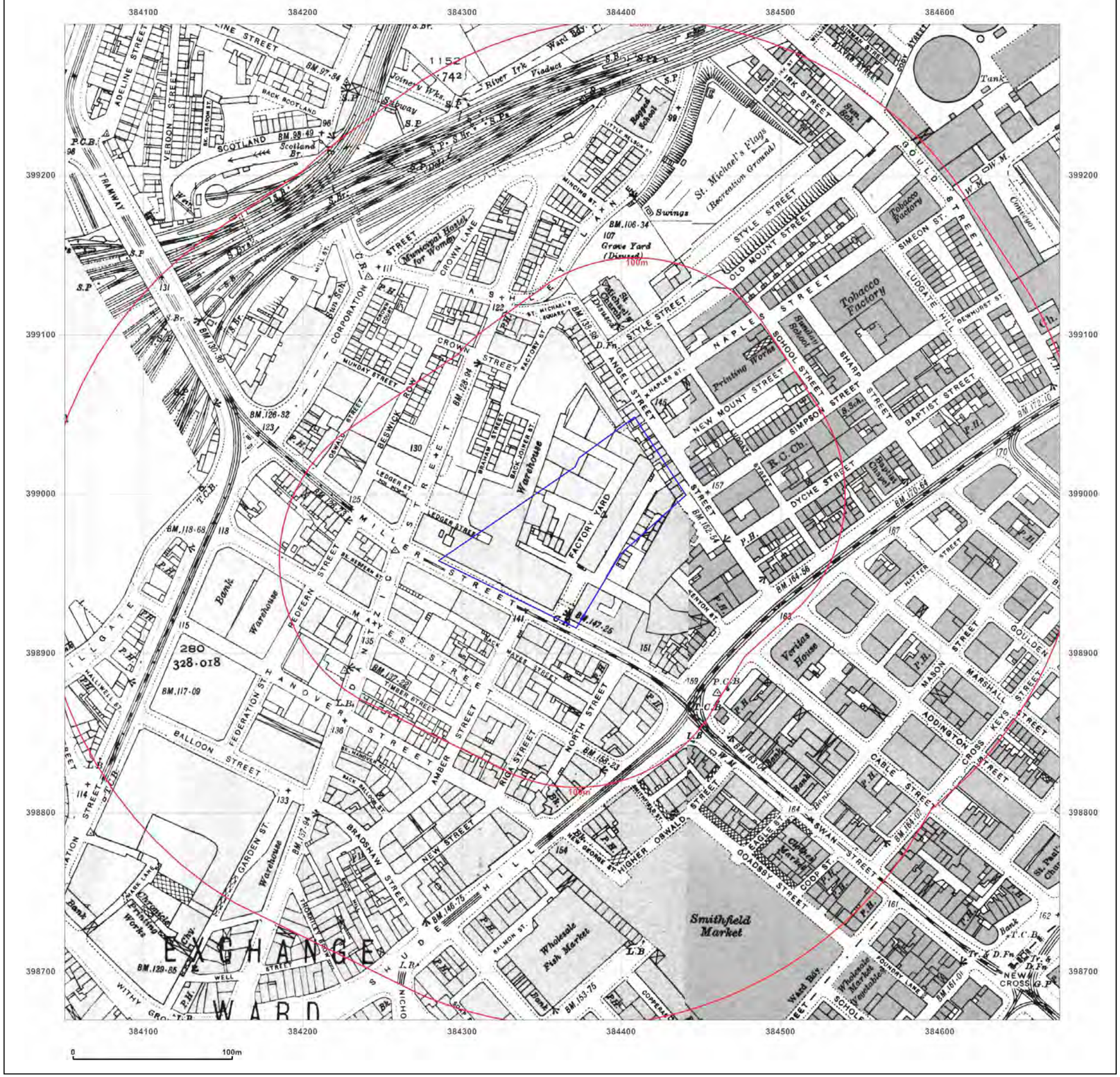
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Production date: 06 August 2019

Map legend available at:
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1931-1933**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1873
Revised 1933
Edition N/A
Copyright N/A
Levelled 1927

Surveyed 1873
Revised 1931
Edition N/A
Copyright N/A
Levelled 1927

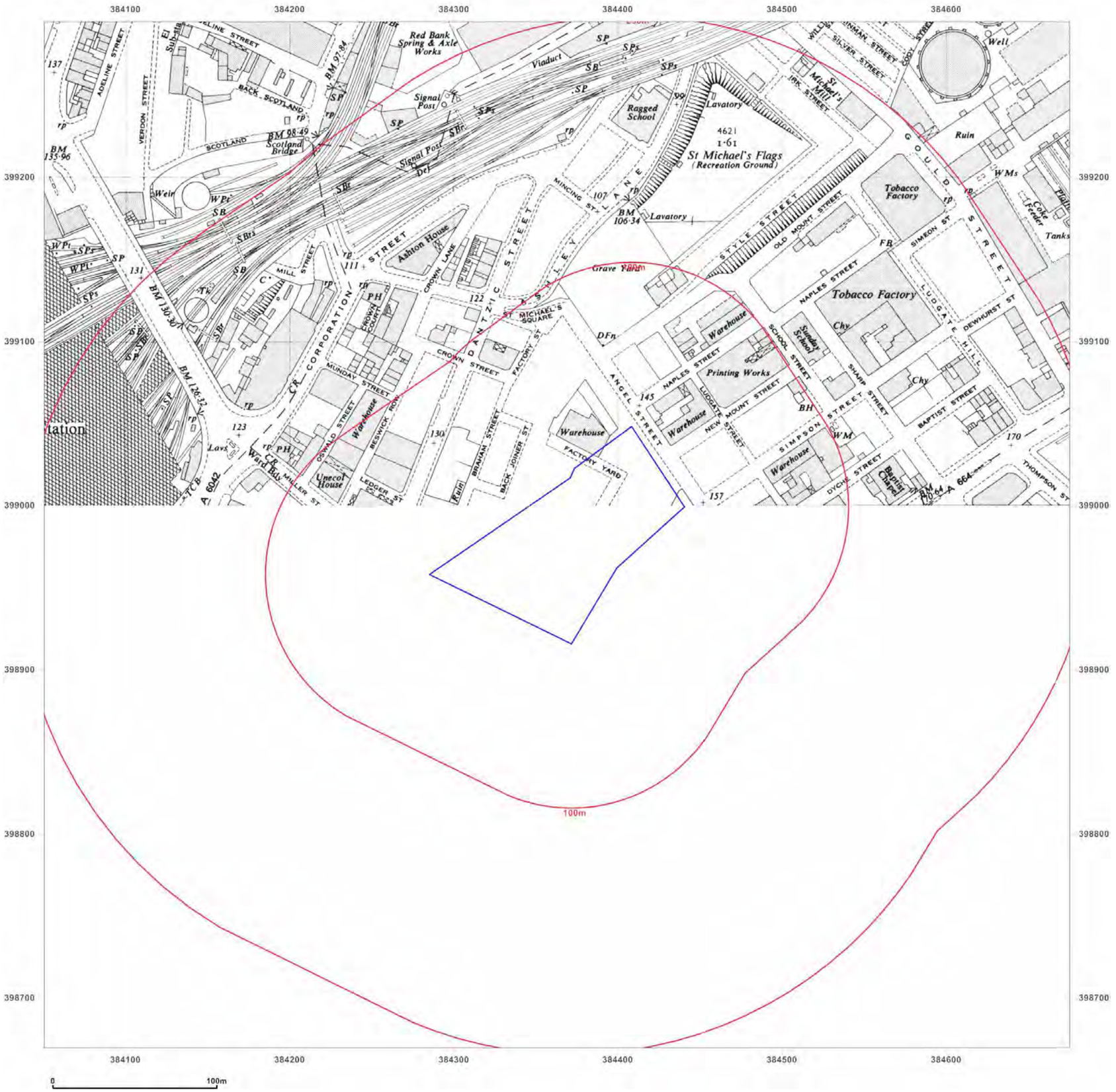
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Production date: 06 August 2019

Map legend available at:
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Surveyed 1949
Revised 1949
Edition N/A
Copyright 1950
Levelled 1929

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1949**

Scale: 1:2,500

Printed at: 1:2,500

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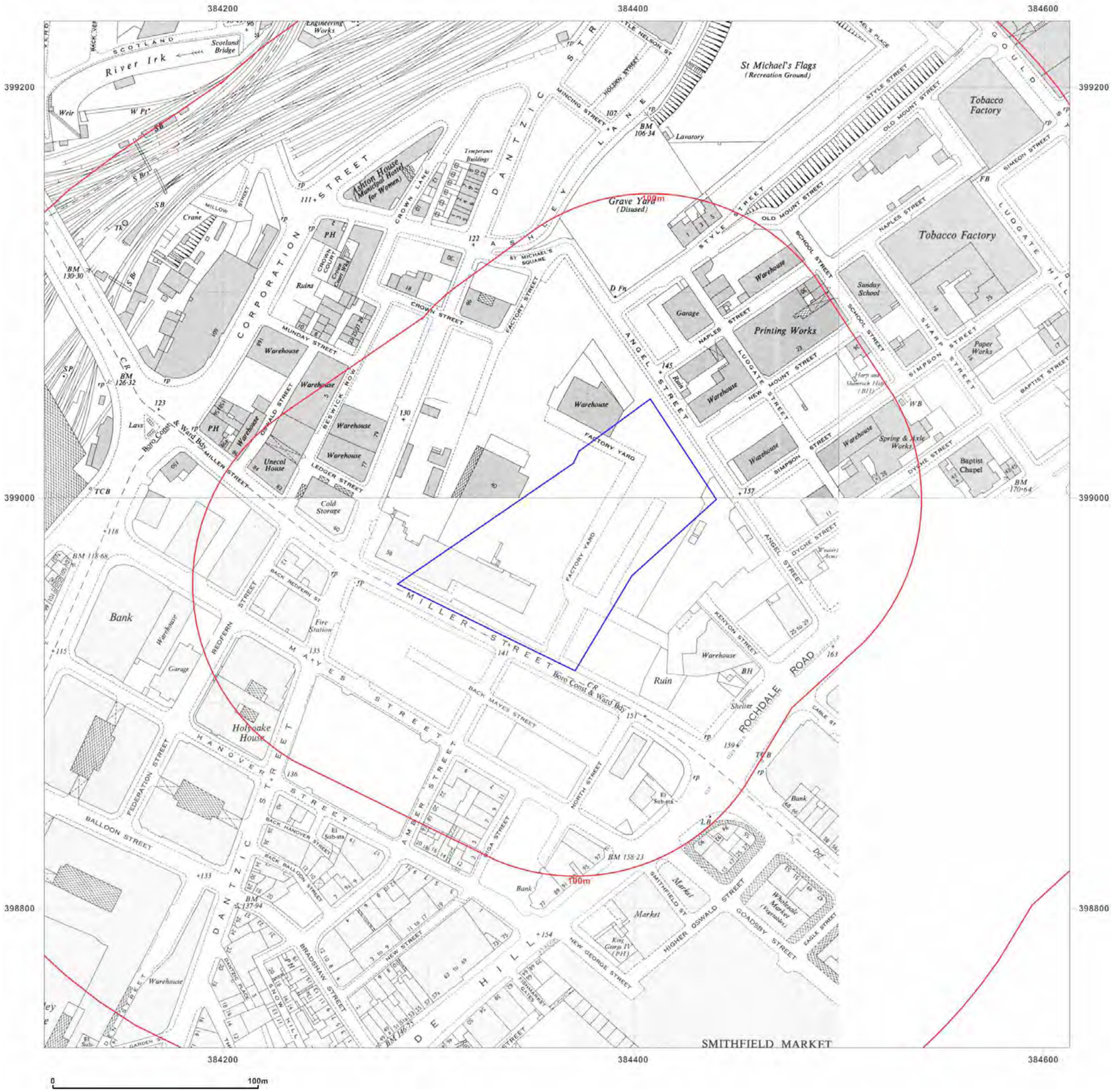
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Production date: 06 August 2019

Map legend available at:
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

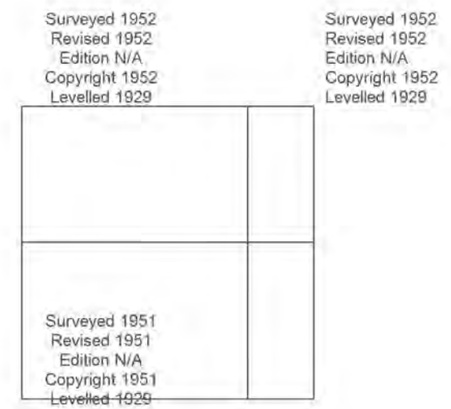
Map Name: National Grid

Map date: **1951-1952**

Scale: 1:1,250

Printed at: 1:2,000

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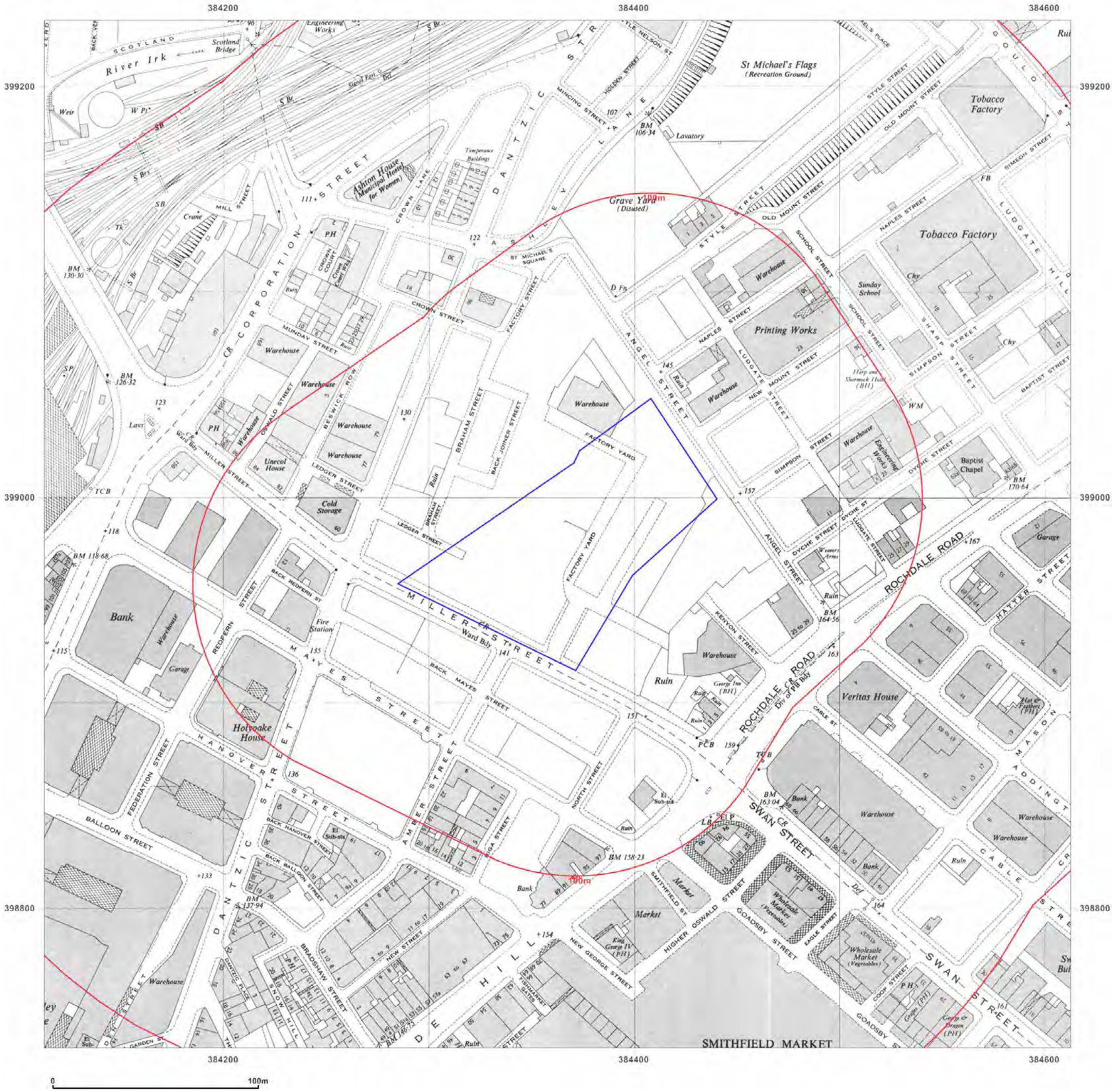
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1948-1953**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1949
Revised 1949
Edition N/A
Copyright 1949
Levelled 1929

Surveyed 1949
Revised 1949
Edition N/A
Copyright 1949
Levelled 1929

Surveyed 1948
Revised 1948
Edition N/A
Copyright 1948
Levelled 1929

Surveyed 1948
Revised 1953
Edition N/A
Copyright 1953
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1952-1953**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1952
Revised 1952
Edition N/A
Copyright 1953
Levelled 1929

Surveyed 1948
Revised 1948
Edition N/A
Copyright 1954
Levelled 1929

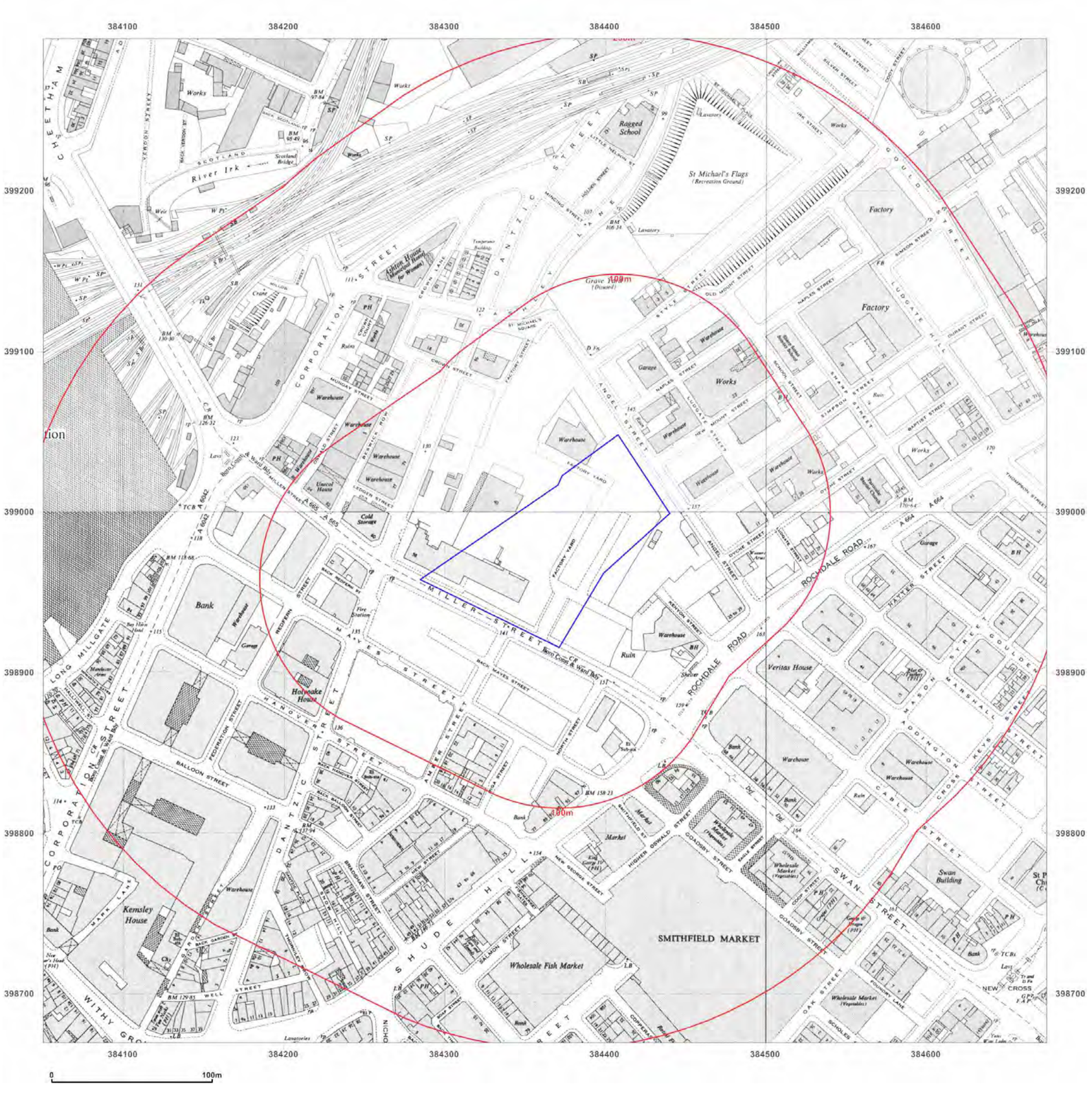
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1953-1958**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1958
Revised 1958
Edition N/A
Copyright 1959
Levelled 1929

Surveyed 1953
Revised 1953
Edition N/A
Copyright 1954
Levelled 1929

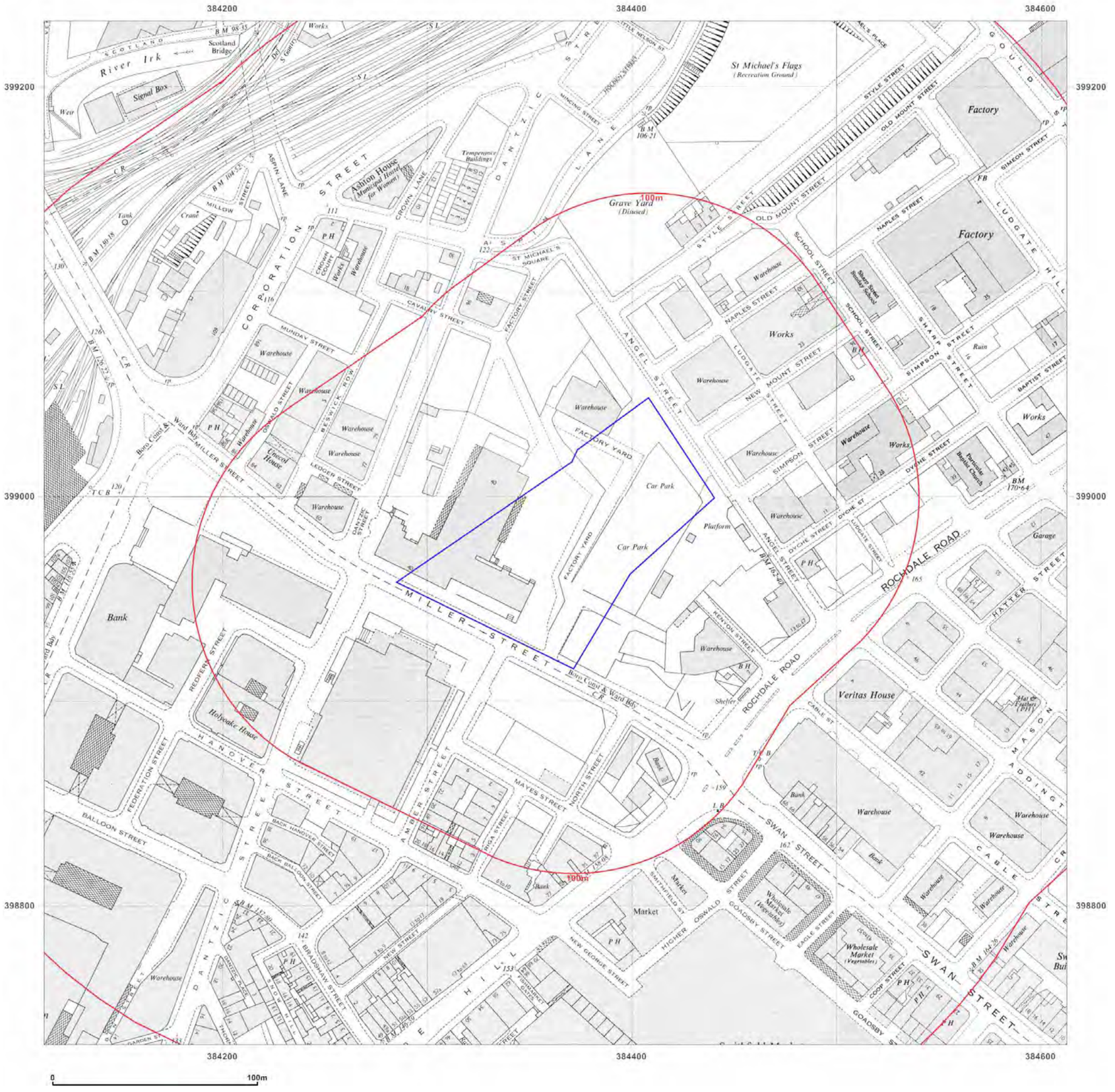
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1958-1963**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1949
Revised 1962
Edition N/A
Copyright 1963
Levelled 1959

Surveyed 1949
Revised 1958
Edition N/A
Copyright 1958
Levelled 1929

Surveyed 1948
Revised 1962
Edition N/A
Copyright 1963
Levelled 1959

Surveyed 1948
Revised 1962
Edition N/A
Copyright 1963
Levelled 1959

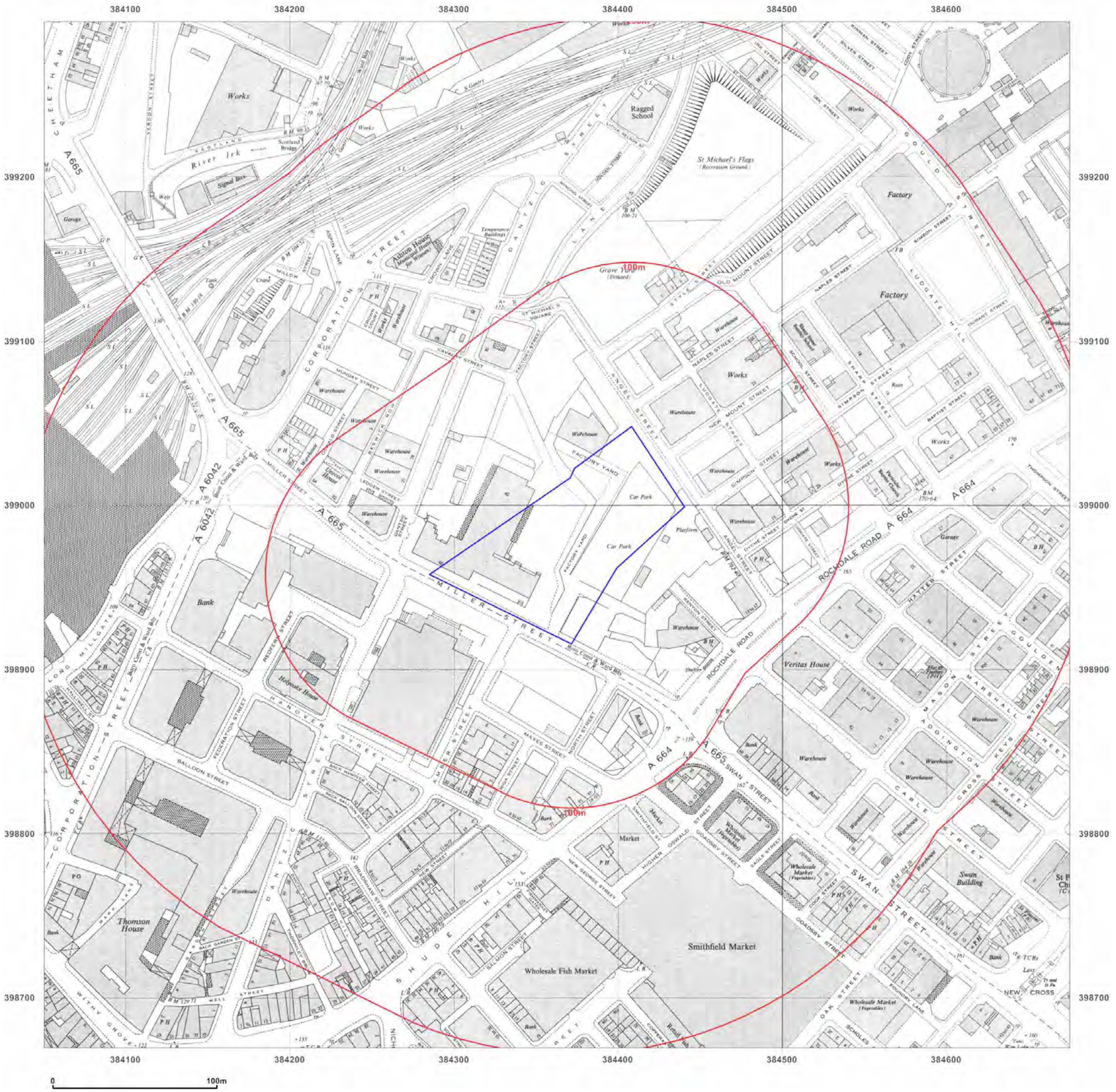
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Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1964-1965**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1964
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Edition N/A
Copyright 1966
Levelled 1964

