MOTT MACDONALD

The Christie Advanced Scanning and Imagine Centre Development (CASICD)

Geotechnical and Geoenvironmental Desk Study

September 2023

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Mott MacDonald
4th Floor
9 Portland Street
Manchester M1 3BE
United Kingdom

T +44 (0)161 914 8880
mottmac.com

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Mott MacDonald Limited. Registered in England and Wales no. 1243967.
Registered office: Mott MacDonald House, 8-10 Sydenham Road, Croydon CR0 2EE, United Kingdom

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
P01	11/08/23	L Brooks V Sin	S Del Castillo-Rubio C Stanford	J Heeds	Draft Issue for Comment
P02	29/08/23	C Smith	A Simpson	J Heeds	Design Team Comments Incorporated
P03	15/09/23	C Smith	A Simpson	J Heeds	Project Name Update

Document reference: CASICD-MMD-XX-XX-RP-C-00001

Information class: Standard

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Executive summary

The Christie Advanced Scanning and Imagine Centre Development (CASICD) seeks to demolish part of the existing two and three storey hospital (Blocks 19 and 20 and part of Block 21) and construct a new principally three-storey building with a level of plant above and additional plant equipment on the roof and a CT scanner, X-ray facility and associated accommodation at ground floor level. A stair core is also proposed to the north of the site rising to five storeys.

Levels 01 and 02 are to be ward accommodation. Plant will be located on level 03 and the roof. There is an existing basement that is used as a conduit for services to feed the wider site. The basement will be demolished, and services rerouted as part of the proposed development. The ground conditions on site are likely to comprise Made Ground, associated with current land use, overlying Till. The bedrock is comprised of the Wilmslow Sandstone Formation.

The primary geotechnical risks identified in this desk study are unconfirmed ground conditions due to lack of freely available borehole records on the site, variable Made Ground and the presence of existing structural foundations/basement.

Cable percussion boreholes with rotary follow-on is the primary recommended ground investigation technique to determine the stratigraphy and characteristics of the strata, including the depth to sandstone bedrock. Initially, undertake this investigation in the verge/pavement along Wilmslow Road, further investigation may be required once the existing building is demolished to determine the ground conditions across the site. Groundwater and ground gas monitoring installations are also recommended to characterise the groundwater and ground gas regime beneath the site.

1 Introduction

1.1 Description of the Project

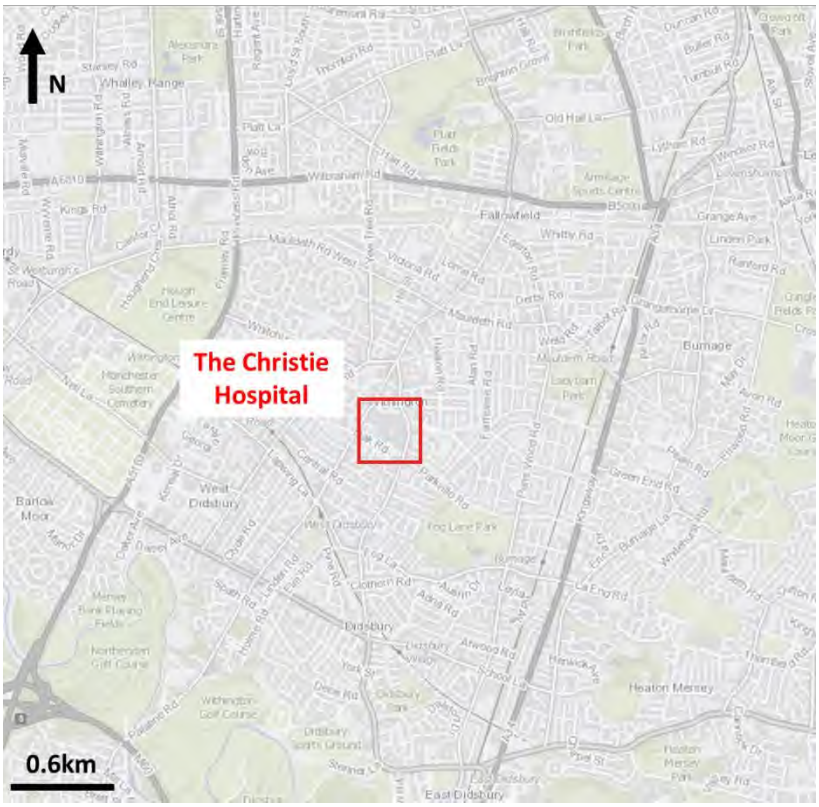
The Christie Advanced Scanning and Imagine Centre Development (CASICD) seeks to demolish part of the existing two and three storey hospital (Blocks 19 and 20 and part of Block 21) and construct a new principally three-storey building with a level of plant above and additional plant equipment on the roof and a CT scanner, X-ray facility and associated accommodation at ground floor level. A stair core is also proposed to the north of the site rising to five storeys.

Levels 01 and 02 are to be ward accommodation. Plant will be located on level 03 and the roof. There is an existing basement that is