Surveyed N/A
Revised 1964
Edition N/A
Copyright 1965
Levelled 1959

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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1967**

Scale: 1:2,500

Printed at: 1:2,500

N
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1969**

Scale: 1:2,500

Printed at: 1:2,500

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

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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

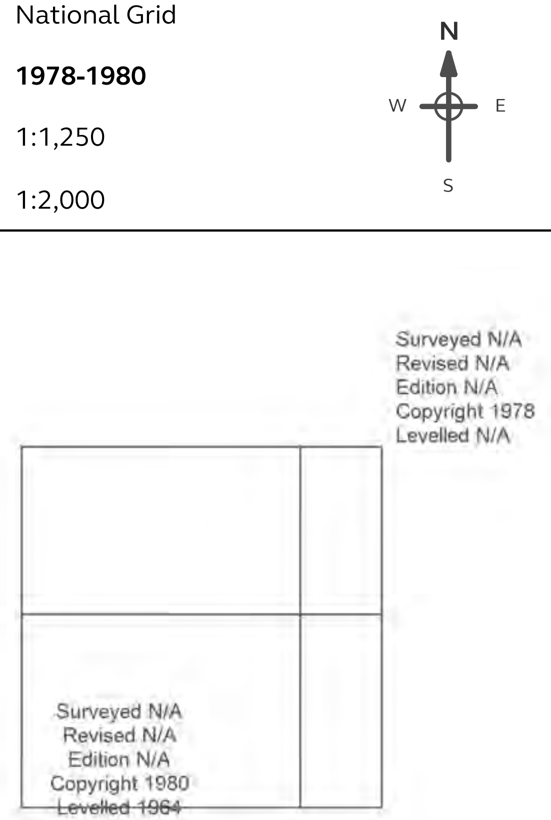
Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1978-1980**

Scale: 1:1,250

Printed at: 1:2,000



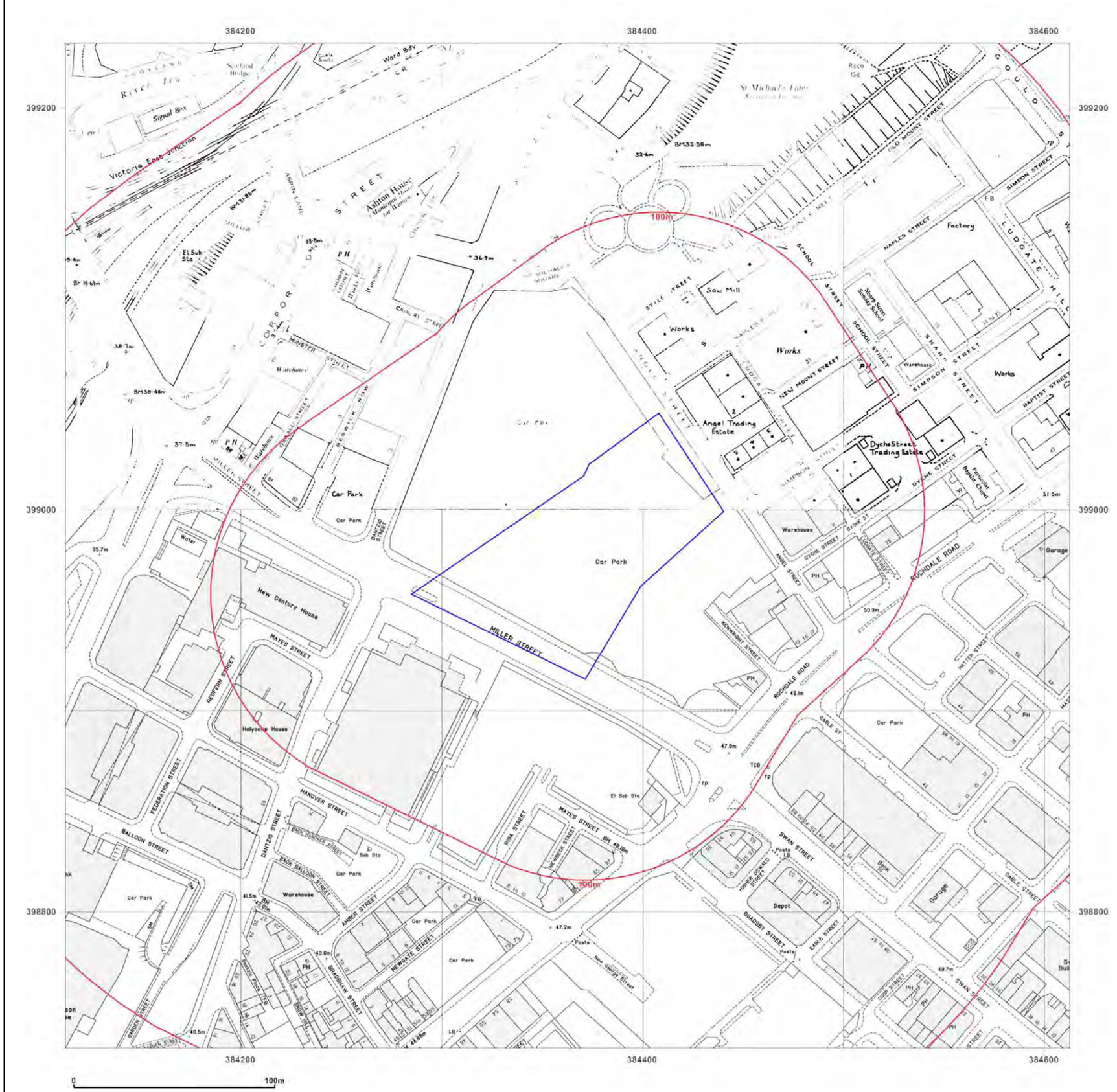
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Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1984-1988**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed N/A Revised N/A Edition N/A Copyright 1984 Levelled 1964	Surveyed 1964 Revised 1984 Edition N/A Copyright 1984 Levelled 1964
Surveyed 1948 Revised 1985 Edition N/A Copyright 1986 Levelled 1964	Surveyed 1948 Revised 1987 Edition N/A Copyright 1988 Levelled 1964

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Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1989-1992**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1949 Revised 1989 Edition N/A Copyright 1990 Levelled N/A	Surveyed 1949 Revised 1988 Edition N/A Copyright 1989 Levelled 1964
Surveyed 1992 Revised 1992 Edition N/A Copyright 1992 Levelled N/A	Surveyed 1992 Revised 1992 Edition N/A Copyright 1992 Levelled N/A

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Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1992-1995**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1992
Revised 1992
Edition N/A
Copyright 1992
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Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A

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

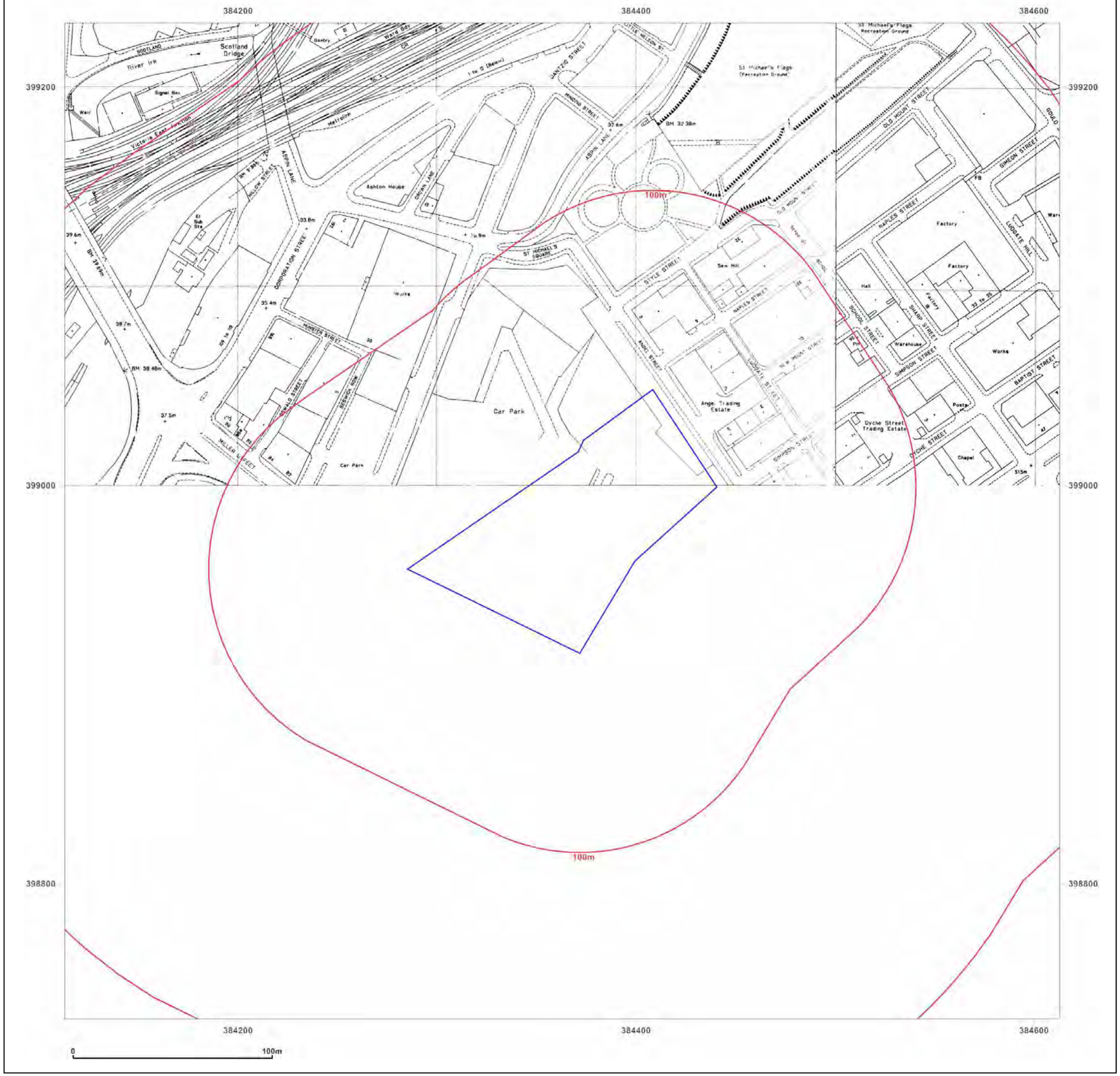
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Groundsure INSIGHTS

Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1993-1995**

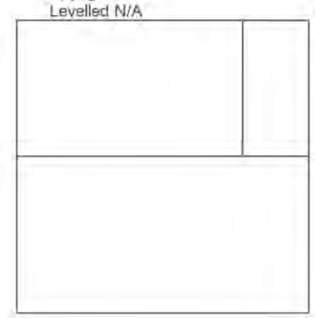
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Printed at: 1:2,000

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

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



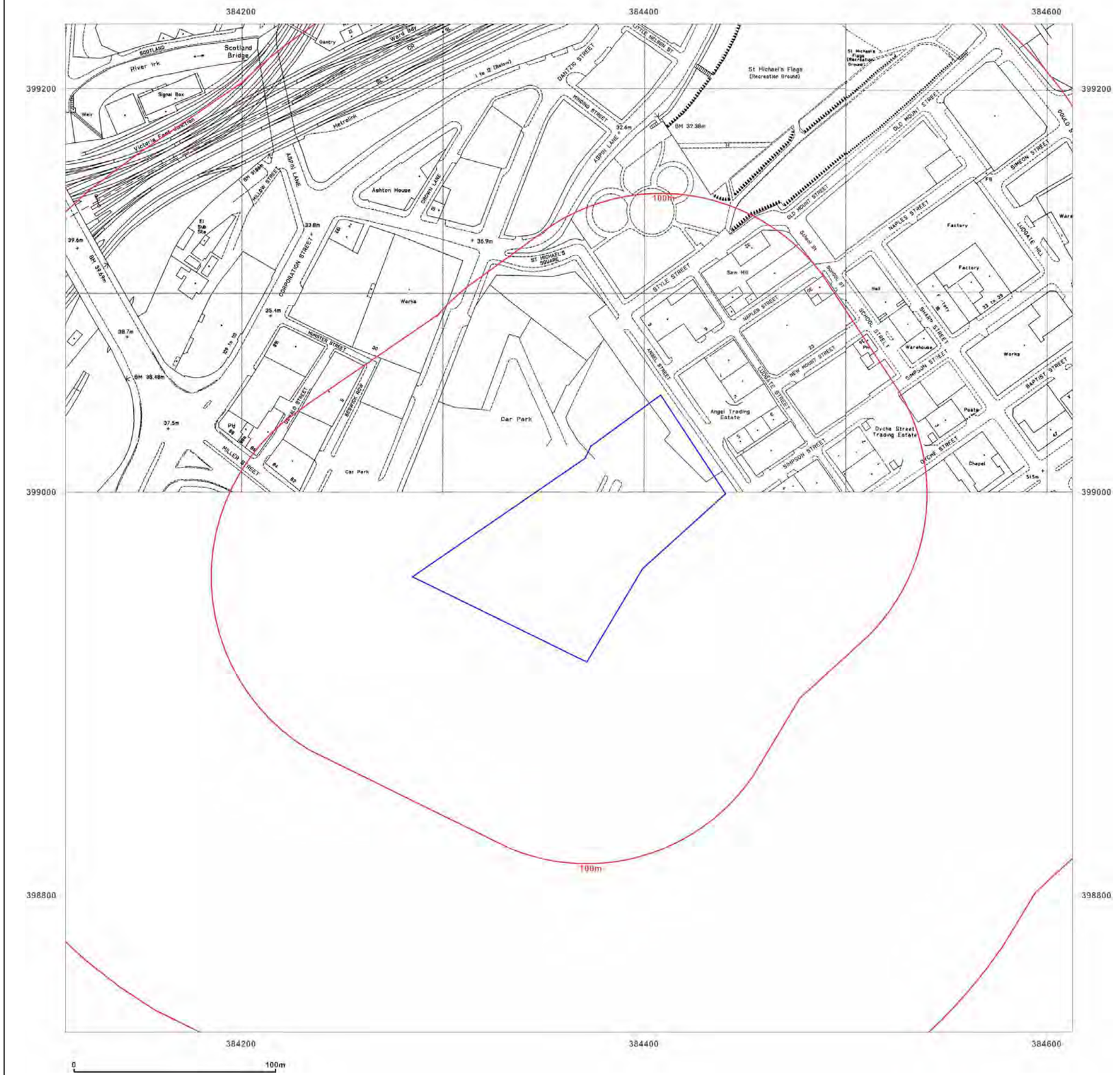
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1994-1995**

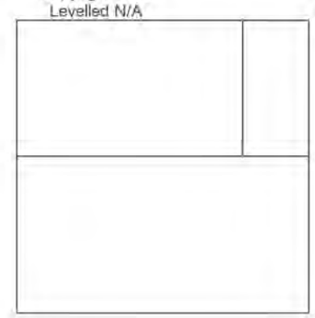
Scale: 1:1,250

Printed at: 1:2,000

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

Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
Levelled N/A



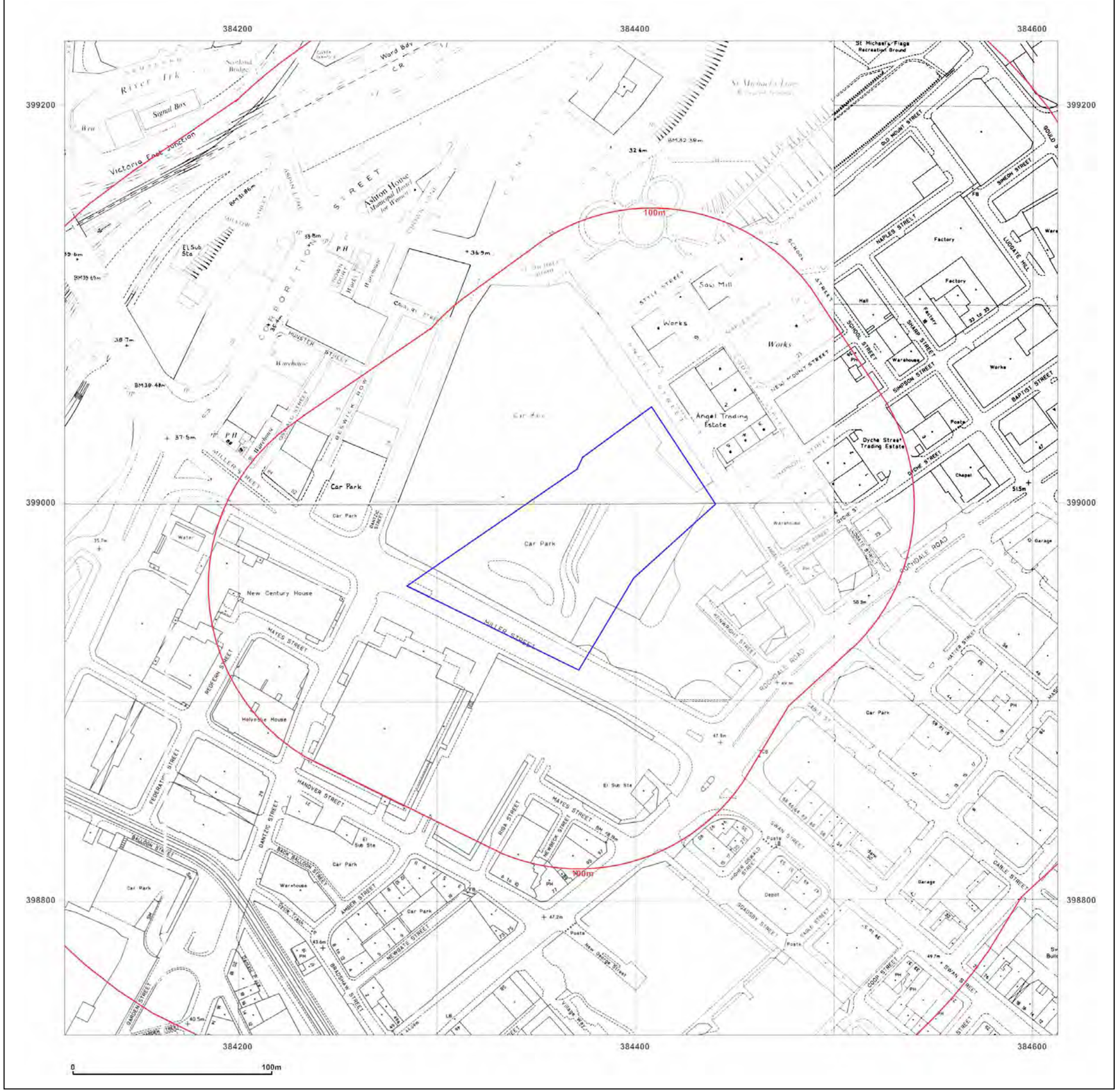
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1990-1995**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1964 Revised 1990 Edition N/A Copyright 1990 Levelled 1964	Surveyed 1992 Revised 1992 Edition N/A Copyright 1992 Levelled N/A
Surveyed 1992 Revised 1992 Edition N/A Copyright 1992 Levelled N/A	Surveyed 1995 Revised 1995 Edition N/A Copyright 1995 Levelled N/A

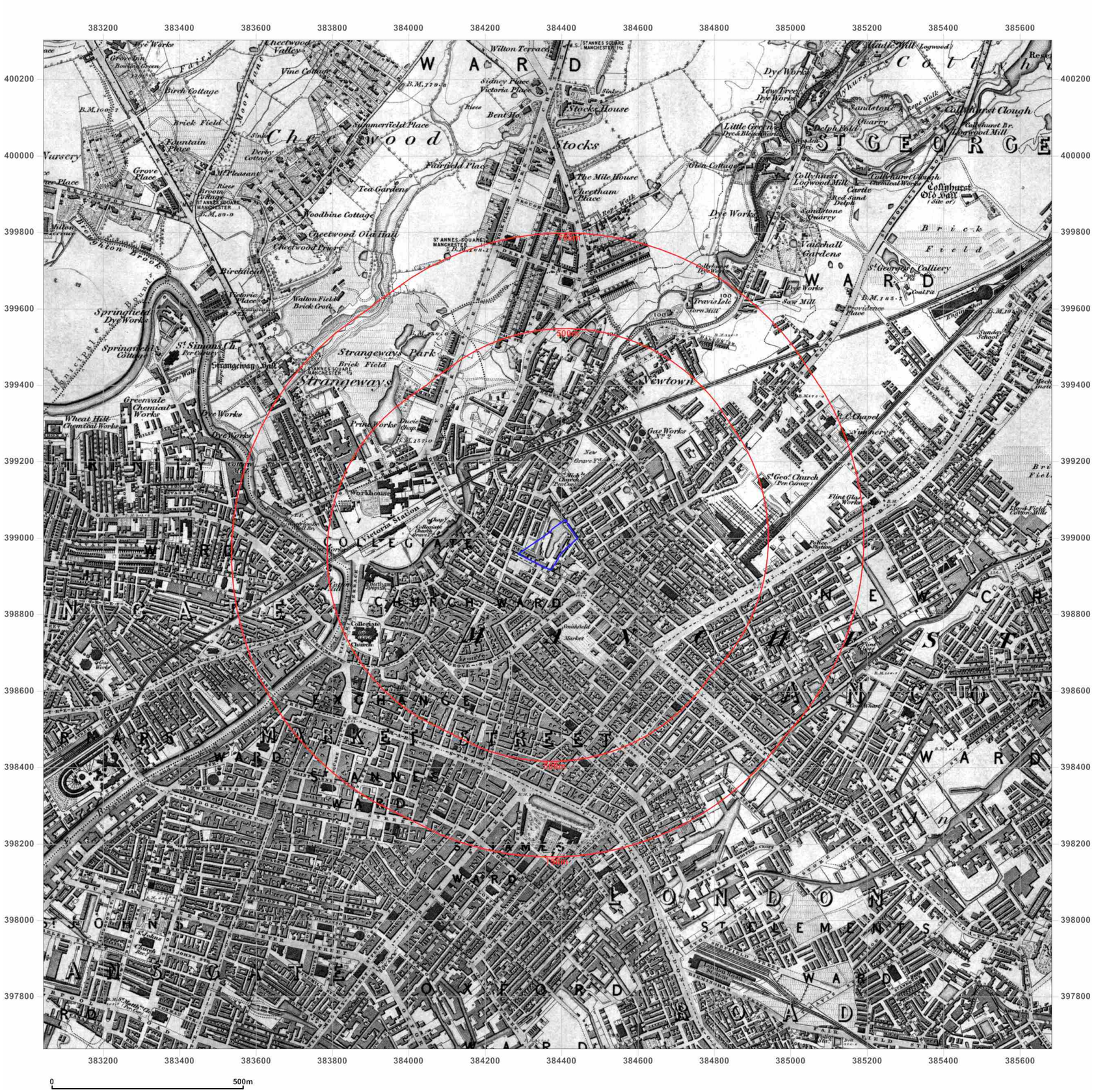
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1848**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1845
Revised N/A
Edition 1848
Copyright N/A
Levelled N/A

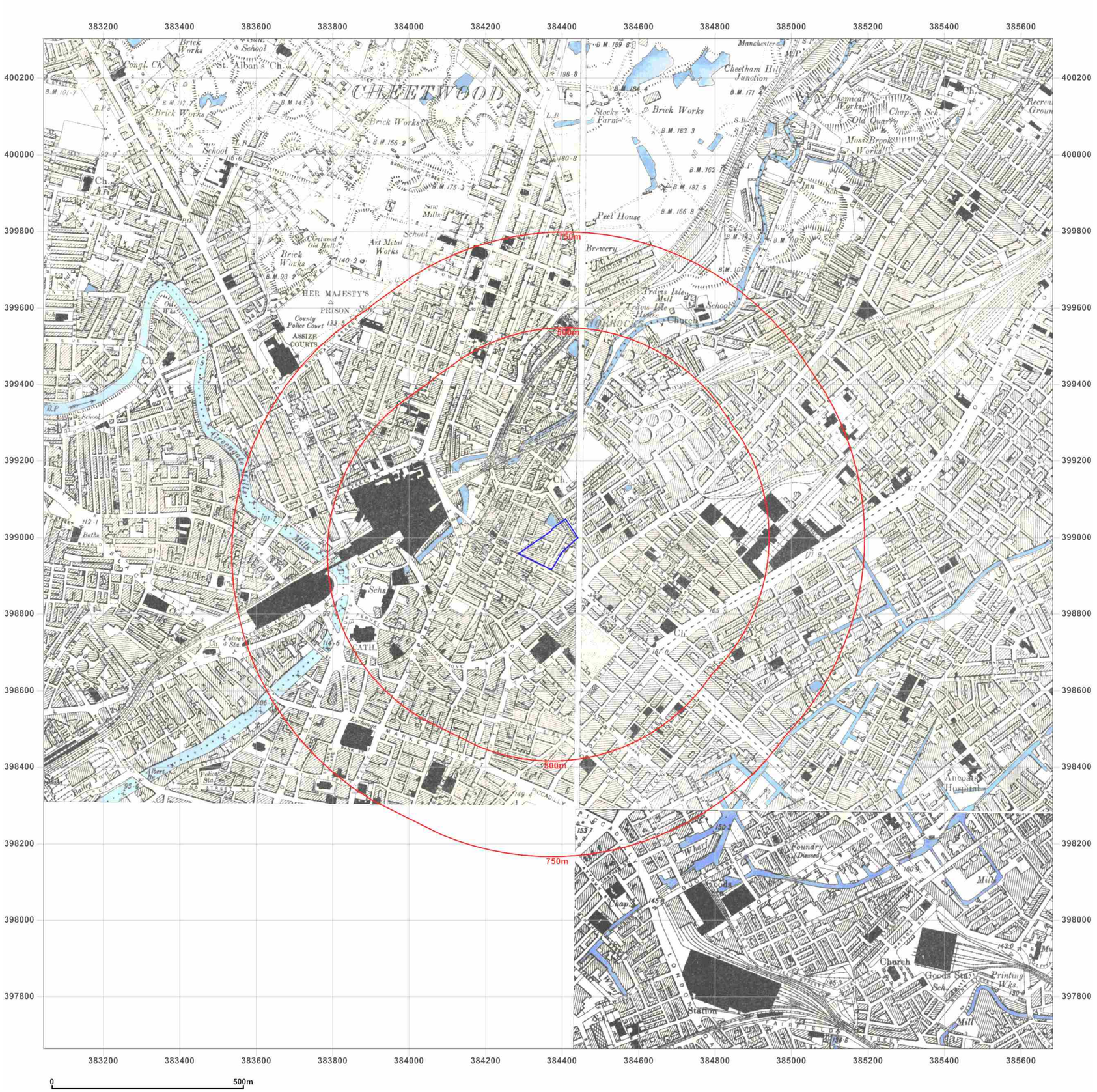
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1890-1894**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1889
Revised 1889
Edition 1894
Copyright N/A
Levelled N/A

Surveyed 1891
Revised 1891
Edition 1891
Copyright N/A
Levelled N/A

Surveyed 1890
Revised 1890
Edition 1890
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1905-1906**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1844
Revised 1906
Edition 1906
Copyright N/A
Levelled N/A

Surveyed 1844
Revised 1906
Edition 1906
Copyright N/A
Levelled N/A

Surveyed 1844
Revised 1905
Edition 1905
Copyright N/A
Levelled N/A

Surveyed 1844
Revised 1905
Edition 1905
Copyright N/A
Levelled N/A

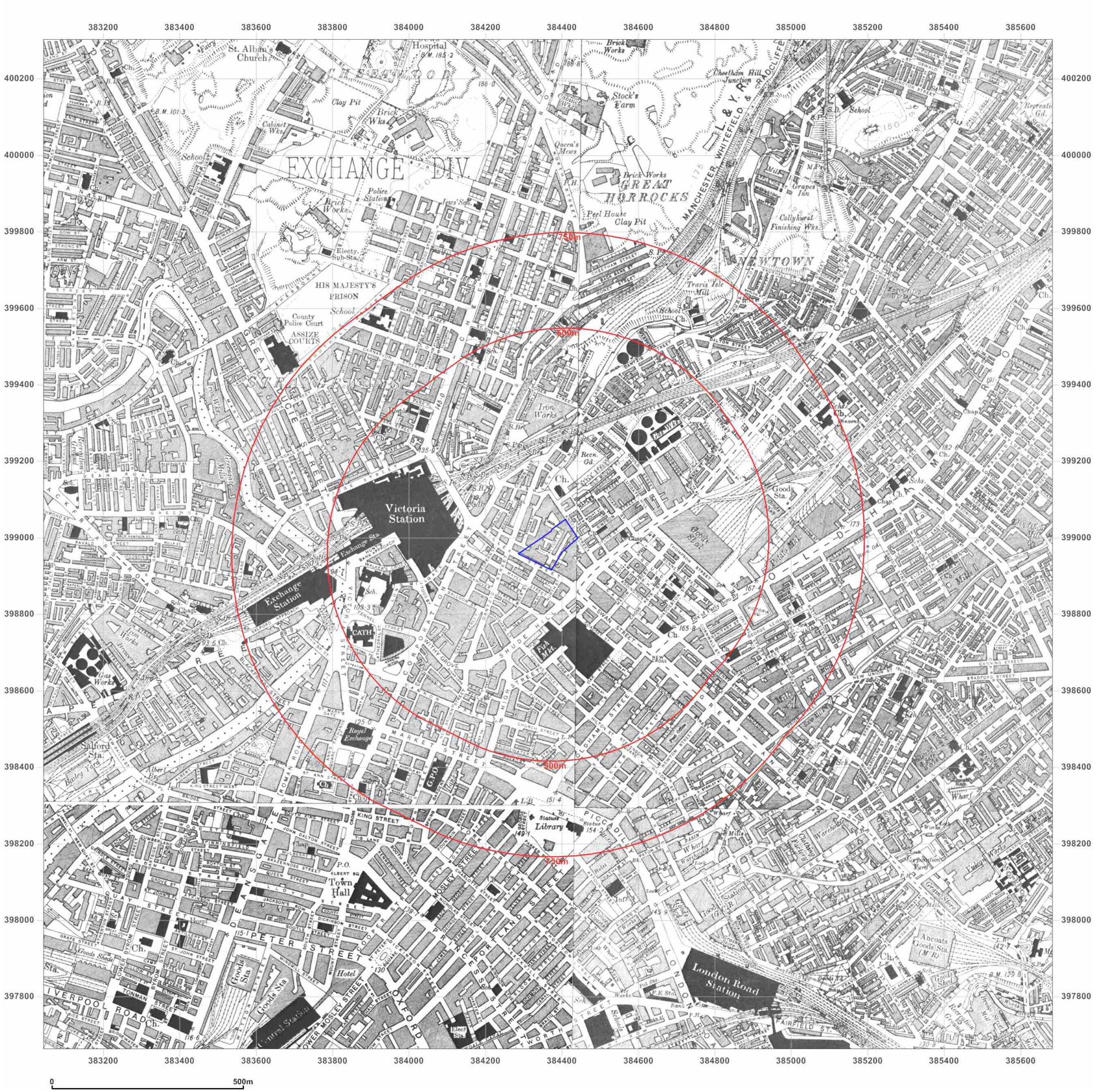
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1923**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1844 Revised 1916 Edition 1923 Copyright N/A Levelled 1915	Surveyed 1844 Revised 1921 Edition 1923 Copyright N/A Levelled 1906
Surveyed 1844 Revised 1916 Edition 1923 Copyright N/A Levelled 1915	Surveyed 1844 Revised 1915 Edition 1923 Copyright N/A Levelled 1915

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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1923**

Scale: 1:10,560

Printed at: 1:10,560

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Edition 1923
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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

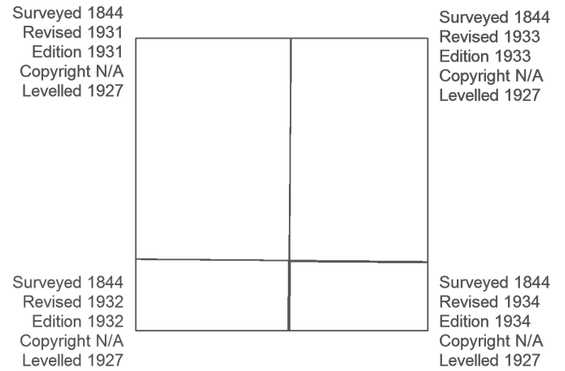
Map Name: County Series

Map date: **1931-1934**

Scale: 1:10,560

Printed at: 1:10,560

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Groundsure INSIGHTS

Site Details:

2 & 3 Angel Square, M4 4DY

Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1844
Revised 1938
Edition 1938
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Levelled 1927

Surveyed 1844
Revised 1938
Edition 1938
Copyright N/A
Levelled 1927

Surveyed 1844
Revised 1938
Edition 1938
Copyright N/A
Levelled 1927

Surveyed 1844
Revised 1938
Edition 1938
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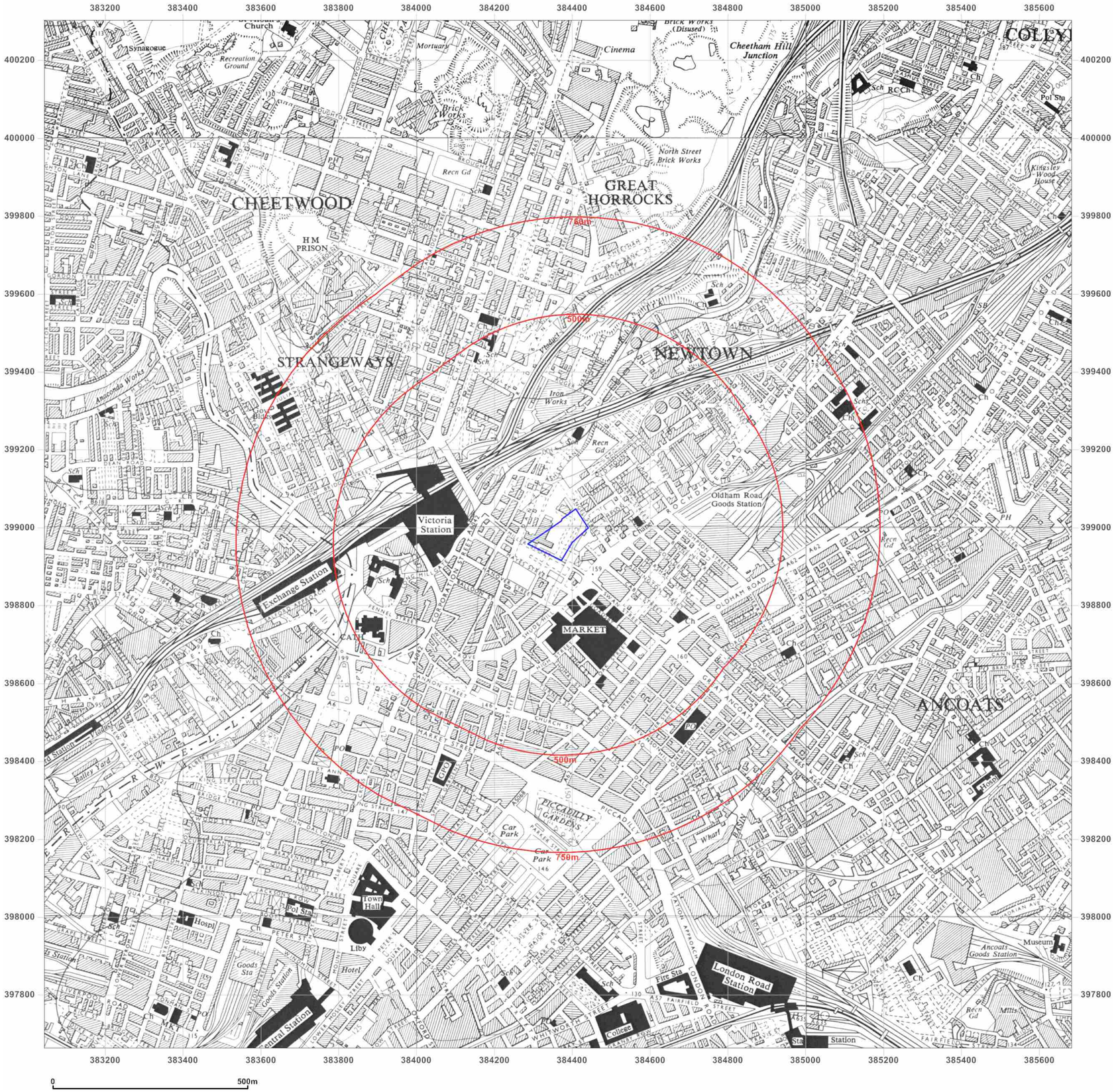
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Site Details:

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Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: Provisional

Map date: **1956**

Scale: 1:10,560

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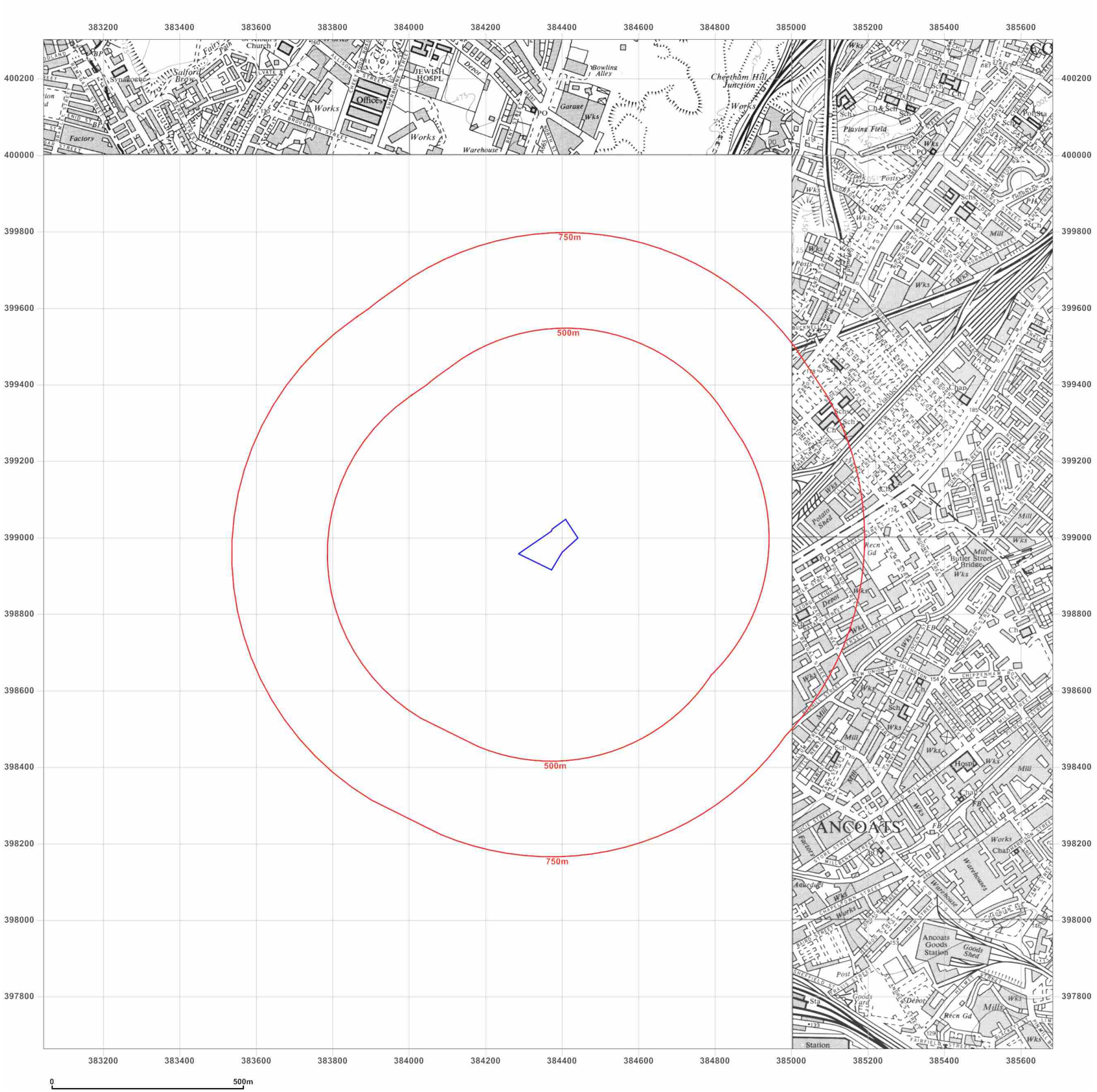
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Map Name: Provisional

Map date: **1966-1968**

Scale: 1:10,560

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Revised 1966
Edition N/A
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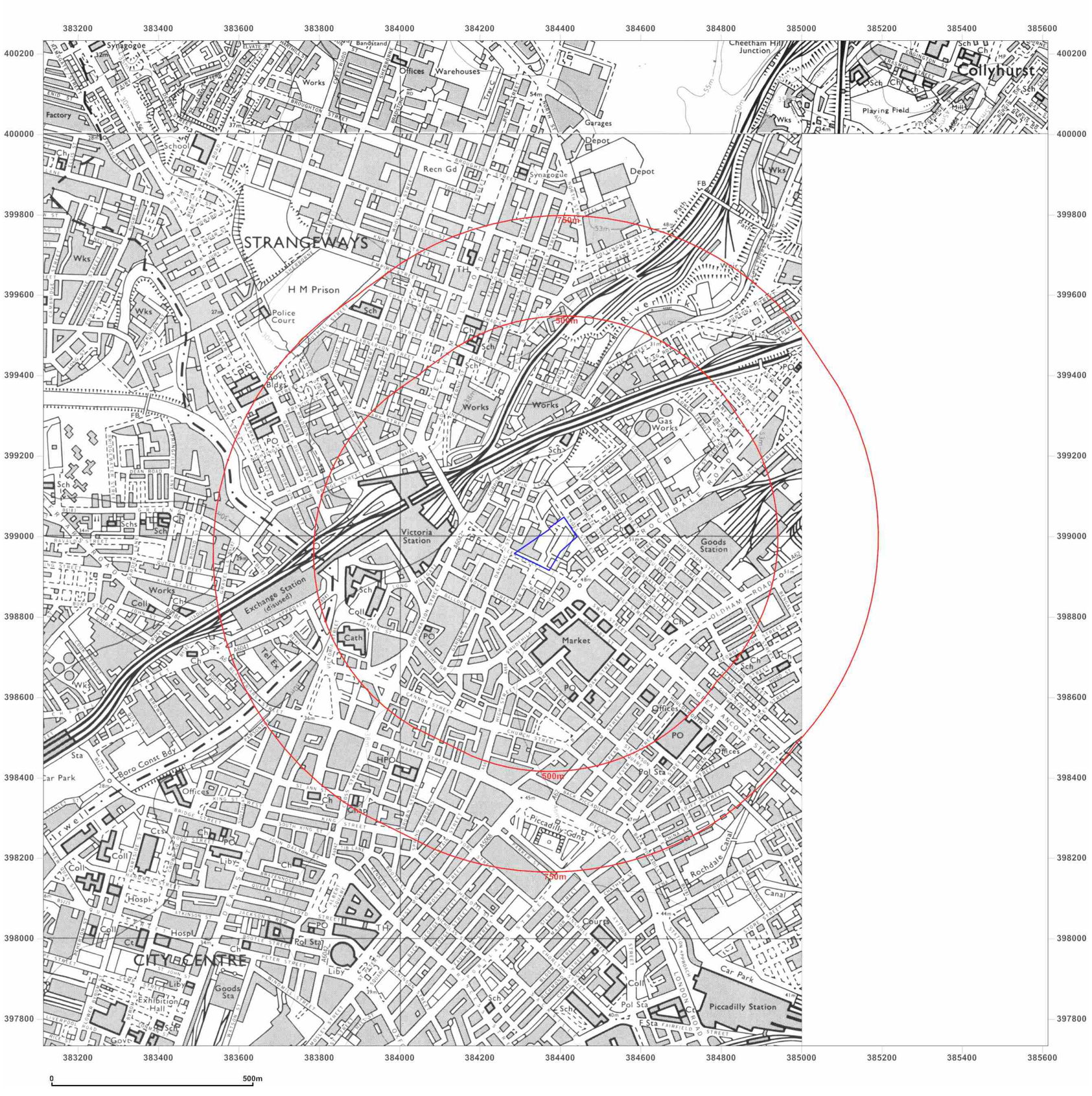
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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1972-1977**

Scale: 1:10,000

Printed at: 1:10,000

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Revised 1975
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Surveyed 1971
Revised 1972
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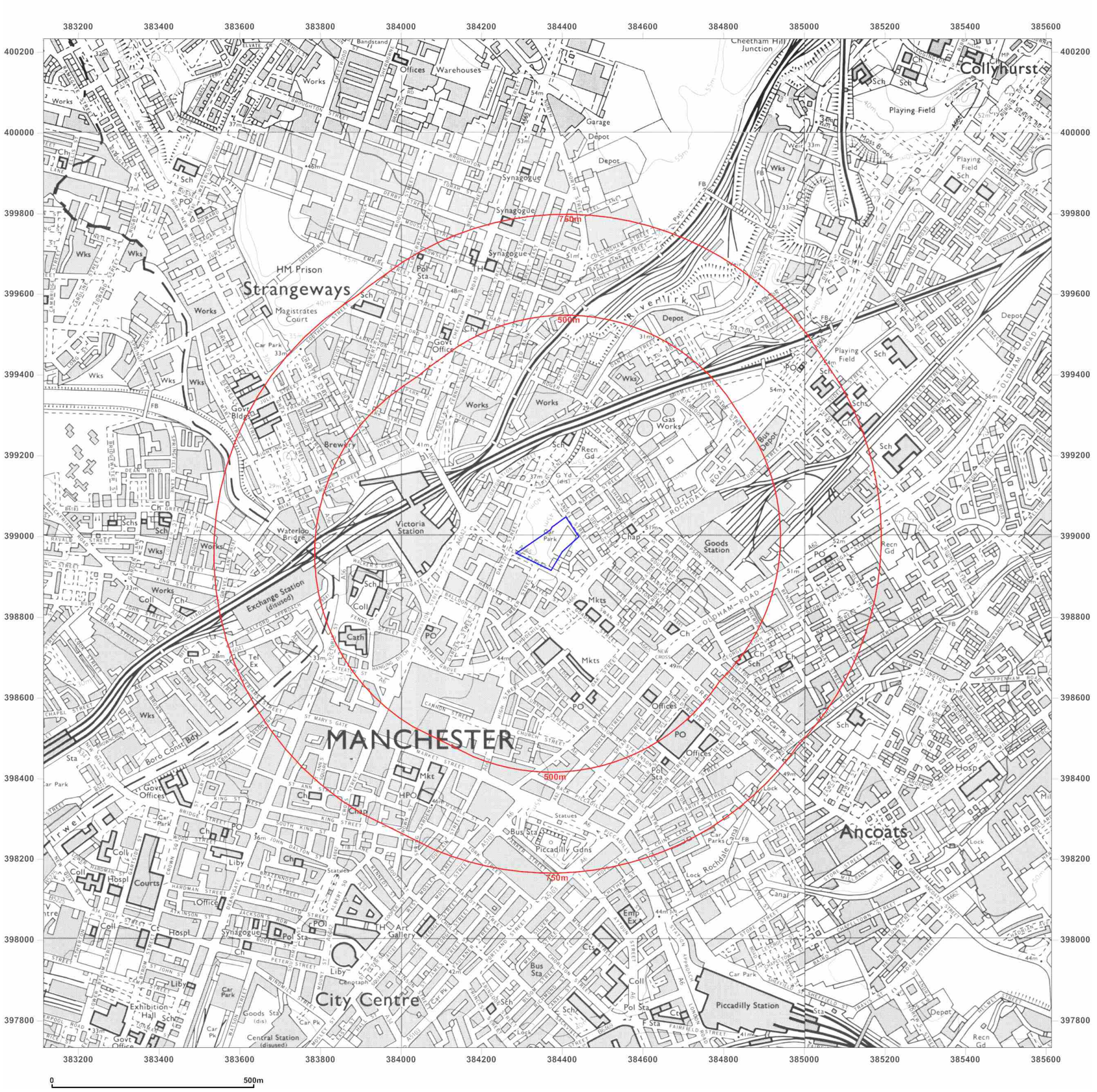
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Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1980-1985**

Scale: 1:10,000

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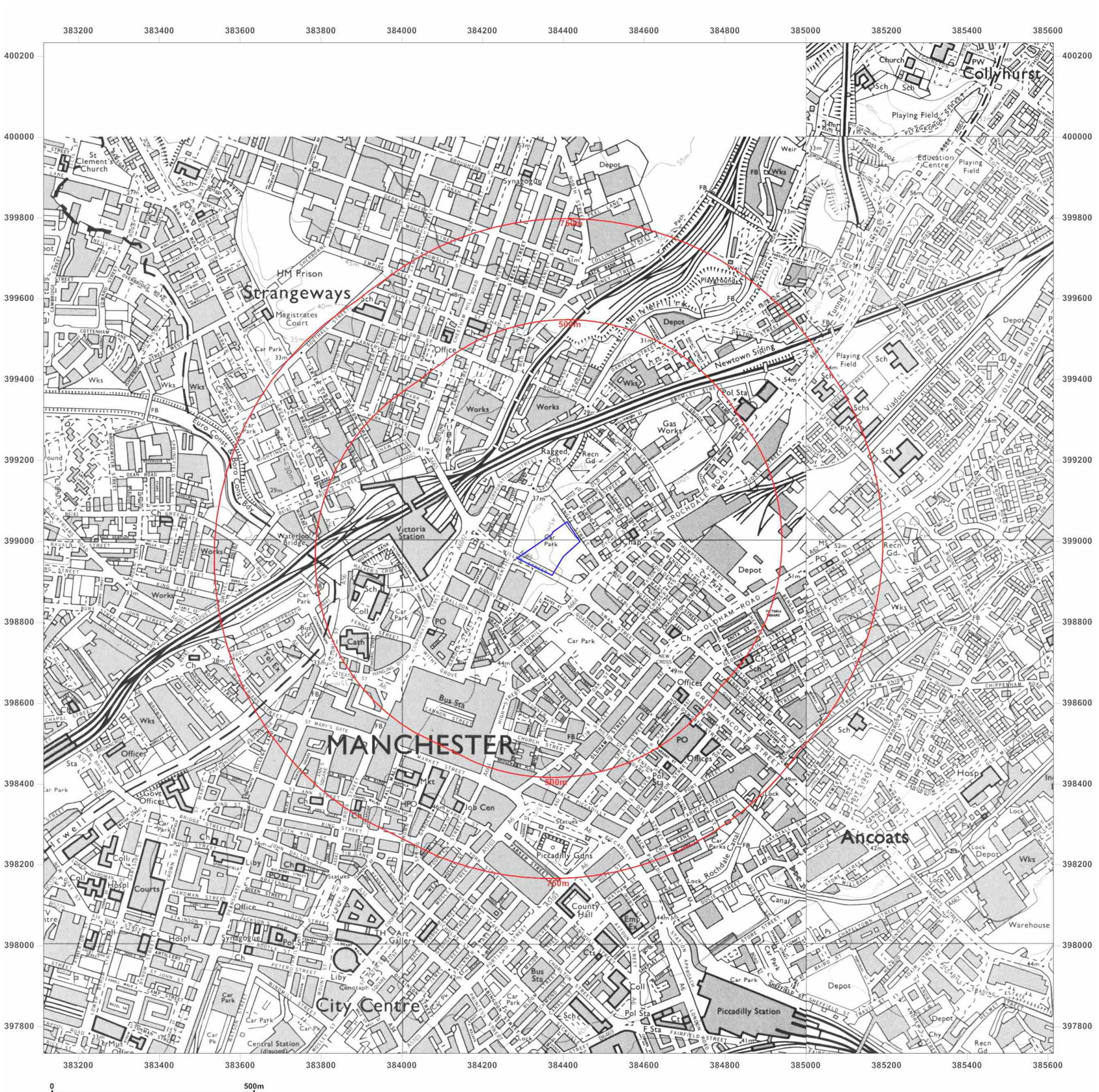
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Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **1985-1988**

Scale: 1:10,000

Printed at: 1:10,000

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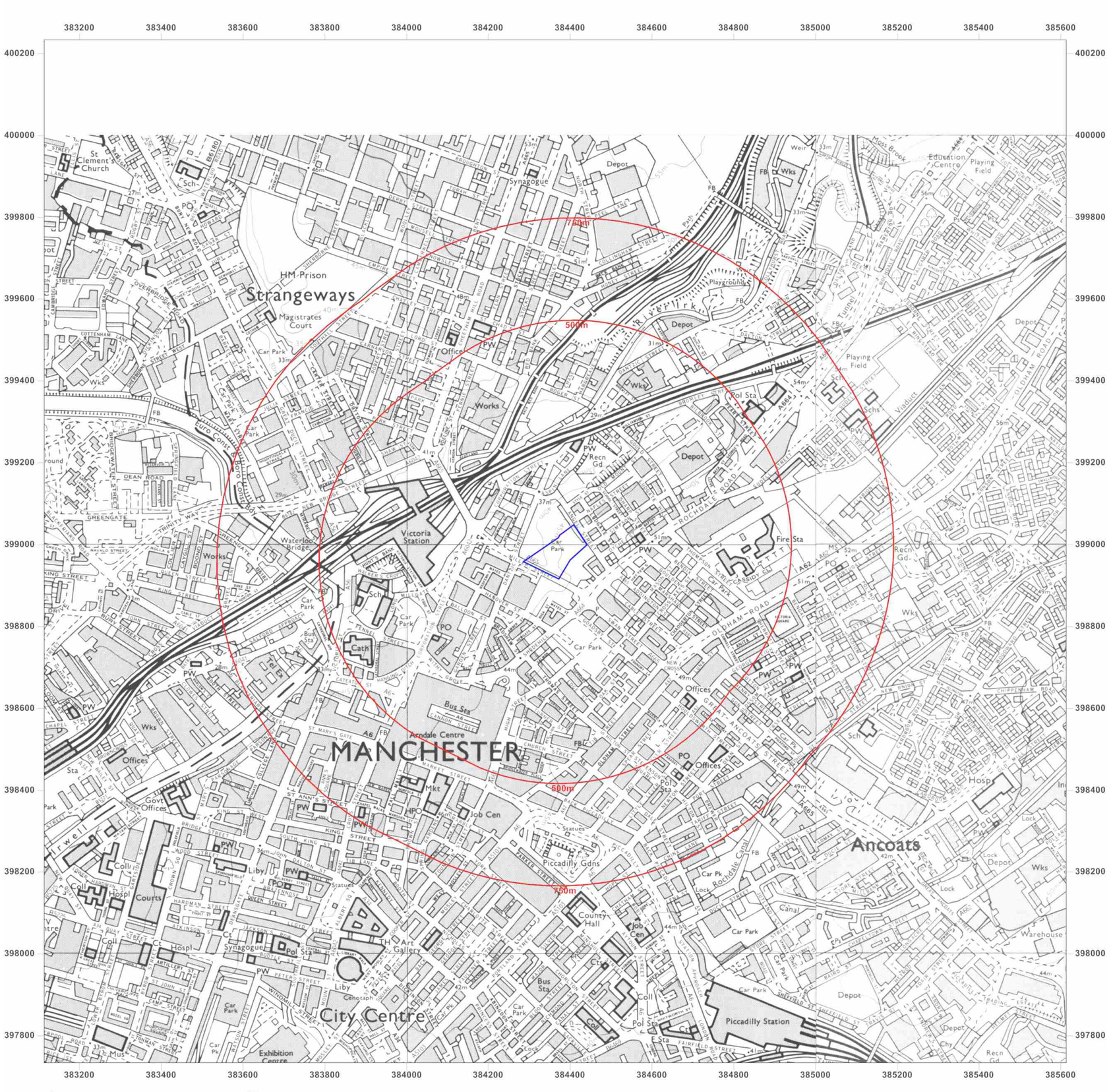
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Groundsure INSIGHTS

Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

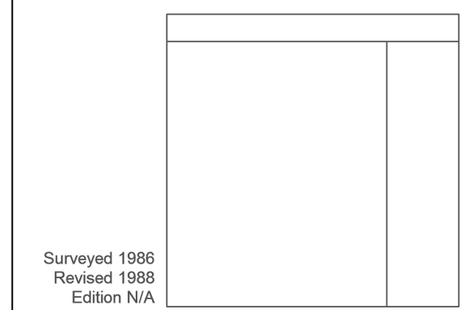
Map Name: National Grid

Map date: **1988-1991**

Scale: 1:10,000

Printed at: 1:10,000

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Groundsure INSIGHTS

Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

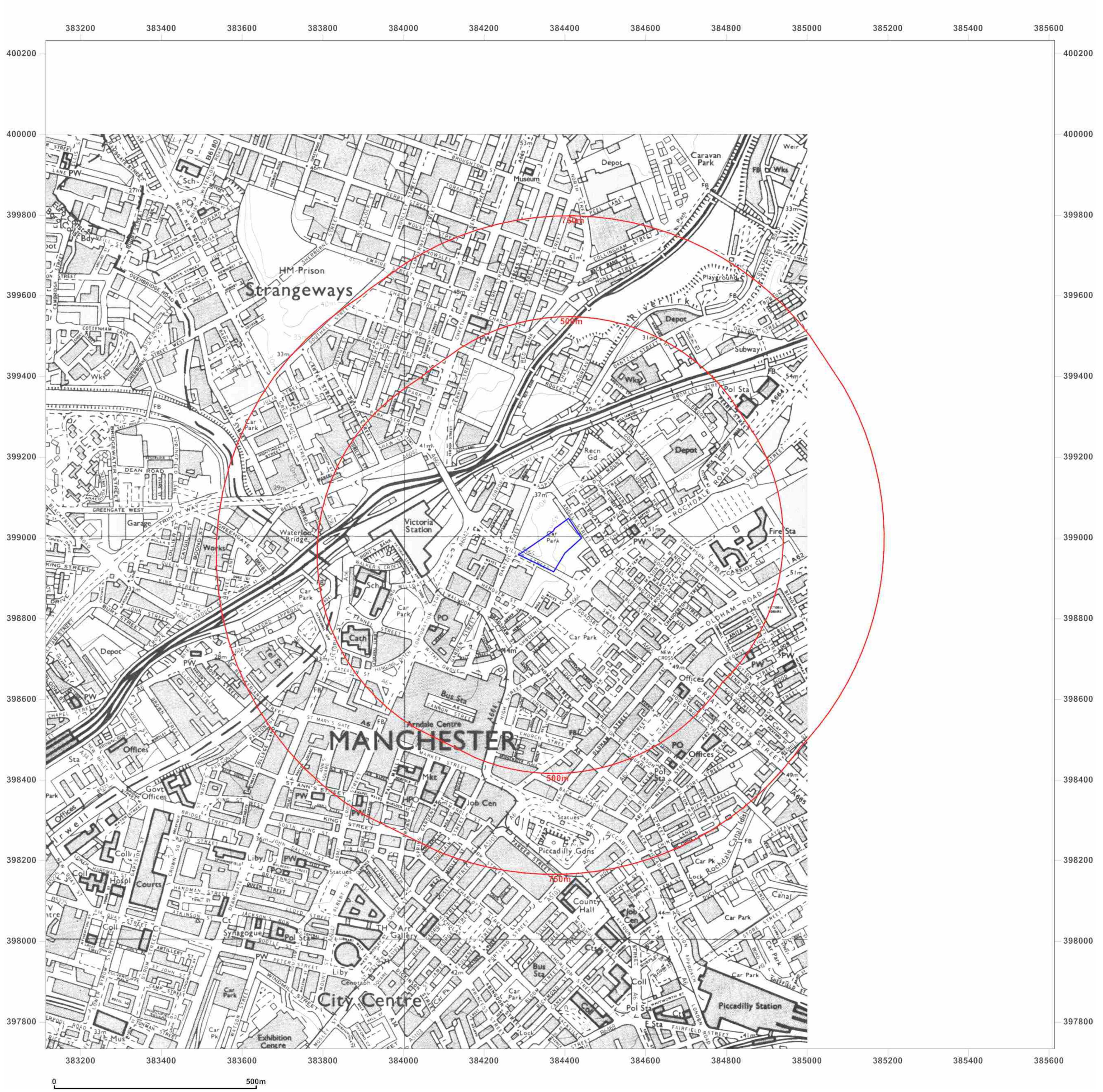
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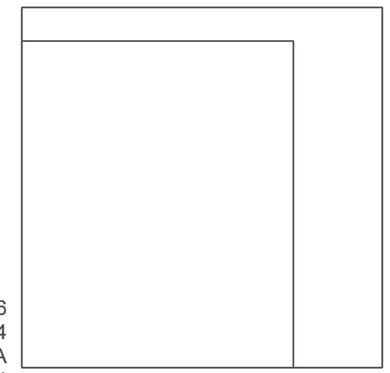
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Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

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Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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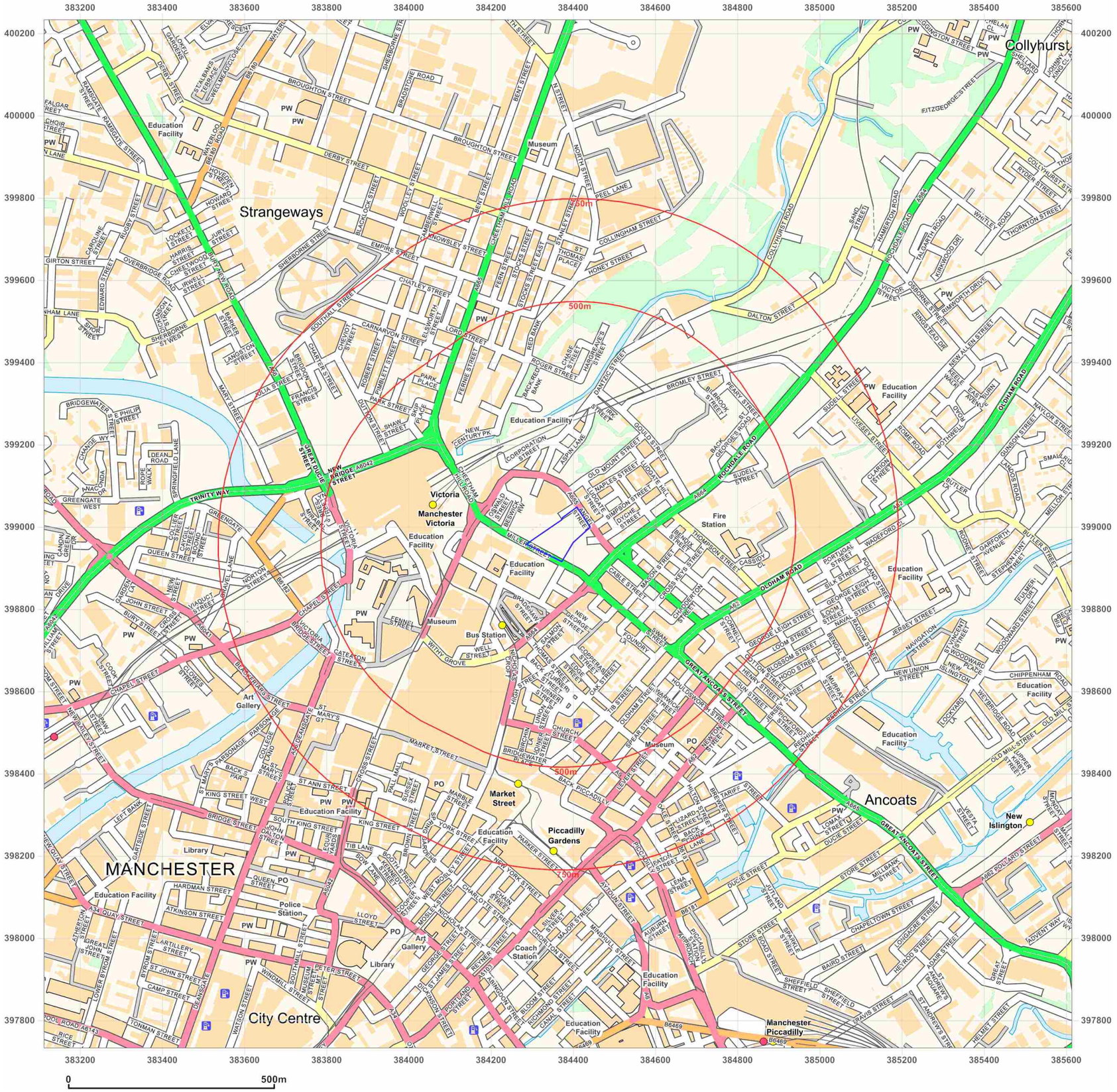
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Groundsure INSIGHTS

Site Details:

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Client Ref: NOMA_2_and_3_Angel_Sq
Report Ref: GS-6225240
Grid Ref: 384363, 398982

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

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Appendix E – Historical Borehole Logs

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MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

SJ 89 NW/[redacted]

Location: MANCHESTER (Miller St) | Task: I.R.O. Schedule 'E' Centre

843 990.

BOREHOLE LOG

Borehole No. A
Ground Level 150·10
Date 9th. – 22nd. June 1968

Note: Slow seepage of ground water at 2'6" cased off at 3'6" borehole dry to 96'0"

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			Metres		
MADE GROUND: Clay, ashes and brick rubble		S269	GL – 150 1'0" 0·31		MADE GROUND
CLAY: soft/firm, silty grey/brown with occasional small stones		S270 S272	1'6" 4'0"		BOULDER CLAY
CLAY: very stiff, silty, grey/brown with small stones and fragments of coal		S273 S275 S277	6'6" 9'0" 11'6"		
SANDY CLAY: brown and gravelly		S279	14'0"		
SAND; Medium/fine, very dense, gravelly, brown		S280	15'0" – 4·57 15'9"		14/28/57 – SC
GRAVEL; Medium/coarse, sandy, poorly graded, very dense, brown		S281	19'0" 5·79 19'9"		17/24/60 – SC
SAND; Medium/fine, variably gravelly, very dense, brown		S282 S283 S285	24'0" 7·32 24'9" 29'3" 33'6" 34'0"		11/30/58 – SC 17/30/61 – SC 8/24/39/50 – SC
SAND; Medium/fine, silty or clayey with occasional stones red/brown		S286	37'0" 11·28 40'0" – 12·19		U4 attempted no recovery

Note: Description of strata is in accordance with B.S. C.P.2001.

Legend:
Disturbed Sample
Undisturbed Sample
Ground Water Level

Standard Penetration Test
Blows per 3" penetration
SC solid cone
OS open spoon

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. 6900 Appendix A Sheet No. 3644

SJ 89 NW/[redacted]

Location MANCHESTER (Miller St.) Task I. R. O. Schedule 'E' Centre [redacted]

BOREHOLE LOG

Borehole No. A (continued)

Ground Level

Date 9th - 22nd June 1968

Note: Percussion borehole to 45'0"
'H' size Rotary bore to 96'0"

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			Metres		
		8287	40'0"		
GRAVEL; Medium / fine sandy		8288			
SAND; fine, silty, grey / brown, very dense, containing pebbles		8289			24/54/24 for 1" = 0S
			45'0"		Core recovery 3'3" (65%)
			48'0"		No core recovered
			53'0"	16.15	
SANDSTONE; Very soft, red / brown medium / fine grained		6912			Core recovery - 3'0" (100 %)
			56'0"		
		6913			Core recovery - 5'0" (100 %)
			61'0"		
		6914			Core recovery - 3'2" (63 %)
			66'0"		
		6915			Core recovery - 3'11" (78 %)
			71'0"		
SANDSTONE; Soft to medium hard coarse grained occasional pebbles many lenses of red marl		6916			Core recovery - 4'0" (82 %)
			76'0"		
		6917			Core recovery - 5'0" (100 %)
			80'0"	24.38	

Note:
Description of strata is in accordance with B.S. C.P.2001.

Legend:
Disturbed Sample
Undisturbed Sample
Ground Water Level

Standard Penetration Test
Blows per 3" penetration
SC Solid cone
OS Open shoe

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. 40[illegible] Appendix A
Sheet No. 3

SJ 89 NW/[illegible]644

Location MANCHESTER (Miller St.)

Task I. R. O. Schadule 'E' Centre

BOREHOLE LOG

Borehole No. A (continued)

Ground Level

Date 9th. - 22 nd June 1968

Note:

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
Many marly laminations and pellets of red marl cement bedding dip 2 - 5°		G918	80'0"	24.38	Core recovery - 5'0" (100%)
		G919	86'0"		Core recovery - 5'0" (100%)
		G920	91'0"		Core recovery - 5'0" (100%)
Borehole completed at 96 ft.			96'0"	29.26	

Note:
Description of strata is in accordance with B.S. C.P.2001.

Legend:
Disturbed Sample
Undisturbed Sample
Ground Water Level

Standard Penetration Test
Blows per 3" penetration
S.C Solid Cone

...ISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. 5/4084 | Appendix A, Sheet No. 4

Location: MANCHESTER (Miller St.) | Task: I. R. O. Schedule 'E' Centre

BOREHOLE LOG

SJ 89 NW [redacted]3645

Borehole No. B
Ground Level 148 · 75
Date 17th – 21st June 1968

Note: No ground water encountered to maximum depth of borehole 45'0"

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			GL	149	
MADE GROUND; Mixture of large rubble and timber		B286			
			11'6"		
SAND; Fine, silty with small stones		B287	12'0"		
			14'0"		
GRAVEL; Large, sandy, brown			14'6"		11/23/61 – SC
		B288			
			19'0"		
			20'0"		16/28/57 – SC
		B301			
			23'0"		
SAND; Medium/fine, gravelly, brown		B302			
			24'6		14/32/61 – SC
GRAVEL; Sandy, well graded, brown		B303			
			29'0"		
			30'0"		18/31/59 – SC
		B304			
			32'6"		33/74 – OS
SAND; Fine, silty and clayey, very dense, red / brown and grey with stones		B305			
		B306			
			40'0"		

Note: Description of strata is in accordance with B.S. C.P. 2001

Legend: Disturbed Sample; Undisturbed Sample; Ground Water Level

Standard Penetration Test: Blows per 3" penetration; SC Solid Cone; OS Open Shoe

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. S/4084 | Appendix A, Sheet No. 5

Location: MANCHESTER (Miller St) | Task: I.R.O. Schedule 'E' Centre

BOREHOLE LOG

SJ89NW 3645 [redacted]

Borehole No. B (continued)

Ground Level

Date

Note:

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
SAND; Fine, silty and clayey, with small stones, grey/brown		B307	40'0"		31/68 - 05
		B308	40'6"		
		B309	44'6"		43/67 - 05
Bore completed at 45'0"					

Note: Description of strata is in accordance with B.S. C.P 2001

Legend: Disturbed Sample; Undisturbed Sample; Ground Water Level

Standard Penetration Test: Blows per 3" penetration; SC Solid cone

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. S/4084 | Appendix A, Sheet No. 8

Location: MANCHESTER (Miller St) | Task: I.R.O. Schedule 'E' Centre

BOREHOLE LOG

3647 SJ 89 NW [redacted]

Borehole No. E
Ground Level 150·48
Date 3rd – 14th July 1968

Note: Seepage of water at 1'0" probably due to recent rain Otherwise borehole dry

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			GL	150	
MADE GROUND: ASHES: LOOSE			1' 0"		
CLAY; silty, grey/brown with fragments of coal and small stones. Firm to stiff becoming very stiff		8208	2' 0"		
			3' 6"		
		8209	4' 6"		
		8210	7' 0"		
			8' 6"		
		8212			
		8213	11' 0"		
			12' 6"		
		8215	13' 6"		
			14' 6"		
SAND; clayey, fine, brown with some stones		8216			9/13/28/31/50 – SC
		8217	16' 0"		
			17' 0"		3/11/23/44 – SC
SAND; fine, silty and gravelly, brown		8218			
			21' 6"		
			22' 0"		2/9/17/53 – SC
GRAVEL; medium/coarse, sandy brown		8219			
			27' 0"		7/7/16/28/39 – SC
		8220			
			32' 0"		3/5/11/25/29/30 – OS
SAND; medium/coarse, gravelly Lt brown		8221			
GRAVEL; medium, sandy, brown		8222			
			36' 6"		28/57/70 – OS
SAND; clayey, brown with some stones		8223			
		8225			

Note: Description of strata is in accordance with B.S. C.P 2001

Legend: Disturbed Sample; Undisturbed Sample; Ground Water Level

Standard Penetration Test: Blows per 3" penetration; SC Solid cone

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. S/4084 Appendix A Sheet No. 16

Location MANCHESTER (Miller St) Task I.R.O. Schedule E Centre

BOREHOLE LOG

3652 SJ 89 NW [redacted]

Borehole No. 1

Ground Level 154·20

Date 8th – 10th July 1968

Note: Borehole dry

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			GL	154	
MADE GROUND: Loose Ash and Brick Fill			5'0"		
CLAY: Silty, variably firm to very stiff, grey/brown with occasional large boulders at depth		8342	6'6"		
		8343			
		8344	10'0"		
			11'6"		
		8346			
		8347	15'0"		U4 sample stopped by Boulder
SAND: Clayey, Stiff, brown containing small stones		8350	16'6"		
SAND: Medium/fine, silty and gravelly, brown, containing occasional bands of coarse sand		7148	18'6"		
		7149	20'0"		28/58 – 05
		7150	24'0"		32/65 – 05
		8250			
Bore completed at 28'6"					

Note: Description of strata is in accordance with B.S. C.P.2001.

Legend: Disturbed Sample; Undisturbed Sample; Ground Water Level

Standard Penetration Test: Blows per 3" penetration; SC Solid cone

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. [redacted] Appendix A
Sheet No. 17

SJ 89 NW/[redacted] 3653

Location: MANCHESTER (Miller St)

Task: I. R. O. Schedule 'E' Centre

BOREHOLE LOG

Borehole No. M
Ground Level 159·25
Date 25th. May to 15th. June 1968

Note: Ground water seepage at 5'0"
Percussion bore to 50'0"
cased to 47'0"

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			GL	159	
MADE GROUND; Large RUBBLE and ASHES with slabs of sandstone at 4 ft.		7991			
		W8254	5' 0"	154	
CLAY; Silty, Firm, grey/brown, containing occasional small pebbles and fragments of coal		7992	6' 0"		
		7994	8' 0"		
		7995	11' 0"		
		7997	13' 0"		
		7998	16' 0"		
		8000	18' 0"		
CLAY; Silty, Very stiff, grey/brown, with small stones and fragments of coal		8251	21' 0"		
		8252	22' 0"		
		8255	24' 0"		
			25' 0"	134	
SAND; Fine, silty, Lt. brown		8256	26' 3"		
		8257	27' 0"		
SAND; Medium / Fine silty and gravelly, dk. brown		8258	31' 0"		
		8259			
			32' 0"	9·91	
SAND; Gravelly, brown		8260	35' 0"		
			36' 0"		
			37' 0"		
SAND; Medium, gravelly brown		8261	40' 0"	12·19	

Note:
Description of strata is in accordance with B.S. C.P.2001.

Legend:
Disturbed Sample
Undisturbed Sample
Ground Water Level
Ground Water Sample W

Standard Penetration Test
Blows per 3" penetration
OS Open Spoon
SC Solid cone

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[SJ89NW BJ 3653 .]

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. SJ 89 NW/3 [redacted] 3653 | Appendix A Sheet No. 18

Location: MANCHESTER (Miller St) | Task: I.R.O. Schedule 'E' Centre

BOREHOLE LOG

Borehole No. M (continued)

Ground Level

Date 25th. May to 6th. June 1968

Note: 'H' size Rotary borehole from 50' 0" to 100' cased to 63' 6"

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			40' 0"	12.19	
SAND; Medium, gravelly, brown with some large cobbles		B202			37/65 - 0S
			42' 6"		
		B203			
			45' 6"	-13.72	
SAND; Medium, Uniform, brown		B204	46' 0"		8/11/14/14/23/29 - 0S
		B206	47' 6"	14.48	
SAND; Medium/fine, silty, red/brown		B207	48' 0"		27/100 - 0S
			50' 0"	15.24	
SAND; Fine silty with pebbles, partially cemented		0901			Core recovery 3' 1" (62%)
			55' 0"		
		0902			Core recovery 3' 0" (60%)
			60' 0"		
			61' 0	18.59	
Band of red Marl			62' 0"	18.90	
		0903			Core recovery 4' 6" (87%)
SANDSTONE; Soft, medium/fine, red/brown with marl pellets and small pebbles			65' 0"		
		0904			Core recovery 4' 0" (80%)
			70' 0"		
		0905			Core recovery 5' 0" (100%)
			75' 0"		
		0906			Core recovery 3' 3" (65%)
			80' 0"	24.38	

Note:
Description of strata is in accordance with B.S. C.P.2001.

Legend:
Disturbed Sample
Undisturbed Sample
Ground Water Level

Standard Penetration Test
Blows per 3" penetration
OS Open spoon
SC Solid cone

W.2037

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[SJ89NW BJ 3653 .]

MINISTRY OF PUBLIC BUILDING AND WORKS
CENTRAL UNIT (CIVIL ENGINEERING)

Task No. [illegible] Appendix A
Part No.

SJ 89 NW/[redacted]

Location: MANCHESTER (Miller St) Task: I.R.O. Schedule 'E' Centre . 3653

BOREHOLE LOG

Borehole No. M (concluded)
Ground Level
Date

Note:

Description of Strata	Legend	Sample	Depth	O.D.	Remarks
			80'0"	24·30	
SANDSTONE: Medium hard, coarse, red/brown with occasional laminations and pellets of marl		6907			Core recovery 3'0" (60%)
			85'0"		
		6908			Core recovery 4'0" (80%)
			90'0"		
		6909			Core recovery 5'0" (100%)
			95'0"		
		6910			Core recovery 3'8" (73%)
			100'0"	30·50	
Bore completed at 100'0"					

Note:
Description of strata is in accordance with B.S. C.P.2001.

Legend:
Disturbed Sample
Undisturbed Sample
Ground Water Level

Standard Penetration Test
Blows per 3" penetration
OS Open spoon
SC Solid cone

W.2037

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[SJ89NW BJ 3653 .]

STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**01.05.09** End: **13.05.09**	**40.8**	**E:384360.0 N:399101.2**	**1** of **5**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Legend
											MADE GROUND: Dark grey black and reddish brown slightly silty fine to coarse SAND and very angular to subangular fine to coarse GRAVEL of ash, clinker, brick, sandstone, ceramic fragments and coal with frequent angular to subangular cobbles of brick.	(0.70)	
0.40	1	ES	Tubx2+J+VL									0.70	
0.50-1.00	4	B											
0.80	2	ES	Tubx2+J+VL								Brick wall in north face extending from 0.20m to 1.00m depth.	1.00	
1.10	5	ES	Tubx2+J+VL								MADE GROUND: Stiff brown slightly gravelly CLAY with occasional grey mottling and occasional subrounded cobbles up to 150mm diameter. Gravel is subangular to subrounded fine to coarse sandstone, limestone, quartzite and ironstone.	1.20	
1.20	3	D											
1.20-1.70	6	B											
1.70	7	ES	Tubx2+J+VL								Very stiff brown very sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse quartzite, limestone, sandstone, and ironstone.	(1.50)	
2.20-2.70	8	B									Brown very clayey slightly gravelly fine to medium SAND. Gravel is subrounded to rounded fine to coarse quartzite, limestone, sandstone and ironstone.	2.70	
2.70-3.20	10	B									Pinkish brown fine to coarse SAND and subangular to rounded fine to coarse GRAVEL of quartzite, limestone and sandstone with frequent subrounded to rounded cobbles.		
2.70	9	D											
3.20	11	D										(1.80)	
3.70-4.20	12	B											
4.20	13	D										4.50	
4.50-4.95	1	SPT	N=50								Very dense reddish brown clayey to very clayey fine to medium SAND and subangular to rounded fine to coarse GRAVEL of various lithologies including sandstone, limestone, quartzite, glacial coal and granite.		
	2	B											

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
01/05/09		4.50	4.50	250	Dry
11/05/09	09:45	4.50	4.50	250	Dry
11/05/09	17:30	11.80	11.80	200	Dry
13/05/09	10:30	11.80	11.80	200	Dry
13/05/09	14:30	21.00	11.80	121	21.00
13/05/09	15:40	24.80	11.80	121	15.80
13/05/09	16:00	24.80	11.80	121	16.80
13/05/09	16:20	24.80	11.80	121	15.15

Chiselling

From	To	Duration (hh:mm)
4.50	11.80	07:00

General Remarks

1. Hand dug pit excavated to 1.20m depth on 14.04.09.
2. All faces similar.
3. All faces generally stable. Slightly unstable below 2.70m depth.
4. No groundwater encountered during excavation of trial pit.

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler**	

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**01.05.09** End: **13.05.09**	**40.8**	**E:384360.0 N:399101.2**	**2** of **5**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thickness)	Legend
6.00	3	D									Very dense reddish brown clayey to very clayey fine to medium SAND and subangular to rounded fine to coarse GRAVEL of various lithologies including sandstone, limestone, quartzite, glacial coal and granite. *(stratum text copied from layer at 4.50m depth from previous sheet)*		
6.00-6.35	4	SPT	N=75*										
	5	B											
												(5.80)	
7.50	6	D											
7.50-7.83	7	SPT	N=83*										
	8	B											
8.00	9	D											
8.00-8.34	10	SPT	N=79*										
	11	B											
9.00	12	D									Below 9.00m, slightly gravelly.		
9.00-9.41	13	SPT	N=57*										
	14	B											
10.00	15	D											
10.00-10.37	16	SPT	N=68*										
	17	B										10.30	
											Orangish brown locally clayey fine to medium SAND.	(0.70)	
												11.00	

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
14/05/09	08:30	24.80	11.80	121	15.10

Chiselling

From	To	Duration (hh:mm)

General Remarks

5. Excavation easy. Moderate below 1.20m depth. Difficult below 2.70m depth.
6. Trial pit terminated at 4.50m depth.
7. 255mm diameter plastic casing installed on completion to enable borehole to be continued at this location.
8. Exploratory hole continued by cable percussive

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler**	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**01.05.09** End: **13.05.09**	**40.8**	**E:384360.0 N:399101.2**	**3** of **5**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Legend
11.00	18	D									Extremely weak red brown locally purplish brown fine to medium grained SANDSTONE.		
11.00-11.43	19	SPT	N=54*									(0.80)	
	20	B										11.80	
11.80-12.80											Very weak locally extremely weak locally weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, highly weathered locally completely weathered to red brown slightly gravelly fine to medium sand. Subhorizontal to horizontal bedding fractures very closely to closely spaced planar smooth tight locally partially open locally weakened with sand infill.		
11.80	21	D									11.80-12.01m : Assumed zone of core loss.		
11.80-11.91	22	SPT	N=429*								12.01-12.10m : Non intact.		
12.33-12.45	23	C		79	69	58							
12.80-14.30							NI						
13.03-13.13	24	C					60						
							119						
				99	95	61		100% return Foam					
14.30-15.80											14.30-14.35m : Non intact. Below 14.30m, bedding fractures closely to medium spaced locally extremely closley to very closely spaced.		
14.92-15.11	25	C		100	97	83							
							NI						
							130						
							290						
15.80-17.30												(8.39)	
				97	91	65							

Boring Progress and Water Observations						Chiselling			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	techniques from 4.50m depth. 9. Cable percussive borehole terminated at 11.80m depth. 10. Exploratory hole continued by rotary drilling techniques from 11.80m depth. 11. Falling head permeability tests conducted at 24.80m depth on 12.05.09 and 13.05.09.

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler**	

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**01.05.09** End: **13.05.09**	**40.8**	**E:384360.0 N:399101.2**	**4** of **5**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Legend
											Very weak locally extremely weak locally weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, highly weathered locally completely weathered to red brown slightly gravelly fine to medium sand. Subhorizontal to horizontal bedding fractures very closely to closely spaced planar smooth tight locally partially open locally weakened with sand infill.		
16.98-17.06	26	C		97	91	65					11.80-12.01m : Assumed zone of core loss. *(stratum text copied from layer at 11.80m depth from previous sheet)*		
17.30-18.80				98	96	85	NI 130 290				16.93-16.98m : Non intact. 17.65-17.70m : Very narrow orangish brown staining up to 3mm thick.		
18.80-20.30													
19.04-19.15	27	C		95	91	79		100% return Foam			19.21-19.23m : Very narrow orangish brown staining up to 3mm thick.		
												20.19	
20.30-21.80							NI 35 60				20.16-20.19m : Band of orangish yellow brown fine to coarse sand. Extremely weak to very weak thinly laminated red brown MUDSTONE, completely to highly weathered. Subhorizontal to horizontal bedding fractures intersecting and interlocking with subvertical to vertical fractures extremely closely to very closely spaced planar smooth tight and clean. 20.21-20.68m : Assumed zone of core loss. 20.70-20.78m : Non intact.	(0.69)	
												20.88	
21.02-21.14	28	C		75	69	45	NI 200 420				*Description on next sheet*		
21.80-23.30				95	85	73					21.80-21.95m : Predominantly non intact.		

Boring Progress and Water Observations						Chiselling			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler**	

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**01.05.09** End: **13.05.09**	**40.8**	**E:384360.0 N:399101.2**	**5** of **5**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Legend
				95	85	73					Very weak locally extremely weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, highly weathered. Subhorizontal to horizontal bedding fractures closely to medium locally very closely spaced planar smooth tight. *(stratum text copied from layer at 20.88m depth from previous sheet)*	(3.92)	
22.88-22.95	29	C									22.70-22.80m : Vertical fracture.		
23.30-24.80							NI 200 420	100% return Foam			23.20-23.30m : Subvertical fracture.		
				100	98	79							
24.69-24.80	30	C										24.80	
											Borehole terminated at 24.80m depth.		

Boring Progress and Water Observations						Chiselling			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler**	

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**02.05.09** End: **15.05.09**	**42.9**	**E:384344.2 N:399048.0**	**1** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thickness)	Legend
											MADE GROUND: Tarmac.	0.05	
											MADE GROUND: Dark grey fine to coarse SAND and angular to subrounded fine to medium GRAVEL of limestone and sandstone.	0.20	
0.20	1	ES	Tubx2+J+VL										
0.50	3	ES	Tubx2+J+VL								MADE GROUND: Stiff friable sandy gravelly CLAY. Gravel is very angular to subrounded fine to coarse brick, sandstone, mudstone, ceramic and possible clinker. Locally very clayey gravelly sand. 0.70m, Abandoned cast iron drainage pipe.	(0.90)	
0.50-1.00	5	B											
0.60-1.10	2	ES	Tubx2+J+VL										
1.00	4	ES	Tubx2+J+VL									1.10	
1.10-1.40	8	B									MADE GROUND: Very stiff brown sandy locally very sandy slightly gravelly to gravelly CLAY. Gravel is subangular to rounded fine to medium sandstone, mudstone, coal and quartzite. Locally very clayey slightly gravelly sand. 1.10m, Abandoned cast iron drainage pipe.	(0.40)	
1.20	6	D											
1.30	7	ES	Tubx2+J+VL									1.50	
2.00-2.50	11	B									MADE GROUND: Light brown slightly gravelly fine to medium SAND. Gravel is subrounded to rounded fine to coarse sandstone. Clay strata above continues from 1.10 to 2.50m in south east side of trial pit. Below 1.50m, 2 No. vertical clay drainage pipes in both north and south faces of trial pit.	(2.50)	
2.00	9	ES	Tubx2+J+VL										
2.50	10	ES	Tubx2+J+VL										
3.50-4.00	12	B									3.70m, Horizontal clay drainage pipe in south face.	4.00	
4.00	13	ES	Tubx2+J+VL								Very stiff brown sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse sandstone, mudstone and coal.	4.30	
4.50-4.92	1	SPT	N=57*								Very dense reddish brown clayey to very clayey gravelly to gravelly fine to medium SAND. Gravel is subangular to rounded fine to coarse various lithologies including sandstone, quartzite, limestone and glacial coal.		
	14	D											
	15	B											
	2	B											

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
02/05/09		1.00	None	N/R	1.00
02/05/09		4.50	4.50	255	Dry
12/05/09	09:00	4.50	4.50	200	Dry
12/05/09	12:30	10.50	10.50	200	Dry
14/05/09	14:00	10.50	10.50	121	Dry
14/05/09	17:45	17.50	10.50	121	17.50
14/05/09	18:45	20.50	10.50	121	18.10
15/05/09	08:30	20.50	10.50	121	16.30

Chiselling

From	To	Duration (hh:mm)
4.50	10.50	00:00

General Remarks

1. Hand dug pit excavated to 1.20m depth on 15.04.09.
2. All faces similar, save where noted.
3. All faces slightly unstable.
4. Slight groundwater seepage at 1.00m depth.
5. Excavation easy. Moderate below 4.30m depth.
6. Trial pit terminated at 4.50m depth.

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler + RLaw**	AGS

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**02.05.09** End: **15.05.09**	**42.9**	**E:384344.2 N:399048.0**	**2** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thickness)	Legend
5.50-5.73	4 17 5	SPT D B	N=130*								Very dense reddish brown clayey to very clayey gravelly to gravelly fine to medium SAND. Gravel is subangular to rounded fine to coarse various lithologies including sandstone, quartzite, limestone and glacial coal. *(stratum text copied from layer at 4.30m depth from previous sheet)*		
6.50-6.69	7 7 8	SPT D B	N=143*									(5.90)	
7.50	9	D											
9.00	10	D											
9.10-9.15	11 12	SPT B	N=300*										
10.10	13	D										10.20	
10.20-10.35	14 15	SPT B	N=214*								Extremely weak red brown fine to medium grained SANDSTONE.	10.50	
10.50-12.00											*Description on next sheet*		
10.50-10.68	17 17	SPT D	N=150*	40	27	0	NI 20 90						

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
15/05/09	11:00	24.50	10.50	121	20.30
15/05/09	12:20	24.50	10.50	121	20.40
15/05/09	12:40	24.50	10.50	121	19.20
15/05/09	14:10	24.50	10.50	121	15.51
15/05/09	14:40	24.50	10.50	121	15.98

Chiselling

From	To	Duration (hh:mm)

General Remarks

7. 255mm diameter plastic casing installed on completion to enable borehole to be continued at this location.
8. Exploratory hole continuted by cable percussive techniques from 4.50m depth.
9. Cable percussive borehole terminated at 10.50m depth.

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler + RLaw**	AGS

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	End: **15.05.09**	**42.9**	**E:384344.2 N:399048.0**	**3** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Legend
				40	27	0					Extremely weak, locally very weak, indistinctly thinly laminated orangish red brown fine to medium locally coarse grained SANDSTONE, completely locally highly weathered to orangish red brown very gravelly fine to medium sand. Gravel is very angular to angular fine to coarse lithorelicts. Subhorizontal to horizontal bedding fractures locally intersected by subvertical fractures extremely closely to very closely spaced planar smooth.		
11.61-11.66	19	C											
11.94-11.98	20	C										(3.00)	
12.00-13.50							NI 20 90				10.50-11.40m : Assumed zone of core loss. *(stratum text copied from layer at 10.50m depth from previous sheet)* 11.40-11.60m : Predominantly non intact. 12.00-12.62m : Assumed zone of core loss.		
				59	12	0					12.62-13.00m : Predominantly non intact.		
13.20	18	D									13.12-13.44m : Predominantly non intact. 13.20m, Narrow band of soft red brown clay (residual mudstone).	13.50	
13.50-14.50								100% return Foam			Extremely weak to very weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, completely to highly weathered. Subhorizontal to horizontal bedding fractures very closely to closely spaced planar smooth tight locally intersected by subvertical to vertical fractures.		
13.62-13.70	21	C											
				100	100	36							
14.50-16.00											14.50-14.68m : Assumed zone of core loss.		
							NI 60 230				15.00-15.33m : Extremely closely spaced intersecting and interlocking subhorizontal and subvertical fractures.		
				88	57	34							
15.40-15.51	22	C									15.68-16.76m : Non intact and completely weathered.	(4.90)	
16.00-17.50													
				97	86	45					16.18-16.25m : Band of extremely weak thinly laminated red brown mudstone.		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling

From	To	Duration (hh:mm)

General Remarks

10. Exploratory hole continued by rotary drilling techniques from 10.50m depth.
11. Falling head permeability test conducted at 24.50m depth on 15.05.09.

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler + RLaw**	

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	End: **15.05.09**	**42.9**	**E:384344.2 N:399048.0**	**4** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instru-mentation	Water	Description of Strata	Depth (Thick ness)	Legend
16.97-17.06	23	C		97	86	45	NI 60	100% return Foam			Extremely weak to very weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, completely to highly weathered. Subhorizontal to horizontal bedding fractures very closely to closely spaced planar smooth tight locally intersected by subvertical to vertical fractures. *(stratum text copied from layer at 13.50m depth from previous sheet)*		
17.50-19.00							230				16.77m, Very narrow band of extremely weak thinly laminated red brown mudstone.		
17.86-17.95	24	C		73	65	15						18.40	
19.00-20.50				33	13	7	NI NI 100				Extremely weak orangish red brown fine to medium grained SANDSTONE, completely weathered to orangish red brown very gravelly fine to medium sand. Gravel is very angular to angular fine to coarse lithorelicts. 18.40-18.60m : Non intact. 18.60-20.00m : Assumed zone of core loss. 20.00-20.15m : Non intact. 20.32-20.42m : Non intact.	(2.40)	
20.40-20.50	25	C											
20.50-21.50				92	66	48					20.50-20.80m : Non intact.	20.80	
21.25-21.37	26	C					NI 100	100% return Foam			Extremely weak to very weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, highly locally completely weathered. Subhorizontal to horizontal bedding fractures closely locally very closely spaced planar smooth light locally with orangish red brown surface staining. 21.38-21.50m : Subvertical fracture. 21.50-21.60m : Assumed zone of core loss. 21.60-21.68m : Non intact.		
21.50-22.50				90	82	57	350						

Boring Progress and Water Observations						Chiselling			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler + RLaw**	AGS

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	End: **15.05.09**	**42.9**	**E:384344.2 N:399048.0**	**5** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Legend
				90	82	57					Extremely weak to very weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, highly locally completely weathered. Subhorizontal to horizontal bedding fractures closely locally very closely spaced planar smooth light locally with orangish red brown surface staining. *(stratum text copied from layer at 20.80m depth from previous sheet)*		
22.50-23.50													
22.99-23.06	27	C		63	57	43					23.13-23.50m : Assumed zone of core loss.		
23.50-24.50							NI 100 350				23.62-23.97m : Assumed zone of core loss.		
24.12-24.20	28	C		65	36	0					24.04-24.13m : Non intact and completely weathered. 24.20-24.36m : Non intact and completely weathered.		
24.50-25.50								100% return Foam			24.50-24.60m : Assumed zone of core loss. 24.60-24.80m : Non intact.		
25.08-25.17	29	C		90	65	27					24.90-25.00m : Subvertical fracture.		
25.50-26.50											Below 25.50m, fractures closely to medium spaced.	(9.70)	
26.50-27.50				72	72	50	NI 150 430				26.00-26.20m : Subvertical fracture. 26.20-27.02m : Assumed zone of core loss.		
27.07-27.20	30	C		48	43	43					27.02-27.05m : Band of firm red brown clay (residual mudstone).		

Boring Progress and Water Observations						Chiselling			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler + RLaw**	

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
The co-operative Head Office, Manchester	**The co-operative**	**TPBH 02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
761072	**02.05.09** End: **15.05.09**	**42.9**	**E:384344.2 N:399048.0**	**6** of **6**

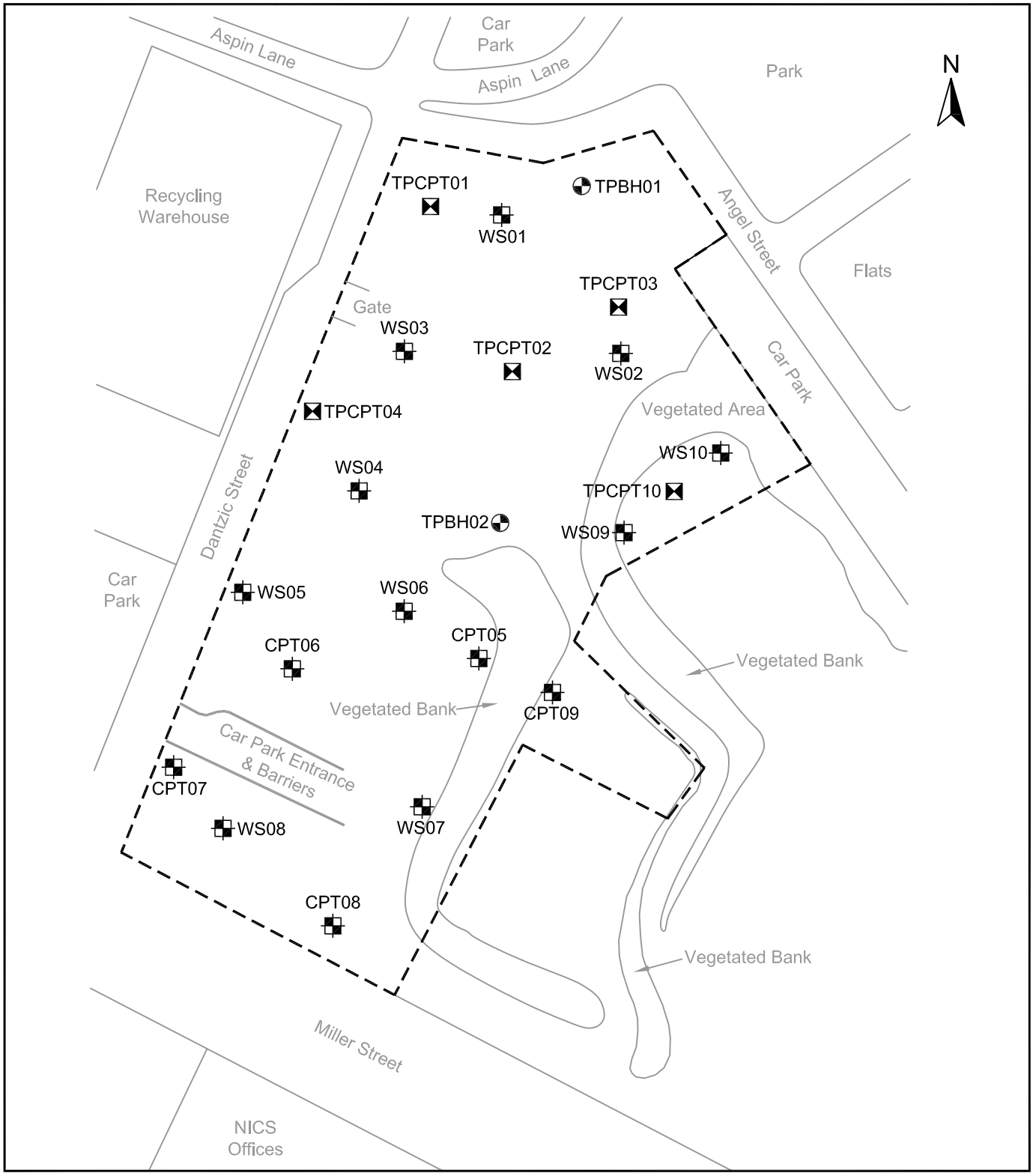
Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Flush Returns & Details	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Legend
27.50-28.50				76	45	30		100% return Foam			Extremely weak to very weak indistinctly thinly laminated red brown fine to medium locally coarse grained SANDSTONE, highly locally completely weathered. Subhorizontal to horizontal bedding fractures closely locally very closely spaced planar smooth light locally with orangish red brown surface staining. *(stratum text copied from layer at 20.80m depth from previous sheet)* 27.50-27.74m : Assumed zone of core loss. 27.74-27.90m : Completely weathered. 28.00-28.10m : Completely weathered. 28.54-28.74m : Completely weathered.		
28.50-29.50				100	76	60	NI 150 430						
29.10-29.20	31	C											
29.50-30.50				100	98	88							
												30.50	
											Borehole terminated at 30.50m depth.		

Boring Progress and Water Observations						Chiselling			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:31**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored + Trial Pit/trench	**Dando 2000 + Massenza M-I-2 + Wheeled 360° excavator**	**JH & RF + SH**	**NFowler + RLaw**	

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LEGEND: TPBH Borehole Location; CPT WS Hand Dug Trial Pit Location; TPCPT Trial Pit Location; Site Boundary

STRUCTURAL SOILS LIMITED

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CLIENT: Buro Happold Limited

PROJECT: The co-operative Head Office, Manchester

TITLE: EXPLORATORY HOLE LOCATION PLAN

REV.	DATE	DESCRIPTION	BY	CHD.	APR.
00	15.06.2009	-	CPM	NF	-

JOB NO.	DRAWING FILE	DRAWING STATUS	FIGURE
761072	-	-	Figure 2

DIMENSION	SCALE	ORIGIN SIZE
m	Not to Scale	A4

STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**02.09.13** End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**1** of **8**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
0.10-0.30	1	B								MADE GROUND : Cobbles. (MADE GROUND)	0.30	
0.30	2	ES								MADE GROUND : Stiff locally closely fissured grey brown and grey slightly sandy slightly gravelly CLAY. Gravel is sub angular to sub rounded fine to coarse coal, sandstone quartzite, brick, clinker. Rare organic material. Localised grey gleying on fissure surfaces. (MADE GROUND)	(1.70)	
0.40	3	D										
0.50-0.80	4	B										
0.90	5	D										
0.90-1.20	6	B										
1.30	7	ES										
1.50-1.95	8	U	50 blows								2.00	
2.00	9	D								Firm brown sandy slightly gravelly CLAY. Gravel is sub angular to sub rounded fine to coarse sandstone, quartzite and mudstone. (GLACIAL TILL)	(1.80)	
2.30	10	ES										
2.50-2.95	11	SPT	N=11									
2.50-2.95	12	B										
3.30	13	ES									3.80	
3.50-3.95	14	U	60 blows							Medium dense brown slightly silty slightly gravelly fine to medium SAND. Gravel is rounded to sub angular fine to coarse sandstone, quartzite and mudstone. (GLACIAL SAND AND GRAVEL)	(0.60)	
4.00	15	D									4.40	
4.10	16	D								Medium dense orange brown slightly silty fine to coarse SAND and rounded to sub rounded fine to coarse GRAVEL of quartzite, sandstone and siltstone. Low cobble content. (GLACIAL SAND AND GRAVEL)		
4.10-4.30	17	B										
4.40	18	D										
4.50-4.95	19	SPT	N=29									
4.50-4.95	20	B										
5.50-5.95	21	SPT(c)	N=31									
6.50	22	D									(4.40)	
7.00-7.21	23	SPT(c)	N=165*									
8.00	24	D									8.80	
										Description on next sheet		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
05/09/13	11:00	14.90	14.90	150	Dry
11/09/13	10:00	30.00	20.25	150	19.90

Chiselling / Slow Progress

From	To	Duration (hh:mm)
7.30	7.60	00:45
8.20	8.40	00:30
9.70	10.00	00:45
10.30	10.70	01:00
11.80	12.00	00:45
12.30	12.50	00:30
13.30	13.60	00:45
14.20	14.80	01:30

General Remarks

1. SPT hammer JB.11-2013 (E_r = 74.00%) used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**02.09.13** End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**2** of **8**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
										Medium dense orange brown slightly silty gravelly fine to coarse SAND. Gravel is rounded to sub rounded fine to coarse quartzite and sandstone. (GLACIAL SAND AND GRAVEL)	(0.80) 9.60	
9.50-9.95	25	SPT(c)	N=31							*(stratum copied from 8.80m from previous sheet)*		
9.50	26	D										
9.70	27	D										
10.00-10.27	28	SPT(c)	N=129*							Dense orange brown slightly silty fine to coarse SAND and rounded to sub rounded fine to coarse GRAVEL of quartzite, sandstone and siltstone. Low cobble content. (GLACIAL SAND AND GRAVEL)		
11.00	29	D										
11.50-11.78	30	SPT(c)	N=120*								(4.30)	
12.50	31	D										
13.00-13.18	32	SPT(c)	N=217*									
											13.90	
13.90	33	D								Red brown fine to medium grained SANDSTONE. Recovered as fine to medium sand with occasional gravel size fragments. (SHERWOOD SANDSTONE GROUP)	(0.90) 14.80	
14.80-15.30				20	8	0				Very weak to weak red brown fine to medium grained SANDSTONE. Discontinuities are horizontal to subhorizontal, closely spaced rough, locally undulating. (SHERWOOD SANDSTONE GROUP)		
14.80-14.89	35	SPT(c)	N=341*									
15.30-15.80				80	62	0				. . . 14.80m to 15.20m, AZCL.		
15.80-16.30				100	82	0	NI			. . . 15.30m to 15.80m, extremely weak.		
16.30-17.80							40 80			. . . 16.30m to 16.69m, AZCL.		
				74	60	7						
							NI 80 120			. . . 17.12m to 17.20m, non intact.		
17.80-18.30				100	70	28						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MDD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**02.09.13** End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**3** of **8**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
18.30-18.80				100	70	28				Very weak to weak red brown fine to medium grained SANDSTONE. Discontinuities are horizontal to subhorizontal, closely spaced rough, locally undulating. (SHERWOOD SANDSTONE GROUP)	(7.52)	
				94	94	94						
18.80-19.30				80	48	0				. . . 14.80m to 15.20m, AZCL.*(stratum copied* from 14.80m from previous sheet)		
										. . . below 18.15m, 1no. 30° fracture, stepped, rough.		
19.50-20.00				74	52	44	NI 140 220		11/09 10:00	. . . 19.30 to 19.50m - open hole drilling, advancing casing.		
20.00-20.50				100	94	82						
20.50-21.50				100	93	78				. . . 20.15m to 20.85m, weak fine to coarse sandstone with rounded gravel of sandstone, mudstone and quartzite.		
21.50-23.00				90	84	49				. . . 21.50m to 21.65m, AZCL.	22.32	
23.00-24.50				75	67	27	NI 100 240			Weak red brown fine to coarse grained SANDSTONE with frequent fine to coarse gravel inclusions of quartzite, sandstone and mudstone. Discontinuities are horizontal, closely spaced, locally medium spaced, rough. (SHERWOOD SANDSTONE GROUP)		
24.50-26.00				100	80	57				. . . 23.82m to 24.00m, 1no. 75° fracture, planar, rough. Yellow brown discolouration penetrating up to 20mm. Possible signs of movement, striations/slikensides on fracture surface.		
26.00-27.50				100	88	44					(7.68)	

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MDJ

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL01**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**02.09.13** End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**4** of **8**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
27.50-29.00				100	88	44				Weak red brown fine to coarse grained SANDSTONE with frequent fine to coarse gravel inclusions of quartzite, sandstone and mudstone. Discontinuities are horizontal, closely spaced, locally medium spaced, rough. (SHERWOOD SANDSTONE GROUP) *(stratum copied from 22.32m from previous sheet)*		
				100	99	62	NI 100 240					
29.00-30.00				98	93	74					30.00	
										Rotary borehole terminated at 30.00m depth.		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MD

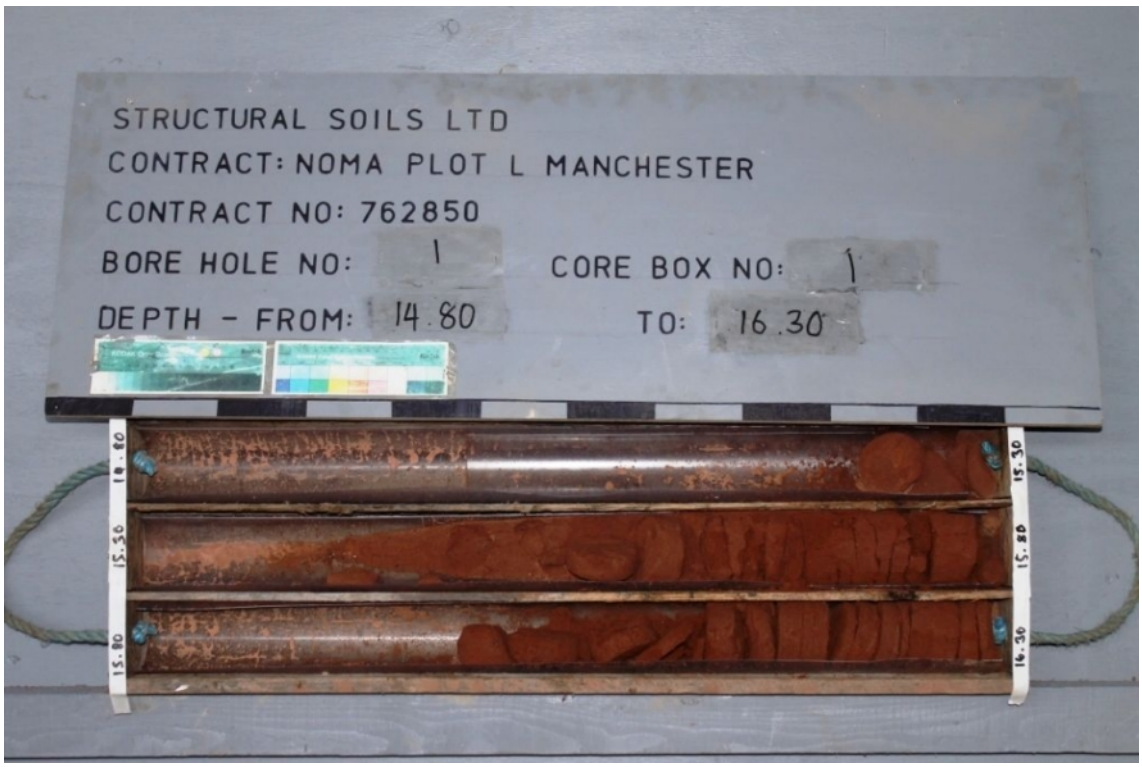
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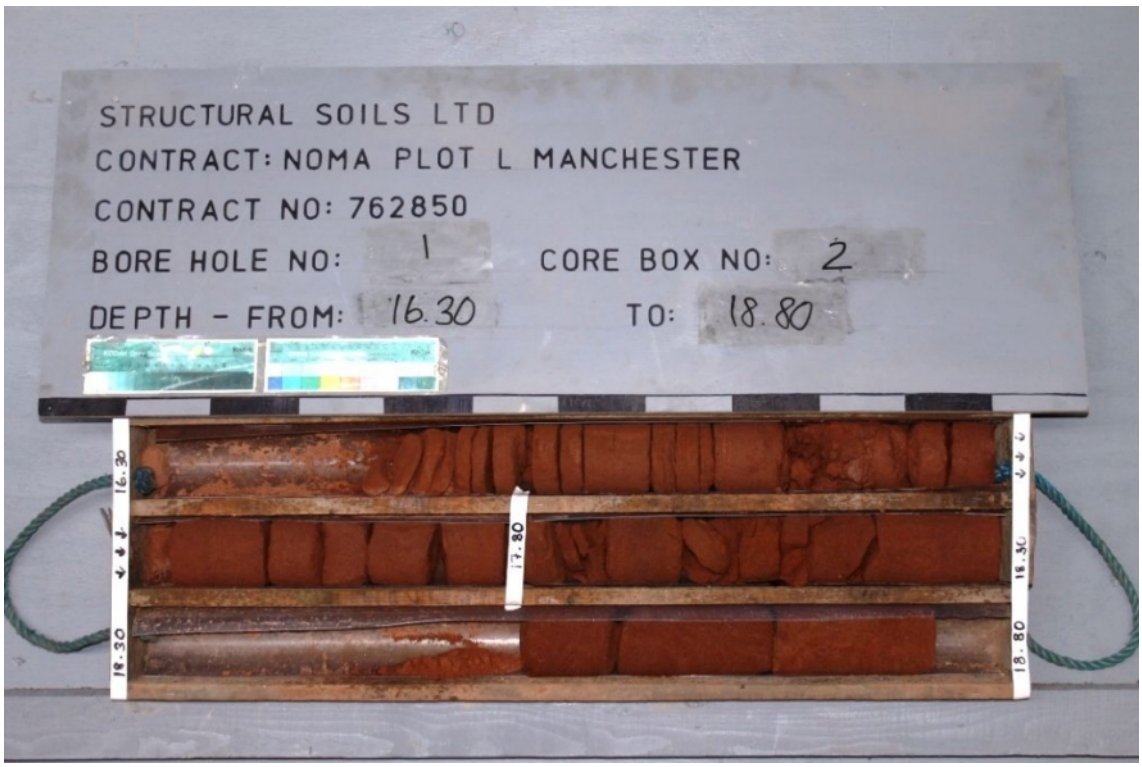
STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL01**
Contract Ref:	Start: **02.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**5** of **8**

BH1 Box 1 - 14.80m to 16.30m





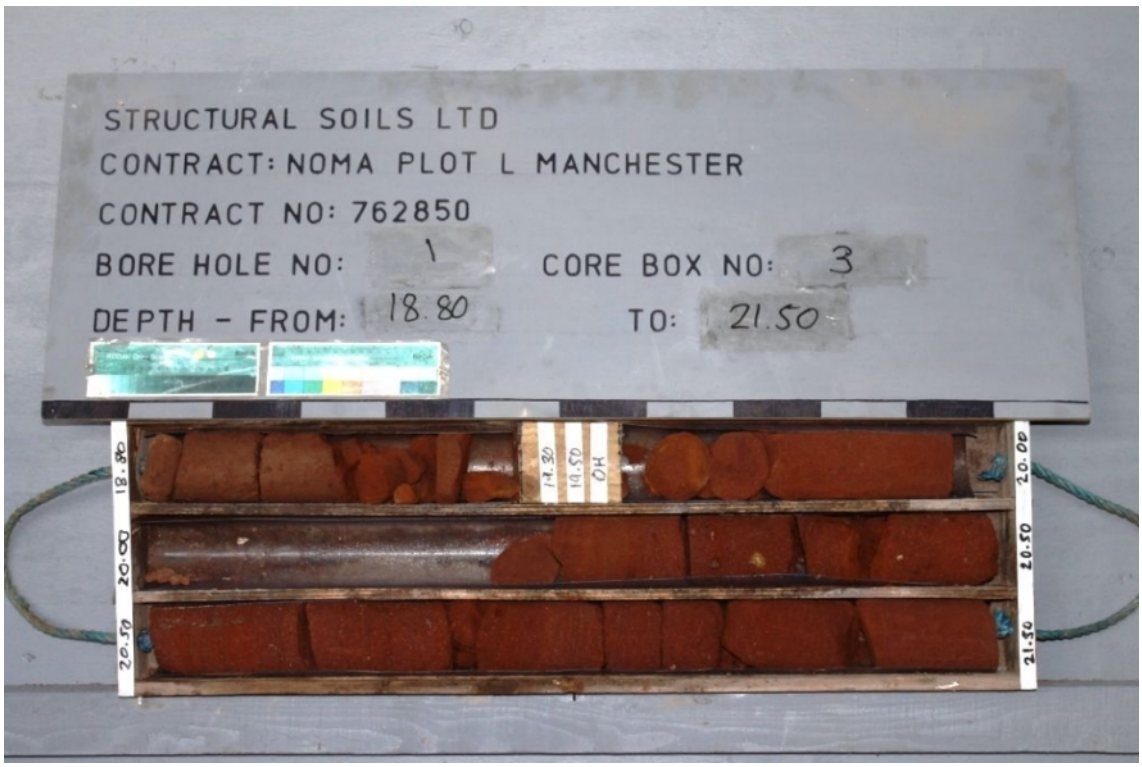
BHL01 Box 2 - 16.30m to 18.80m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDD

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Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL01**
Contract Ref:	Start: **02.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**6** of **8**

BHL01 Box 3 - 18.80m to 21.50m





BHL01 Box 4 - 21.50m to 24.50m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log COMPOSITE LOG | 762850 - NOMA MANCHESTER.GPJ - v8_05 | 16/01/14 - 16:40 | MD.
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STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL01**
Contract Ref:	Start: **02.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**7** of **8**

BHL01 Box 5 - 24.50m to 27.50m





BHL01 Box 6 - 27.50m to 30.00m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDJ

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL01**
Contract Ref:	Start: **02.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **10.09.13**	**45.47**	**E:384366.9 N:398957.8**	**8** of **8**

BH1 - 23.82m to 24.00m.





BH1 - 23.82 to 24.00m.

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDJ

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log COMPOSITE LOG | 762850 - NOMA MANCHESTER.GPJ - v8_05 | 16/01/14 - 16:40 | MD.
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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL02**

Contract Ref:	Start: **05.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **05.09.13**	**48.72**	**E:384446.4 N:398924.5**	**1** of **2**

Depth (m)	Samples & Testing: No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
						MADE GROUND : Hardcore/roadstone (Foreman's description) (MADE GROUND)	0.25	
0.20	1	ES				MADE GROUND : Dense dark brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to sub rounded sandstone, quartzite, brick and concrete. Foreman reports full and half bricks, wood and glass. (MADE GROUND)	(2.55)	
0.30	2	D						
0.40-0.70	3	B						
0.80	4	D						
0.90-1.20	5	B						
1.30	6a	ES						
1.50-1.79	7	SPT(c)	N=111*					
1.50	7	B						
2.30	8	ES						
2.50	9	B					2.80	
2.80-3.11	9	SPT(c)	N=93*			MADE GROUND : Concrete basement (Foreman's description) (MADE GROUND)	3.00	
3.30	10	ES				MADE GROUND : Dense dark brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to sub rounded sandstone, quartzite, brick and concrete. (MADE GROUND)	(0.60)	
3.50-3.95	11	SPT(c)	N=14				3.60	
3.50	11	B				MADE GROUND : Medium dense red brown clayey gravelly locally very gravelly fine to coarse SAND. Gravel is fine to coarse angular to sub rounded sandstone, quartzite, brick and concrete. (MADE GROUND)	4.00	
						Borehole terminated at 4.00m depth as the drill casing was off vertical due to obstructions.		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress

From	To	Duration (hh:mm)
1.80	2.10	00:45
2.80	3.00	01:30

General Remarks

1. Inspection pit to 1.20m
2. Magnetometer survey to 3.00m.
3. Cable percussion boring to 4.00m using 150mm casing and tools.
4. Hole terminated due to off vertical casing caused by obstructions.
5. Borehole backfilled with arisings.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion	**Dando 2000**	**GB**	**RH**	MD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL02**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**05.09.13** End: **05.09.13**	**48.72**	**E:384446.4 N:398924.5**	**2** of **2**

Depth (m)	Samples & Testing: No	Type	Results	Backfill	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend

Boring Progress and Water Observations						Chiselling / Slow Progress		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)

General Remarks

6. SPT hammer JB.11-2013 (E_r = 74.00%) used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion	**Dando 2000**	**GB**	**RH**	MD

AGS

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL02A**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**06.09.13** End: **13.09.13**	**48.77**	**E:384447.4 N:398926.6**	**1** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
										MADE GROUND : Hardcore stone (Foreman's description) (MADE GROUND)	0.25	
										MADE GROUND : Brick rubble with ash fill, full and halfbricks, concrete and wood. (Foreman's description) (MADE GROUND)	(2.55)	
											2.80	
										MADE GROUND : Concrete basement (Foreman's description) (MADE GROUND)	3.00	
										MADE GROUND : Brick and ash rubble fill (Foreman's description) (MADE GROUND)	(0.70)	
											3.70	
3.80	1	D								Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular sandstone and mudstone. (GLACIAL TILL)		
3.90	2	ES										
4.00-4.45	3	U	55 blows									
4.50	4	D								. . . 3.80 - soil sampling commences. (see BHL02 for 0.00 to 3.80m)		
5.00	5	ES										
5.00-5.45	6	SPT	N=17									
5.00-5.45	7	B										
6.00	8	D									(5.00)	
6.50-6.95	9	U	55 blows									
7.00	10	D										
7.60	11	D								. . . Below 7.60m - foreman reports sand bands.		
8.00-8.24	12	SPT	N=167*							. . . below 8.00m becoming stiff to very stiff.		
8.00-8.30	13	B										
											8.70	
8.70	14	D								*Description on next sheet*		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
12/09/13	16:00	19.70	19.70	150	Dry
13/09/13	13:00	30.00	19.70	150	23.10

Chiselling / Slow Progress

From	To	Duration (hh:mm)
1.50	1.80	00:30
2.20	2.40	00:30
2.80	3.00	01:15
8.30	8.50	00:45
9.30	9.50	00:30
10.90	11.00	00:30
11.20	11.40	00:45
14.90	15.20	00:45

General Remarks

1. Hand dug inspection pit to 1.20m
2. Magnetometer surevey to 3.00m
3. Cable tool boring using 150mm casing and tools to 19.60m
4. Rotary core drilling using PWF core barrel and air mist flush from 1.60m to 30.00m.
5. Dual installation (both 50mm diameter)

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL02A**

Contract Ref:	Start: **06.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **13.09.13**	**48.77**	**E:384447.4 N:398926.6**	**2** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.00-9.26	15	SPT(c)	N=135*							Dense orange brown slightly gravelly fine to medium SAND. Gravel is sub angular to sub rounded fine to coarse sandstone and mudstone. (GLACIAL SAND AND GRAVEL) *(stratum copied from 8.70m from previous sheet)*	(1.10)	
9.00-9.30	15	B									9.80	
10.00	16	D								Dense orange brown fine to medium SAND. (GLACIAL SAND AND GRAVEL)	(1.20)	
10.50-10.79	17	SPT	N=105*									
10.50-10.80	18	B									11.00	
11.00	19	D								Dense orange brown slightly silty fine to coarse SAND and sub angular to rounded fine to coarse GRAVEL of sandstone, mudstone and quartzite. Foreman reports cobbles and boulders. (GLACIAL SAND AND GRAVEL)	(4.00)	
11.50-11.80	20	SPT(c)	N=103*									
11.50-11.80	20	B										
12.50	21	D										
13.00-13.20	22	SPT(c)	N=147*									
13.00-13.30	22	B										
14.00	23	D										
14.50-14.78	24	SPT(c)	N=115*									
14.50-14.80	24	B									15.00	
15.50	25	D								Very stiff red brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub angular sandstone and mudstone. (GLACIAL TILL)	(3.50)	
16.00-16.11	26	SPT(c)	N=208*									
16.00-16.30	26	B										
17.00	27	D										
17.50-17.70	28	SPT(c)	N=156*									
17.50-17.80	28	B										

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress

From	To	Duration (hh:mm)
17.80	18.00	00:45
19.30	19.60	01:00

General Remarks

installed on completion.
6. SPT hammer JB.11-2013 (E_r = 74.00%) used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL02A**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**06.09.13** End: **13.09.13**	**48.77**	**E:384447.4 N:398926.6**	**3** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
											18.50	
18.70	29	D								Red brown fine to medium grained SANDSTONE. Recovered as fine to medium sand with occasional gravel size fragments. (SHERWOOD SANDSTONE GROUP)	(1.10)	
19.00-19.14	30	SPT	N=238*								19.60	
19.60-20.60										Weak red brown fine to coarse grained SANDSTONE with frequent fine to coarse gravel inclusions of quartzite, sandstone and mudstone. Discontinuities are horizontal, closely spaced, locally medium spaced, rough. (SHERWOOD SANDSTONE GROUP)		
19.60-19.72	31	SPT	N=283*									
				80	64	12						
20.60-22.10				80	63	31	NI 120 200			. . . 19.60m to 19.80m, AZCL. . . . 20.14m to 20.17m, Light orange in colour. . . . 20.60m to 20.90m, AZCL.		
22.10-23.60				93	83	31			13/09 13:00	. . . 22.37m to 22.42m, non intact.		
23.60-25.10				92	84	65	NI 200 340			. . . below 23.90m, closely to medium spaced with rare fine to medium gravel inclusion of sandstone.	(10.40)	
25.10-26.60				88	83	64	NI 100 150					
26.60-28.10				92	75	25						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MDD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL02A**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**06.09.13** End: **13.09.13**	**48.77**	**E:384447.4 N:398926.6**	**4** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
				92	75	25	NI 100 150			Weak red brown fine to coarse grained SANDSTONE with frequent fine to coarse gravel inclusions of quartzite, sandstone and mudstone. Discontinuities are horizontal, closely spaced, locally medium spaced, rough. (SHERWOOD SANDSTONE GROUP)		
28.10-29.60				97	90	63	25 120 280			. . . 19.60m to 19.80m, AZCL. *(stratum copied from 19.60m from previous sheet)*		
29.60-30.00				100	100	88					30.00	
										Borehole terminated at 30.00m.		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MD

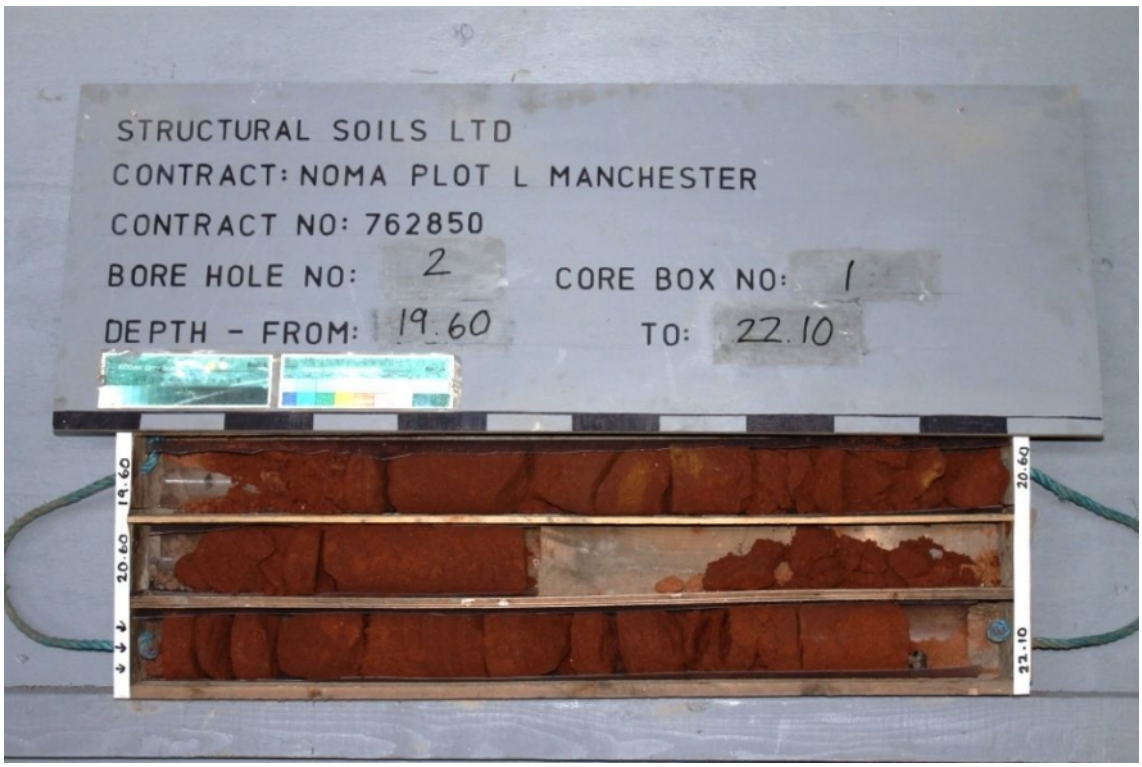
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STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL02A**
Contract Ref:	Start: **06.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **13.09.13**	**48.77**	**E:384447.4 N:398926.6**	**5** of **6**

BHL02a Box 1 - 19.60m to 22.10m





BHL02a Box 2 - 22.10m to 25.10m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDJ

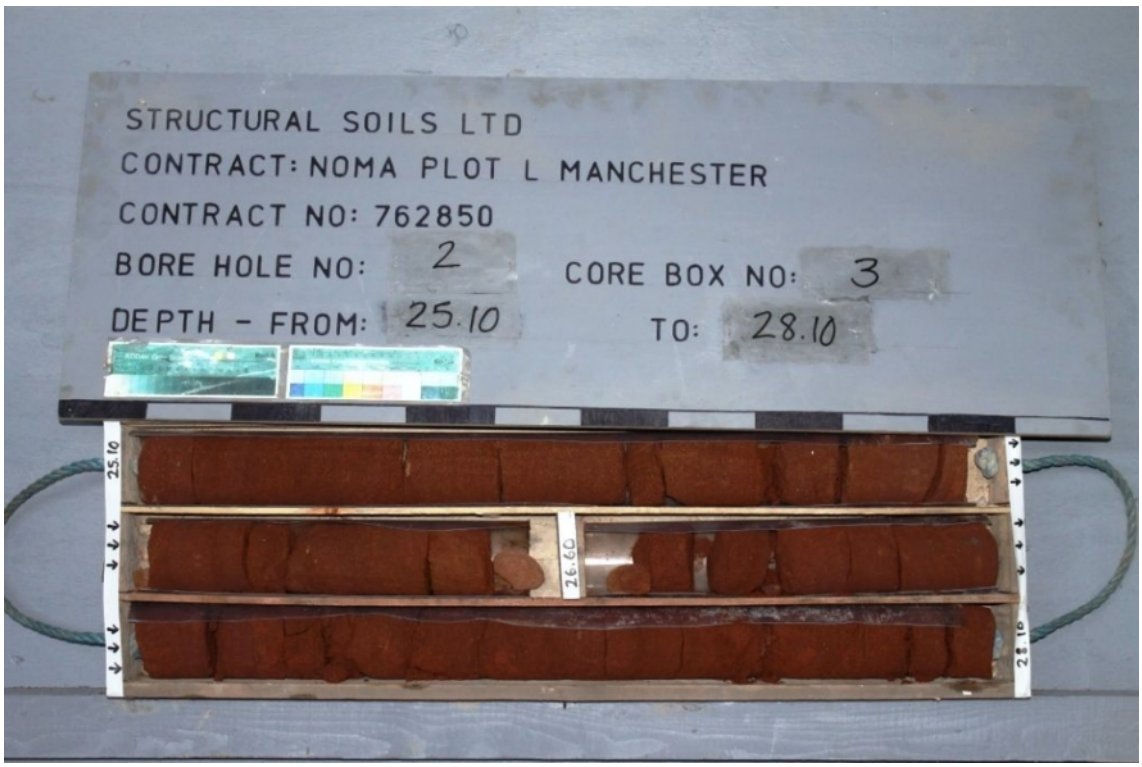
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STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL02A**
Contract Ref:	Start: **06.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **13.09.13**	**48.77**	**E:384447.4 N:398926.6**	**6** of **6**

BHL02a Box 3 - 25.10m to 28.10m





BHL02 Box 4 - 28.10m to 30.00m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDJ

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL03**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**13.09.13** End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**1** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
										MADE GROUND : Hardcore (Foreman's description) (MADE GROUND)	0.10	
0.20	1	ES										
0.30	2	D										
0.30-0.60	3	B								MADE GROUND : Medium dense dark grey brown clayey gravelly fine to coarse SAND. Gravel is a angular to sub angular fine to coarse limestone and mudstone. Foreman reports fragments of glass, wood and bone. (MADE GROUND)		
0.80	4	D										
0.90-1.20	5	B										
1.30	6	ES										
1.50-1.95	7	SPT	N=13							. . . Below 0.80m becoming sandy gravelly clay.	(3.30)	
2.30	8	ES										
2.50-2.95	9	SPT(c)	N=18									
3.30	10	ES									3.40	
3.50	11	ES								Firm to stiff slightly sandy slightly gravelly CLAY. Gravel is sub angular to sub rounded fine to coarse sandstone and mudstone. Occasional closely spaced silt partings. (GLACIAL TILL)		
3.50-3.95	12	$U_{(100)}$	70 blows 80% recovery									
4.00	13	D										
4.30	14	ES									(2.10)	
4.50-4.95	15	SPT	N=19									
4.50-4.95	16	D										
5.50-5.80	17	SPT(c)	N=102*								5.50	
										Dense brown slightly silty fine to coarse SAND and sub angular to rounded fine to coarse GRAVEL of sandstone mudstone and quartzite. (GLACIAL SAND AND GRAVEL)		
6.50	18	D									(2.30)	
7.00-7.35	19	SPT(c)	N=75*									
											7.80	
8.00	20	D								Dense orange brown slightly gravelly fine to medium SAND. Gravel is sub angular to sub rounded fine to coarse sandstone and mudstone. (GLACIAL SAND AND GRAVEL)		
8.50-8.86	21	SPT(c)	N=70*							. . . Below 8.50m foreman reports with silt bands.		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
16/09/13	13:00	14.00	14.00	150	Dry
18/09/13	11:00	29.80	14.30	150	21.10

Chiselling / Slow Progress

From	To	Duration (hh:mm)
5.80	6.00	00:30
8.80	9.10	00:45
9.80	10.00	00:30
10.30	10.70	00:45
11.10	11.30	00:30
13.60	13.80	00:45

General Remarks

1. Hand dug inspection pit to 1.20m
2. Magnetometer survey to 3.00m
3. Cable tool boring using 150mm casing and tools to 14.00m
4. Rotary core drilling using PWF core barrel and air mist flush from 14.00m to 29.80m.
5. Dual installation (both 50mm diameter)

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MDD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL03**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**13.09.13** End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**2** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.50	22	D								Dense orange brown slightly gravelly fine to medium SAND. Gravel is sub angular to sub rounded fine to coarse sandstone and mudstone. (GLACIAL SAND AND GRAVEL) *(stratum copied from 7.80m from previous sheet)*		
10.00-10.18	23	SPT(c)	N=238*							. . . Below 10.00m foreman reports sands and gravels with very stiff clay bands.	(6.20)	
11.00	24	D										
11.50-11.68	25	SPT	N=246*									
11.50-11.70	26	B										
12.50	27	D										
13.00-13.17	28	SPT(c)	N=146*								14.00	
14.30-15.30				0	0	0				Foreman reports sand, gravel and clay. (GLACIAL SAND AND GRAVEL) 14.00m - foreman reports boulder, unable to progress casing.	(2.00)	
15.30-16.30				40	0	0				. . . 15.30m-15.90m AZCL. . . . 15.90m-16.00m recovered as medium to coarse sub rounded gravel of limestone, sandstone and quartzite.	16.00	
16.30-17.30				40	22	0	NI 50 100			Very weak red brown fine to medium grained SANDSTONE. Discontinutities are horizontal, very closely spaced becoming closely spaced, planar, rough, occassionally undulating. (SHERWOOD SANDSTONE GROUP) . . . 16.30m-16.90m AZCL. . . . 16.90m-17.00m recovered as fine to medium sand. . . . 17.30m-17.68m AZCL.		
17.30-17.80				24	0	0						
17.80-18.30				92	56	0						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

installed on completion.
6. SPT hammer JB.11-2013 (E_r = 74.00%) used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL03**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**13.09.13** End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**3** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
18.30-19.30				92 75	56 53	0 10	NI 50 100			Very weak red brown fine to medium grained SANDSTONE. Discontinutities are horizontal, very closely spaced becoming closely spaced, planar, rough, occassionally undulating. (SHERWOOD SANDSTONE GROUP) *(stratum copied from 16.00m from previous sheet)* . . . 18.00m-18.13m extremely closly spaced, randomly orientated, intersecting, interlocking fractures. . . . 18.30m-18.55m AZCL. . . . 18.70m-19.02m Extremely weak sandstone. Extremely close to very closely spaced, randomly orientated, intersecting, interlocking and some horizontal fractures. Bands of clay 1mm-2mm and pockets of clayey sand 2mm-4mm. . . . 19.07m-19.12m 45° fracture. . . . 19.20m-19.27m 45° fracture. . . . 19.97m Sub horizontal fracture with 3-4mm band of clay. . . . 20.30m-20.44m AZCL. . . . 20.54m-20.58m Very close interseting 45° fractures. . . . 20.80m-20.92m Very closely spaced, randomly orientated, intersecting and interlocking fractures. . . . 20.92m-20.98m Sub vertical fracture. . . . 21.14m-21.19m Very closely spaced fracture. . . . 22.30m-22.60m AZCL.		
19.30-20.80				89	77	52			18/09 11:00			
20.80-22.30				92	79	64	NI 120 270					
22.30-23.80				75	46	14					(13.80)	
23.80-25.30				95	82	43	NI 110 160			. . . 23.40m-23.64m Extremely weak sandstone with 2-4mm pockets and bands of clay in very closely spaced horizontal and 45 degree intersecting and interlocking fractures. . . . 24.11m-24.13m extremely closely spaced horizontal fracture. . . . 24.60m band of clay 2-3mm		
25.30-26.80				87	80	63	90 320 360					
26.80-28.30				97	80	54						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MDD

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:	Client:	Borehole:
NOMA Plot L Manchester	**Co-operative Group Limited**	**BHL03**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**13.09.13** End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**4** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
28.30-29.80				97 88	80 73	54 56	NI 120 260			Very weak red brown fine to medium grained SANDSTONE. Discontinutities are horizontal, very closely spaced becoming closely spaced, planar, rough, occassionally undulating. (SHERWOOD SANDSTONE GROUP) *(stratum copied from 16.00m from previous sheet)* . . . 28.42m-28.75m occasional sub angular to rounded fine and medium gravel size inclusions of quartz and sandstone. . . . 29.43m-29.62m Weak sandstone, extremely closely spaced fractures. Frequent rounded fine to coarse inclusions of red brown mudstone. Borehole terminated at 29.80m.	29.80	

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2000 + Comacchio MC300**	**GB + LW**	**MDolby**	MDJ

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL03**
Contract Ref:	Start: **13.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**5** of **7**

BHL03 Box 1 - 15.30m to 18.30m





BHL03 Box 2 - 18.30m to 20.80m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDJ

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log COMPOSITE LOG | 762850 - NOMA MANCHESTER.GPJ - v8_05 | 16/01/14 - 16:41 | MD.
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Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL03**
Contract Ref:	Start: **13.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**6** of **7**

BHL03 Box 3 - 20.80m to 23.80m





BHL03 Box 4 - 23.80m to 26.80m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDJ

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STRUCTURAL SOILS

BOREHOLE LOG

Contract:		Client:		Borehole:
NOMA Plot L Manchester		**Co-operative Group Limited**		**BHL03**
Contract Ref:	Start: **13.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **18.09.13**	**46.81**	**E:384407.2 N:399027.1**	**7** of **7**

BHL03 Box 5 - 26.80m to 29.80m



Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2000 + Comacchio MC300**	Drilled By:	**GB + LW**	Logged By:	**MDolby**	Checked By:	MDD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log COMPOSITE LOG | 762850 - NOMA MANCHESTER.GPJ - v8_05 | 16/01/14 - 16:41 | MD.
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STRUCTURAL SOILS

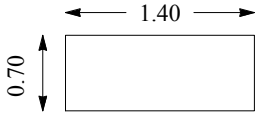
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
NOMA Plot L Manchester	**Co-operative Group Limited**	**TP1**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**03.09.13** End: **03.09.13**	**44.68**	**E:384370.4 N:398934.4**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Dark grey angular coarse GRAVEL of limestone..	0.05	
						MADE GROUND: Cobbles.	0.15	
0.20	1	ES				MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is angular to subangular medium to coarse brick, sandstone, slag, ash, slate and clay pipe. . . . below 0.50m, drain pipe dissused.	(0.75)	
							0.90	
1.10	2	ES				Firm orangey brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse mudstone, sandstone and coal.	(1.10)	
							2.00	
						Trial pit terminated at 2.00m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation easy using JCB 3CX.
2. Stability - slight spalling during excavation.
3. All faces similar.
4. No groundwater encountered during excavation.
5. Trial pit backfilled using compacted arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP1**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**44.68**	**E:384370.4 N:398934.4**	**2** of **3**

TP01 Face A





TP01 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP1**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**44.68**	**E:384370.4 N:398934.4**	**3** of **3**

TP01 Base



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

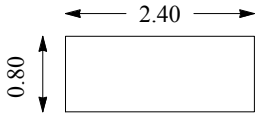
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
NOMA Plot L Manchester	**Co-operative Group Limited**	**TP2**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**03.09.13** End: **03.09.13**	**48.66**	**E:384444.0 N:398910.1**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Tarmac.	0.20	
0.30	1	ES				MADE GROUND: Yellow brown medium to coarse SAND with some gravel. Gravel is angular to subangular.	0.40	
						MADE GROUND: Hardcore stone.	0.60	
						MADE GROUND: Dark brown sandy gravelly COBBLES. Sand is angular to subangular medium to coarse. Gravel is angular medium to coarse. Cobbles are full and half bricks along with concrete and paving slabs, glass and slate.	(1.50)	
							2.10	
						Firm brown grey slightly gravelly CLAY. Gravel is subangular to rounded fine to medium including various lithologies of mudstone, coal and organic materials (roots).	(0.80)	
2.80	4	D					2.90	
						Trial pit terminated at 2.90m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation easy using JCB 3CX, breaker used on the tarmac.
2. Sides unstable during excavation, some face collapse.
3. Similarity - brickwork basement structure in two long faces.
4. No groundwater encountered during excavation.
5. Trial pit backfilled using compacted arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP2**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**48.66**	**E:384444.0 N:398910.1**	**2** of **3**

TP02 face A





TP02 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP2**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**48.66**	**E:384444.0 N:398910.1**	**3** of **3**

TP02 spoil



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

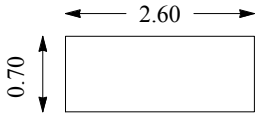
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
NOMA Plot L Manchester	**Co-operative Group Limited**	**TP3**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**03.09.13** End: **03.09.13**	**49.51**	**E:384465.1 N:398953.5**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Tarmac.	0.10	
						MADE GROUND: Hardcore stone.	(1.40)	
0.50	1	ES					1.50	
						MADE GROUND: Brown grey sandy gravelly BOULDERS. Sand is angular to subangular fine to coarse. Gravel is angular to subangular medium to coarse.	(1.90)	
1.70	2	ES					3.40	
						Firm brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of various lithologies of coal, sandstone and mudstone.	3.60	
3.50	3	ES						
3.50	4	B						
						Trial pit terminated at 3.60m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation easy using JCB 3CX.
2. Stability : sides spalling during excavation
3. All faces similar - clay pipe located at 0.60m.
4. No groundwater encountered during excavation.
5. Trial pit backfilled using compacted arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP3**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**49.51**	**E:384465.1 N:398953.5**	**2** of **3**

TP03 Face A





TP03 Base

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP3**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**49.51**	**E:384465.1 N:398953.5**	**3** of **3**

TP03 spoil



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

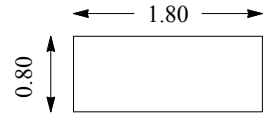
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
NOMA Plot L Manchester	**Co-operative Group Limited**	**TP4**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**03.09.13** End: **03.09.13**	**48.82**	**E:384451.7 N:398976.4**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: TARMAC.	0.20	
						MADE GROUND: Hardcore stone.	0.30	
0.50	1	ES				MADE GROUND : Dark brown SAND and GRAVEL of angular to subangular medium to coarse of various lithologies of brick, coal, glass, slate, sandstone and clay pipe.	(0.80)	
1.00	2	ES					1.10	
1.00	4	B				Firm brown slightly sandy slightly gravelly CLAY. Sand is subangular to subrounded fine. Gravel is subangular to subrounded fine to coarse of mudstone, coal and sandstone.	1.30	
						Trial pit terminated at 1.30m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation easy using JCB 3CX.
2. Stability - faces spalling during excavation.
3. All faces similar.
4. No groundwater encountered during excavation.
5. Trial pit backfilled using compacted arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP4**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**48.82**	**E:384451.7 N:398976.4**	**2** of **3**

TP04 Face A





TP04 base

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP4**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**48.82**	**E:384451.7 N:398976.4**	**3** of **3**

TP04 Face C



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

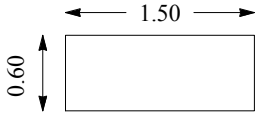
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
NOMA Plot L Manchester	**Co-operative Group Limited**	**TP5**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**03.09.13** End: **03.09.13**	**47.00**	**E:384404.6 N:399007.4**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Hardcore stone, ash, brick, sandstone, coal, slate and slag ash.	(0.30)	
							0.30	
0.30	1	ES				Firm brown slightly sandy gravelly CLAY. Gravel is angular to subangular medium to coarse of mudstone, sandstone and coal.		
0.80	2	ES					(1.50)	
							1.80	
						Trial pit terminated at 1.80m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation easy using JCB 3CX.
2. Stability : All sides spalling during excavation.
3. All faces similar.
4. No groundwater encountered during excavation.
5. Trial pit backfilled using compacted arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP5**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**47.00**	**E:384404.6 N:399007.4**	**2** of **3**

TP05 Face A





TP05 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP5**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**47.00**	**E:384404.6 N:399007.4**	**3** of **3**

TP05 Spoil



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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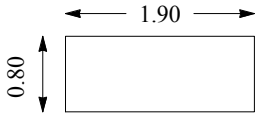
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
NOMA Plot L Manchester	**Co-operative Group Limited**	**TP6**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	**03.09.13** End: **03.09.13**	**48.16**	**E:384426.2 N:398950.0**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Gravelly sandy TOPSOIL with rootlets.	(0.50) 0.50	
0.70	1	ES				MADE GROUND: Brown sandy gravelly COBBLES. Sand is angular to subangular fine to coarse. Gravel is angular to subangular medium to coarse of brick, sandstone, ash, slate, glass and clay pipe.	(0.60) 1.10	
1.80	2	ES				Firm friable brown grey sandy gravelly CLAY. Sand is subangular to subrounded fine to medium. Gravel is suabngular to subrounded fine to coarse of mudstone, sandstone and coal.	(0.90) 2.00	
						Trial pit terminated at 2.00m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation easy using JCB 3CX.
2. All sides stable during excavation.
3. All faces similar - disused electric cable located in the pit.
4. No groundwater encountered during excavation.
5. Trial pit backfilled using compacted arisings on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:58 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP6**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**48.16**	**E:384426.2 N:398950.0**	**2** of **3**

TP06 Face A





TP06 cable

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:59 | MD.
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STRUCTURAL SOILS

TRIAL PIT LOG

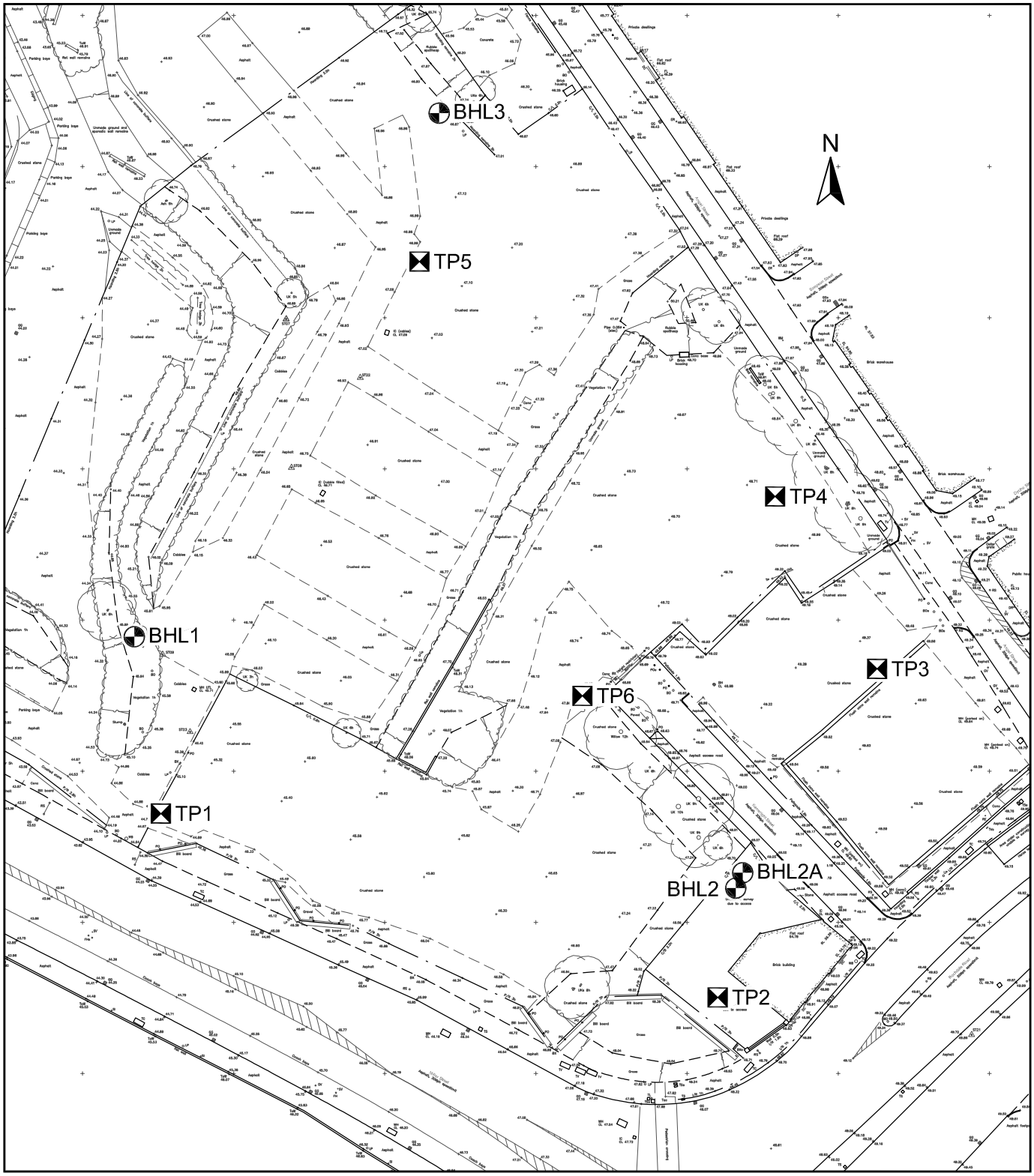
Contract:		Client:		Trial Pit:
NOMA Plot L Manchester		**Co-operative Group Limited**		**TP6**
Contract Ref:	Start: **03.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
762850	End: **03.09.13**	**48.16**	**E:384426.2 N:398950.0**	**3** of **3**

TP06 spoil



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**DRoberts**	MJD

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0002 | Log TRIAL PIT LOG | 762850 - NOMA MANCHESTER GPJ - v8_05 | 16/01/14 - 16:59 | MD.
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LEGEND	
	Borehole Location
	Trial Pit Location

STRUCTURAL SOILS LIMITED

The Potteries
Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Tel: 01977 552255
Fax: 01977 552299
ask@soils.co.uk
www.soils.co.uk

REV.	DATE	DESCRIPTION	BY	CHD.	APR.
00	23.10.2013	-	JAH	MD	-

DIMENSION	SCALE	DRAWING STATUS
m	1:750	-

CLIENT: The Co-operative

PROJECT: NOMA PLOT L Manchester

TITLE: EXPLORATORY HOLE LOCATION PLAN

JOB NO.	SCALE BAR	ORIGIN SIZE	FIGURE
762850	0 10 20 30 40m	A4	2

STRUCTURAL SOILS

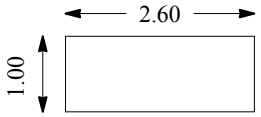
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP1**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15**	**45.66**	**E:384409.8 N:399020.8**	**1** of **3**
	End: **26.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.00-0.55	1	B				MADE GROUND: Black brown clayey slightly sandy subangular to subrounded fine to coarse GRAVEL of brick and ash with high cobble and medium boulder content.		(0.80)	
0.30	1	ES	Tx2, Jx2, Vx2						
0.70	2	ES	Tx2, Jx2, Vx2				44.86	0.80	
1.00-1.50	2	B		≈		Stiff brown silty CLAY with pockets of grey silt and rare gravel of coal.		(0.70)	
							44.16	1.50	
						Trial pit terminated at 1.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. Slight groundwater seepage at 1.10m.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:13 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP1**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.66**	**E:384409.8 N:399020.8**	**2** of **3**

TP1 Face A





TP1 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:13 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP1**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.66**	**E:384409.8 N:399020.8**	**3** of **3**

TP1 Face C





TP1 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:14 | GR.
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STRUCTURAL SOILS

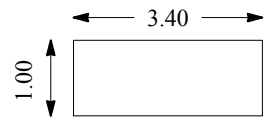
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP2**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15** End: **26.01.15**	**46.23**	**E:384389.9 N:398987.7**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: BRICKWORK.	46.15	0.08	
						MADE GROUND: Black brown slightly clayey slightly sandy angular to subangular fine to coarse GRAVEL of brick and sandstone with medium cobble content.	46.08	0.15	
0.30	1	ES	Tx2, Jx2, Vx2			Stiff brown mottled light blue silty slightly sandy CLAY with rare fine gravel of sandstone and coal.		(0.85)	
0.90	2	ES	Tx2, Jx2, Vx2				45.23	1.00	
0.90-1.00	3	B				Trial pit terminated at 1.00m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:14 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP2**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**46.23**	**E:384389.9 N:398987.7**	**2** of **3**

TP2 Face A





TP2 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:14 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP2**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**46.23**	**E:384389.9 N:398987.7**	**3** of **3**

TP2 Face C





TP2 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:15 | GR.
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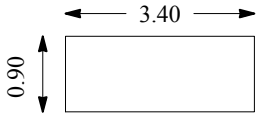
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP3**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15**	**45.86**	**E:384375.3 N:398958.6**	**1** of **3**
	End: **26.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.30	1	ES	Tx2, Jx2, Vx2			Stiff light brown mottled blue silty slightly sandy CLAY with rare fine to medium gravel of sandstone and coal.		(1.00)	
0.90	2	ES	Tx2, Jx2, Vx2				44.86	1.00	
						Trial pit terminated at 1.00m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:17 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP3**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.86**	**E:384375.3 N:398958.6**	**2** of **3**

TP3 Face A





TP3 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:18 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP3**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.86**	**E:384375.3 N:398958.6**	**3** of **3**

TP3 Face C





TP3 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:19 | GR.
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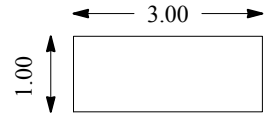
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP4**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15**	**45.48**	**E:384386.4 N:398932.6**	**1** of **2**
	End: **26.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.00-0.20	1	B				MADE GROUND: Black slightly sandy locally slightly clayey angular to subangular fine to coarse GRAVEL of ash, brick and metals with high cobble and medium boulder content.		(0.80)	
0.40	1	ES	Tx2, Jx2, Vx2				44.68	0.80	
						MADE GROUND: BRICK foundations.		(0.50)	
							44.18	1.30	
						Trial pit terminated at 1.30m depth due to foundations in absence of archaeologist.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:19 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP4**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.48**	**E:384386.4 N:398932.6**	**2** of **2**

TP4 Face A





TP4 Face C

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:19 | GR.
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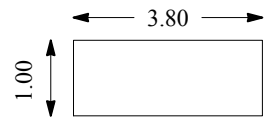
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP4a**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**45.47**	**E:384382.2 N:398938.8**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	ES	Tx2, Jx2, Vx2			MADE GROUND: Black slightly sandy locally slightly clayey angular to subangular fine to coarse GRAVEL of ash, brick and metals with high cobble and medium boulder content.			
1.00	2	ES	Tx2, Jx2, Vx2			. . . below 0.10m, wire rope.		(2.40)	
2.00	3	ES	Tx2, Jx2, Vx2				43.07	2.40	
						Trial pit terminated at 2.40m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:20 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP4a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**45.47**	**E:384382.2 N:398938.8**	**2** of **3**

TP4a Face A





TP4a Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:20 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP4a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**45.47**	**E:384382.2 N:398938.8**	**3** of **3**

TP4a Face C





TP4a Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:21 | GR.
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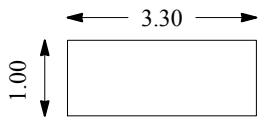
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP5**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**47.37**	**E:384423.5 N:398991.3**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Light brown mottled light grey orange sandy angular to subangular fine to coarse GRAVEL of brick, glass and coal with high cobble content and brickwork present.			
0.50	1	ES				. . . below 0.65m, orange brown medium sand.			
						. . . below 0.80m, redundant water drain (100mm diameter) damaged.		(1.80)	
1.40	2	ES							
				≈			45.57	1.80	
1.80	3	EW				MADE GROUND: Black sandy angular to subangular fine to coarse GRAVEL in clayey matrix with pottery and snail shells.			
1.80	3	ES						(0.40)	
							45.17	2.20	
						Stiff to very stiff light brown mottled light blue silty locally slightly sandy CLAY.		(0.30)	
2.40	4	ES					44.87	2.50	
						Trial pit terminated at 2.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - water pipe detected.
2. Slight seepage of water at 1.80m.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:21 | GR.
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FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP5**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**47.37**	**E:384423.5 N:398991.3**	**2** of **3**

TP5 Face A





TP5 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:22 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP5**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**47.37**	**E:384423.5 N:398991.3**	**3** of **3**

TP5 Face C





TP5 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:22 | GR.
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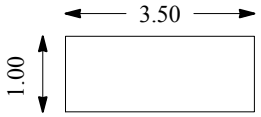
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP6**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**46.02**	**E:384392.4 N:398952.1**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Black sandy angular to subangular fine to coarse GRAVEL of ash, brick and glass with high cobble and low boulder content.		(0.50)	
0.40	1	ES	Tx2, Jx2, Vx2				45.52	0.50	
						Stiff to very stiff light brown mottled light blue silty locally sandy CLAY.			
0.70	2	ES	Tx2, Jx2, Vx2						
								(1.50)	
1.50	3	ES	Tx2, Jx2, Vx2						
							44.02	2.00	
						Trial pit terminated at 2.00m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trila pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP6**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**46.02**	**E:384392.4 N:398952.1**	**2** of **3**

TP6 Face A





TP6 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:23 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP6**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**46.02**	**E:384392.4 N:398952.1**	**3** of **3**

TP6 Face C





TP6 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:24 | GR.
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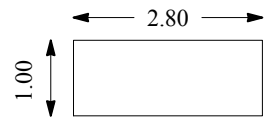
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP7**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15** End: **28.01.15**	**44.74**	**E:384379.3 N:399001.1**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: ASPHALT.	44.64	0.10	
						Light grey dark grey angular medium to coarse GRAVEL of limestone.	44.44	0.30	
0.40	1	ES	Tx2, Jx2, Vx2	≈		Black dark grey sandy angular to subrounded fine to coarse GRAVEL of ash, brick and sandstone.	44.24	0.50	
0.80	2	ES	Tx2, Jx2, Vx2			Very stiff light brown mottled light blue slightly sandy silty CLAY.	43.24	(1.00) 1.50	
						Trial pit terminated at 1.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. Slight seepage of water at 0.50m.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:24 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP7**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.74**	**E:384379.3 N:399001.1**	**2** of **3**

TP7 Face A





TP7 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:25 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP7**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.74**	**E:384379.3 N:399001.1**	**3** of **3**

TP7 Face C





TP7 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:26 | GR.
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STRUCTURAL SOILS

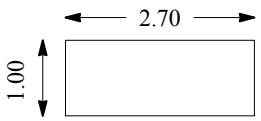
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP8**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15**	**44.62**	**E:384368.9 N:398979.4**	**1** of **3**
	End: **28.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: ASPHALT.	44.52	0.10	
						Light grey dark grey angular medium to coarse GRAVEL of limestone.	44.42	0.20	
0.30	1	ES	Tx2, Jx2, Vx2			Black slightly clayey sandy angular to subangular fine to coarse GRAVEL of brick, ash and sandstone with low cobble content.		(0.50)	
						. . . below 0.65m, redundant water drain (100mm diameter) damaged.	43.92	0.70	
0.80	2	ES	Tx2, Jx2, Vx2			Stiff to very stiff light brown mottled light blue silty slightly sandy CLAY		(1.00)	
						Trial pit terminated at 1.70m depth.	42.92	1.70	

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - water pipe detected.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:29 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP8**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.62**	**E:384368.9 N:398979.4**	**2** of **3**

TP8 Face A





TP8 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:29 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP8**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.62**	**E:384368.9 N:398979.4**	**3** of **3**

TP8 Face C





TP8 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:30 | GR.
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STRUCTURAL SOILS

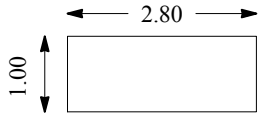
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP9**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15** End: **28.01.15**	**44.48**	**E:384343.7 N:398972.7**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: ASPHALT.	44.38	0.10	
						MADE GROUND: Light grey dark grey angular medium to coarse GRAVEL of limestone.	44.18	0.30	
0.25	1	ES	Tx2, Jx2, Vx2			MADE GROUND: Black sandy angular to subangular fine to coarse GRAVEL of ash, brick and sandstone.	44.03	0.45	
						Very stiff light brown mottled light blue silty slightly sandy CLAY.		(0.85)	
1.00	2	ES	Tx2, Jx2, Vx2				43.18	1.30	
						Trial pit terminated at 1.30m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's- trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:30 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP9**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.48**	**E:384343.7 N:398972.7**	**2** of **3**

TP9 Face A





TP9 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:31 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP9**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.48**	**E:384343.7 N:398972.7**	**3** of **3**

TP9 Face C





TP9 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:31 | GR.
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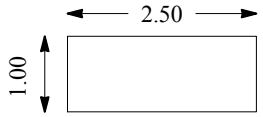
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP10**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15**	**41.67**	**E:384318.6 N:398969.9**	**1** of **2**
	End: **27.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Light grey angular coarse GRAVEL.	41.57	0.10	
						MADE GROUND: Light brown gravelly fine to medium SAND. Gravel is angular medium to coarse limestone and brick.	41.37	0.30	
						Trial pit terminated at 0.30m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's- trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit terminated at 0.30m due to hard standing asphalt, unable to penetrate.
4. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:32 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP10**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**41.67**	**E:384318.6 N:398969.9**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:32 | GR.
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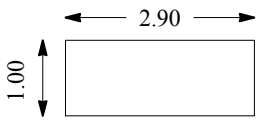
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP10a**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**42.35**	**E:384326.9 N:398965.4**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Light grey dark grey clayey slightly sandy angular to subangular fine to coarse GRAVEL of limestone.	42.05	(0.30) 0.30	
0.40	1	ES	Tx2, Jx2, Vx2			MADE GROUND: Black dark grey angular to subrounded fine to coarse sandy GRAVEL of ash, brick and sandstone, including brickwork. . . . below 0.50m, waste materials including old shoes, plastic ties, fabrics.			
1.00	2	ES	Tx2, Jx2, Vx2					(2.50)	
2.00	3	ES	Tx2, Jx2, Vx2						
2.60	4	ES	Tx2, Jx2, Vx2			. . . below 2.50m, no waste materials.	39.55	2.80	
						Trial pit terminated at 2.80m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried servoces and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:32 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP10a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**42.35**	**E:384326.9 N:398965.4**	**2** of **3**

TP10a Face A





TP10a Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:33 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP10a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**42.35**	**E:384326.9 N:398965.4**	**3** of **3**

TP10a Face C





TP10a Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:33 | GR.
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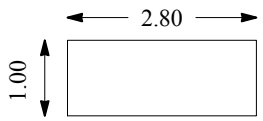
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP11**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15** End: **28.01.15**	**43.81**	**E:384353.7 N:398950.7**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Black slightly clayey sandy angular to subrounded fine to coarse GRAVEL of brick and ash.		(0.60)	
0.30	1	ES	Tx2, Jx2, Vx2				43.21	0.60	
						MADE GROUND: Orange brown fine to medium SAND.			
						. . . at 0.70m, electric cables, no signals detected.	43.01	0.80	
						MADE GROUND: Black dark grey slightly clayey sandy angular to subangular fine to coarse GRAVEL of brick and ash.		(0.70)	
0.90	2	ES	Tx2, Jx2, Vx2						
1.40	3	ES	Tx2, Jx2, Vx2			. . . below 1.30m, brown sandy clayey angular to subrounded fine to coarse gravel of ash and sandstone.	42.31	1.50	
						Trial pit terminated at 1.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:34 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP11**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**43.81**	**E:384353.7 N:398950.7**	**2** of **3**

TP11 Face A





TP11 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:34 | GR.
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FINAL TRIAL PIT LOG

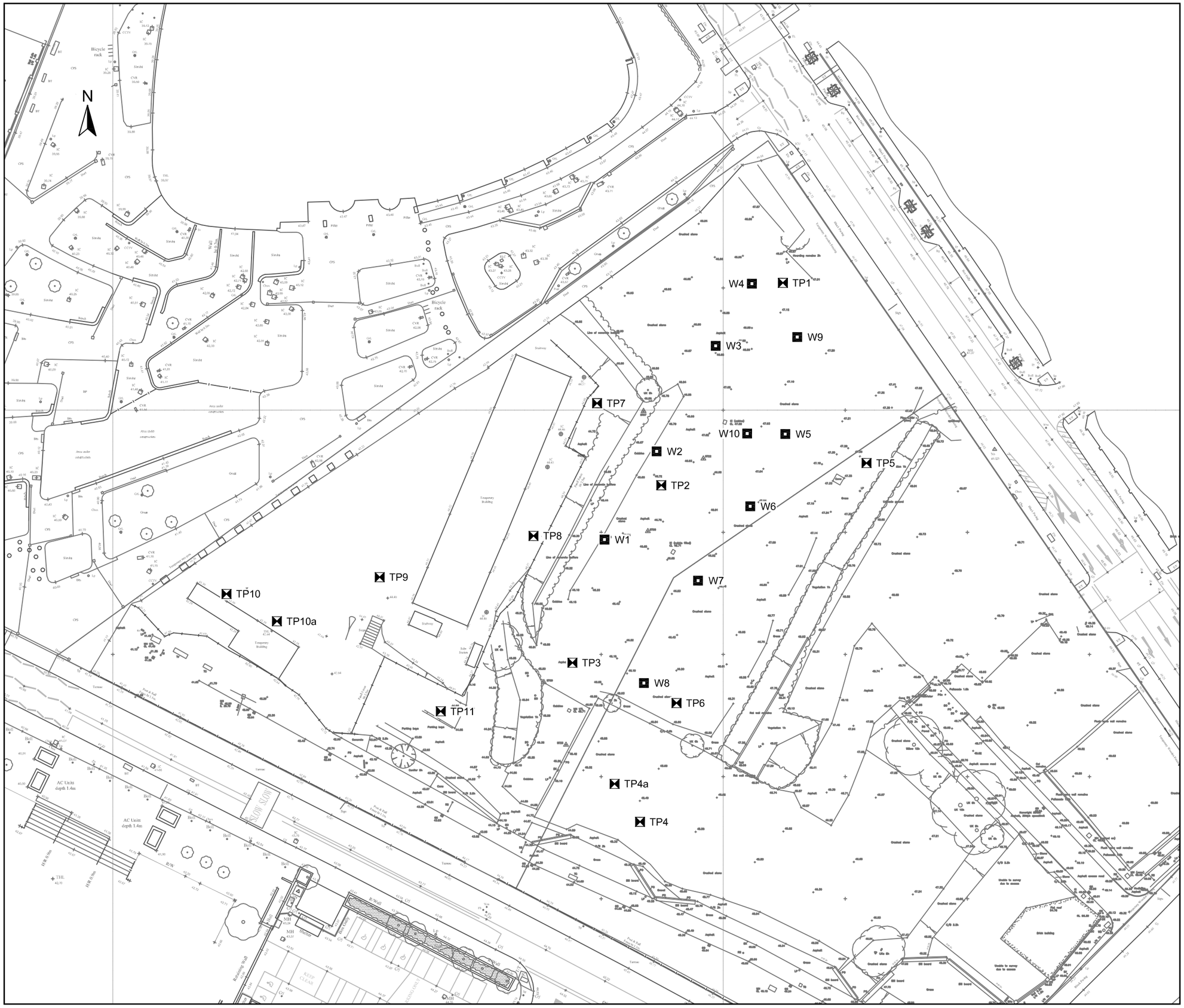
Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP11**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**43.81**	**E:384353.7 N:398950.7**	**3** of **3**

TP11 Face C



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:35 | GR.
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LEGEND

- Trial Pit Location
- WAC Stockpile Locations

REV	DATE	DESCRIPTION	BY	CHD	APR
01	18.02.2015	-	MW	GR	-

DIMENSION	SCALE	ORIGIN SIZE
m	1:600	A3

STRUCTURAL SOILS

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Fax: 01977 552299
ask@soils.co.uk
www.soils.co.uk

CLIENT

NOMA (GP) Ltd

PROJECT

2&3 Angel Square, Manchester

TITLE

EXPLORATORY HOLE LOCATION PLAN

JOB NO	FIGURE
763315	2

DRAWING STATUS	REV
-	01

SCALE BAR

0 5 10 15 20 25 30m

Appendix F – Indicative Fluvial Floodplain Map

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



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

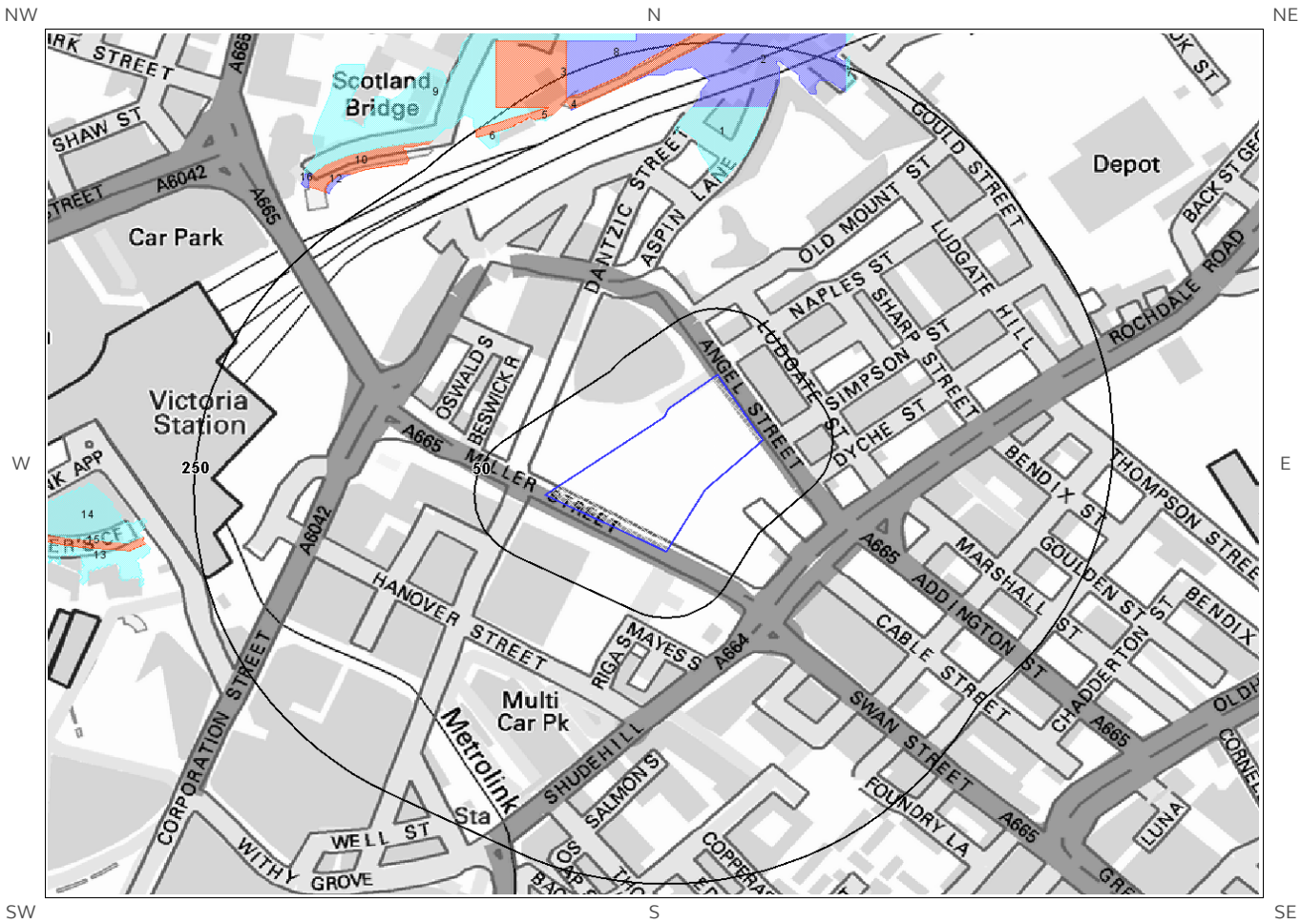
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

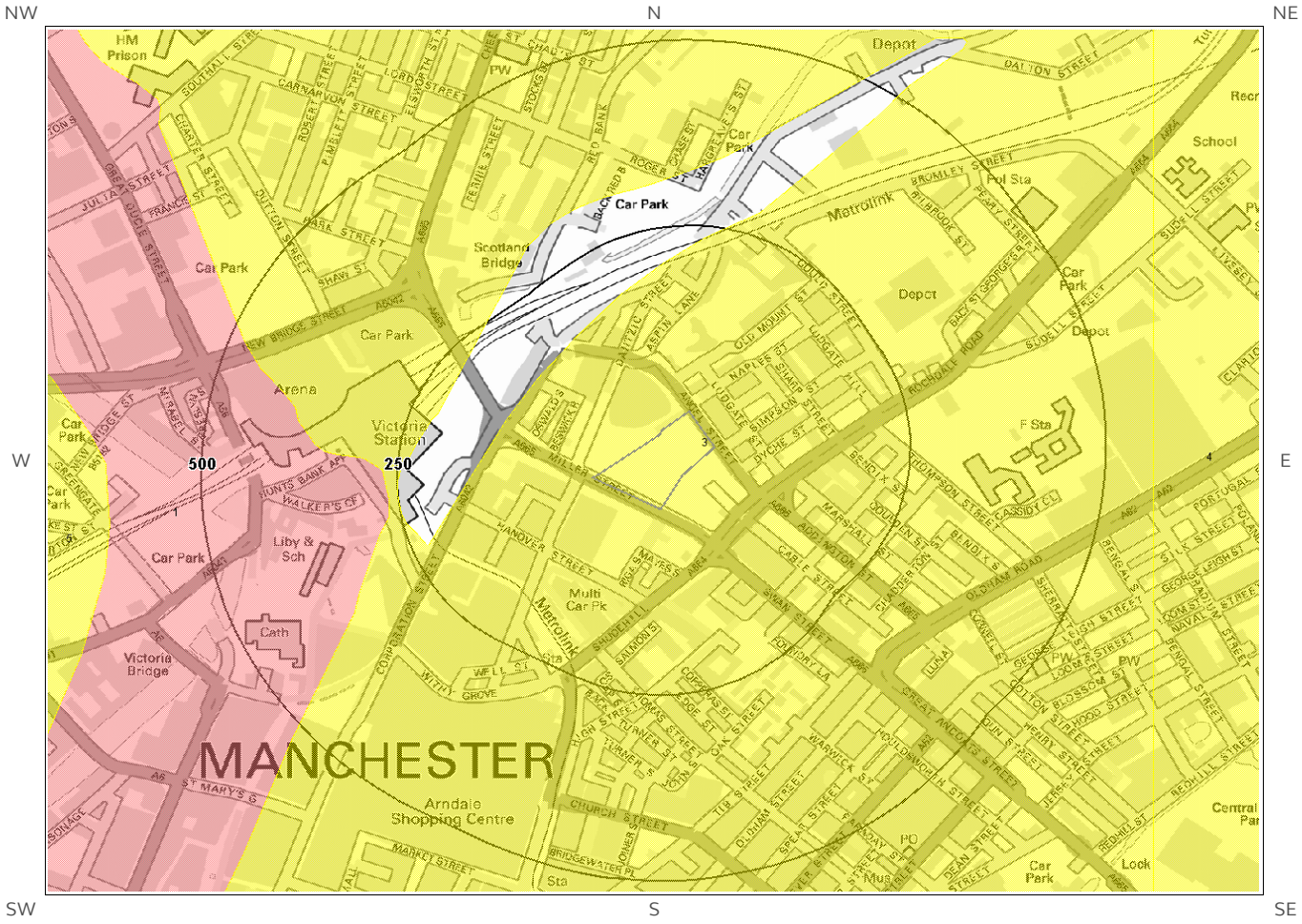
- Very Low
- Low
- Medium
- High

Appendix G – Groundwater Vulnerability Map

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6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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6b. Aquifer Within Bedrock Geology and Abstraction Licences



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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

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



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2 - Outer Catchment

Site Outline

Source Protection Zone 3 - Total Catchment

250
500
Search Buffers (m)

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

Site Outline

250 Search Buffers (m)
500

6e. Hydrology – Watercourse Network and River Quality

NW N NE

W E

SW S SE



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Site Outline

250 Search Buffers (m)
500

Watercourse type

- Tidal River
- Inland River
- Canal
- Lock or Flight of Locks
- Lake, Reservoir, or Marsh
- Foreshore
- Drain or Transfer

Watercourse level

- On ground surface
- Underground or Elevated
- Level unknown

- General Quality Assessment: Biology
- General Quality Assessment: Chemistry

Appendix H – Coal Authority Report

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The Coal Authority

CON29M
coal mining report

N.O.M.A, 2 ANGEL SQUARE ANGEL STREET, MANCHESTER

Known or potential coal mining risks

Past underground coal mining	Page 3
Future underground coal mining	Page 3

Further action

No further reports from the Coal Authority are required. Further information on any next steps can be found in our Professional opinion.

For more information on our reports please visit www2.groundstability.com

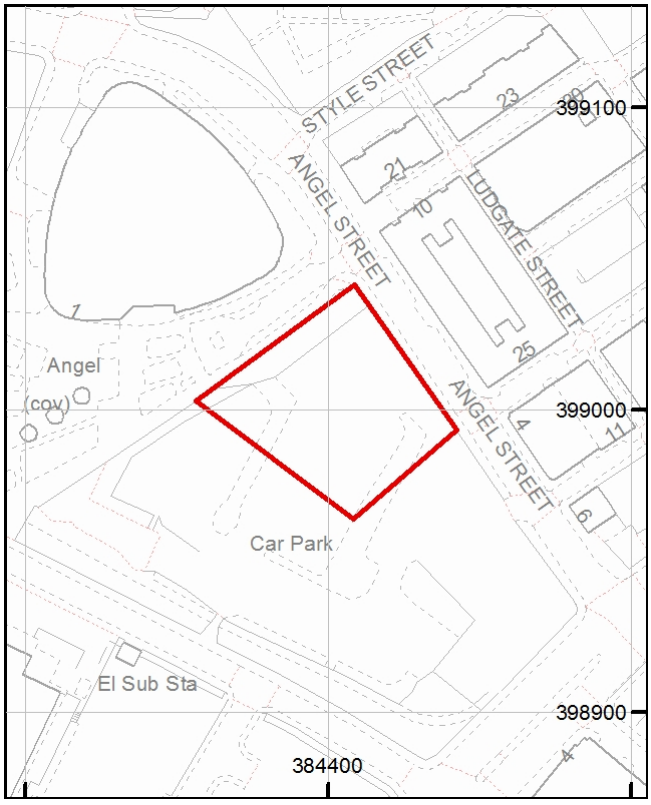
Professional opinion

According to the official mining information records held by the Coal Authority at the time of this search, evidence of, or the potential for, coal mining related features have been identified. It is unlikely that these features will impact on the stability of the enquiry boundary.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



We can confirm that the location is **on the coalfield**

Map data

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This report is prepared in accordance with the latest Law Society's Guidance Notes 2018, the User Guide 2018 and the Coal Authority's Terms and Conditions applicable at the time the report was produced.

Accessibility

If you would like this information in an alternative format, please contact our communications team on 0345 762 6848 or email communications@coal.gov.uk.

Detailed findings

Information provided by the Coal Authority in this report is compiled in response to the Law Society's CON29M Coal Mining enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL.

The Coal Authority owns the copyright in this report and the information used to produce this report is protected by our database rights. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

1 Past underground coal mining

The property is in a surface area that could be affected by underground mining in 1 seam of coal at 820m depth, and last worked in 1965.

Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.

2 Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3 Future underground coal mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4 Mine entries

There are no recorded coal mine entries known to the Coal Authority within, or within 20 metres, of the boundary of the property.

5 Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6 Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7 Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8 Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9 Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10 Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11 Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

12 Withdrawal of support

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

13 Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14 Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Statutory cover

Coal mining subsidence

In the unlikely event of any coal mining related subsidence damage, the Coal Authority or the mine operator has a duty to take remedial action in respect of subsidence caused by the withdrawal of support from land or property in connection with lawful coal mining operations.

When the works are the responsibility of the Coal Authority, our dedicated public safety and subsidence team will manage the claim. The house or land owner ("the owner") is covered for these works under the terms of the Coal Mining Subsidence Act 1991 (as amended by the Coal Industry Act 1994). Please note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

The owner therefore shouldn't incur cost or liability from repairs caused by the withdrawal of support from land and/or property in connection with lawful coal mining operations. Usually these actions will not need to involve your insurance company or mortgage lender.

Coal mining hazards

Our public safety and subsidence team provide a 24 hour a day, 7 days a week hazard reporting service, to help protect the public from hazards caused by past coal workings, such as a mine shaft or shallow working collapse. To report any hazards please call 01623 646 333. Further information can be found on our website: www.gov.uk/coalauthority.

Glossary

Key terms

adit - horizontal or sloped entrance to a mine

coal mining subsidence - ground movement caused by the removal of coal by underground mining

Coal Mining Subsidence Act 1991 - the Act setting out the duties of the Coal Authority to repair damage caused by coal mining subsidence

coal mining subsidence damage - damage to land, buildings or structures caused by the removal of coal by underground mining

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future opencast coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal from the surface

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mine entries - collective name for shafts and adits

payments to owners of former copyhold land - historically, copyhold land gave rights to coal to the copyholder. Legislation was set up to allow others to work this coal, but they had to issue a notice and pay compensation if a copyholder came forward

shaft - vertical entry into a mine

site investigation - investigations of coal mining risks carried out with the Coal Authority's permission

stop notice - a delay to repairs because further coal mining subsidence damage may occur and it would be unwise to carry out permanent repairs

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The Coal Authority

CON29M
coal mining report

N.O.M.A, 3 ANGEL SQUARE MILLER STREET, MANCHESTER

Known or potential coal mining risks

Past underground coal mining	Page 3
Future underground coal mining	Page 3

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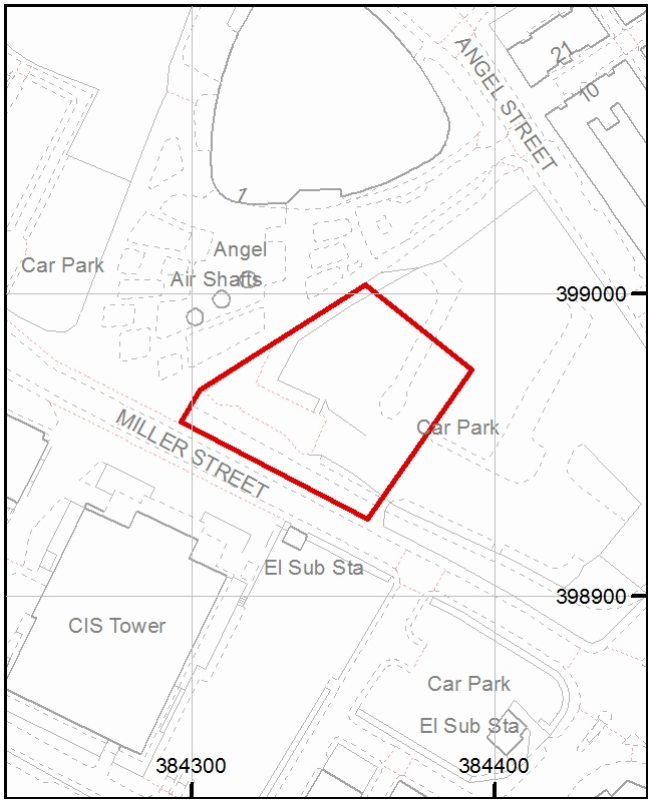
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Appendix I – Zetica Unexploded Bomb Map

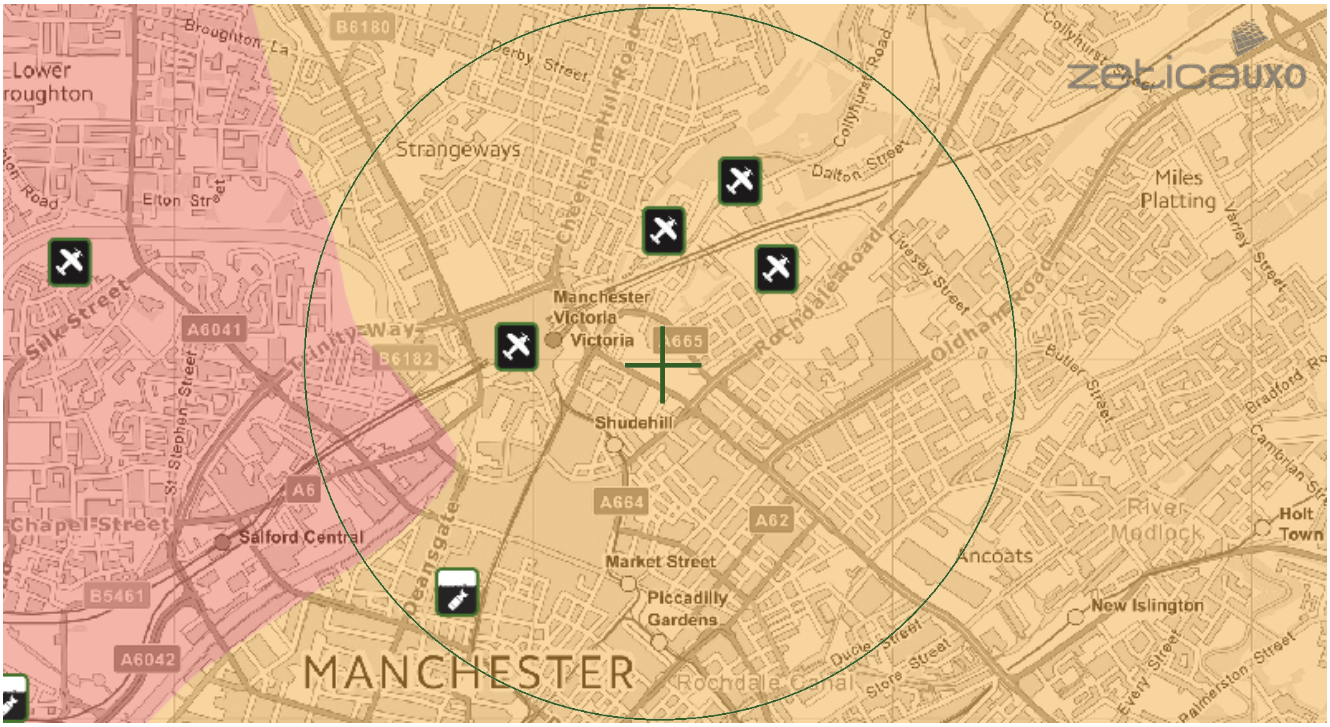
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UNEXPLODED BOMB RISK MAP

zeticaUXO

SITE LOCATION

Map Centre: 384367,398988



LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

miltary | **industry** | **UXO find**

transport | **dock** | **Luftwaffe targets**

utilities | **other**

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

If I have any questions, who do I contact?

tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

web: **www.zeticauxo.com**

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: **(https://zeticauxo.com/downloads-and-resources/risk-maps/)**

Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgment. The copyright remains with Zetica Ltd.

It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

Appendix J – Hazard Checklist

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Ground Engineering Hazard Check List

Job Nr: 043434 **Project: 2 & 3 Angel Square, Manchester**

Rev: 00 **Date: August 2019**

BUROHAPPOLD ENGINEERING

Ref No.	Hazard	Risk (Y/N?)					What action have you taken	Further action(s) required	Action Req'd By		
		C	P	H&S	E	S			Client	Des'nr	Cont'r
1.00	**Site Appraisal**										
1.01	Are access restrictions (e.g. site access, turning circles in the vicinity of the site, or congested sites) likely to cause restrictions in the ability to access the site for ground investigation purposes? *(Refer to BH CDM Policy hazard note 6.4)*	N	N	N	N	Y	Access to Total Car Parks Limited car park provided through gate at southeast end of the car park.	Contractor to liaise with Total car Parks Limited prior to start/during of works.	-	Y	Y
1.02	Is there restricted space at the perimeter of the site boundary for required investigation?	N	N	N	N	N	None required.	-	-	-	-
1.03	Could the location of investigations result in undermining or cause vibration to existing structures resulting in structural collapse or damage?	N	N	Y	Y	Y	No structures identified within a reasonable distance of the proposed exploratory holes.	-.	-	-	-
1.04	Will any ground investigation works impede the means of escape from occupied or nearby premises or restrict access for emergency vehicles during construction?	N	N	N	N	N	None required.	-	-	-	-
1.05	Are there any overhead power lines crossing the site?	N	N	N	N	N	None required.	-	-	-	-
1.06	Will working over or adjacent to water be required at the site?	N	N	N	N	N	None required.	-	-	-	-
1.07	Will rope access or work on or adjacent to steep slopes be required at the site?	N	N	N	N	N	None required.	-	-	-	-
1.08	Will working in confined spaces be required?	N	N	N	N	N	None required.	-	-	-	-
1.09	Is the site in an area where damage to plant and/or equipment stored on site needs to be considered?	Y	N	N	N	Y	All working areas must be fenced off and locked if equipment is to be left on site overnight.	Secure container to be used if required by contactor.	-	-	Y
1.10	Are munitions or unexploded ordnance present or likely to be present on site?	N	Y	Y	N	Y	An Unexploded Ordnance Desk Study has been completed to assess risk. All exploratory hole locations to be cleared by a UXO specialist.	During the GI, on site presence from suitable UXO company is required to clear all exploratory hole positions to bedrock.	-	Y	Y

Risk Categories: C = Cost; P = Programme; H&S = Health & Safety; E = Environmental and S = Serviceability

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Ground Engineering Hazard Check List

Job Nr: 043434 **Project: 2 & 3 Angel Square, Manchester**

Rev: 00 **Date: August 2019**

BUROHAPPOLD ENGINEERING

Ref No.	Hazard	Risk (Y/N?)					What action have you taken	Further action(s) required	Action Req'd By		
		C	P	H&S	E	S			Client	Des'nr	Cont'r
1.11	Is there the presence or likely presence of tunnels or mineshafts?	N	N	N	N	N	None required.	-	-	-	-
1.12	Is the site in an area that has or is likely to have experienced mining activities?	N	N	N	N	N	None required.	-	-	-	-
1.13	Is the site in an area that is likely to contain natural cavities, voids or solution features?	N	N	N	N	N	None required.	-	-	-	-
1.14	Is there a possibility that existing structures, below or above ground, could contain or incorporate asbestos or other suspect harmful chemicals? *(Refer to BH CDM Policy hazard note 6.3)*	N	N	Y	Y	N	Buildings demolished on site in the 1950s after World War Two bombing and in the 1980s may have contained asbestos. Asbestos found in archaeological excavation for Arkwrights Mill (Oxford Archaeology 2014). Asbestos removal Dec 2014/Jan 2015.	Asbestos testing during ground investigation.	-	-	Y
1.15	Does the site history indicate that the site is likely to be contaminated either above or below ground?	Y	N	Y	Y	N	The site is in an industrial area of Manchester City Centre which has previously been used for a variety of industrial uses. However, ground investigation laboratory data onsite and at the adjacent 1 Angel Square site/ NOMA Plot L site recorded limited elevated chemical concentrations within the ground and as such the risk is low. Notwithstanding the foregoing, chemical testing in respect of asbestos during site specific ground investigation will be required.	Chemical testing during site specific ground investigation will be required.	-	-	Y
1.16	Is there the presence or likely presence of below ground fuel tanks that may or may not have fuel in them?	N	N	N	N	N	None required.	-	-	-	-
1.17	Are there likely to be any harmful or explosive gases below ground?	N	N	Y	Y	N	Ground gas monitoring has been undertaken as part of previous site specific ground investigation.	-	-	-	Y
1.18	Are there gas storage tanks on or near the site?	N	N	N	N	N	None required.	-	-	-	
1.19	Are there any live services within the existing structures and or on the site? Have these been adequately identified especially next to live services? *(Refer to BH CDM Policy hazard note 6.5)*	N	Y	Y	N	Y	Available service plans to be provided to contractor.	Contractor to review service information provided and provide for CAT scans, manhole lifting and complete hand dug inspection pits	-	-	Y
1.20	Are there any legal or other constraints to obtaining access to work on boundary walls from the neighbours' side?	N	N	N	N	N	None required.	-	-	-	-

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Ground Engineering Hazard Check List

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		C	P	H&S	E	S			Client	Des'nr	Cont'r
1.21	Are there any permits or consents required for ground investigation work, e.g. hot springs	N	N	N	N	N	None required.	-	-	-	-
1.22	Will work on the site require access to or be adjacent to land owned by Network Rail?	N	N	N	N	N	None required.	-	-	-	-
1.23	Is there the presence or likely presence of below ground structures on site i.e. basements?	N	Y	Y	N	N	Infilled basements and concrete/brick obstructions likely due to the development history of the site.	Provision of breaker required for inspection pits.		Y	Y
1.24	Is there the presence or likely presence of deep chambers?	N	N	N	N	N	None required.	-	-	-	-
1.25	Is there the presence or likely presence of tunnels below or near the site?	N	N	Y	N	Y	Abandoned culvert (1850 mm diameter) running northwest – southeast across the northern half of the site.	-	-	-	-
1.26	Will ground investigation result in excessive noise, dust, vibration which could affect adjacent properties such as schools and hospitals etc.?	N	N	N	N	N	None required.	-	-	-	-
1.27	Are there any site issues with regard to water e.g. flooding, tidal and ground water?	N	N	N	N	N	None required.	-	-	-	-
1.28	Are there likely to be any archaeological features on site?	N	N	N	N	N	None required.	-	Y	Y	Y
1.29	Are there likely to be any ecological features on site?	N	N	N	N	N	None required	-	Y	Y	Y
1.30											
1.31											

Risk Categories: C = Cost; P = Programme; H&S = Health & Safety; E = Environmental and S = Serviceability

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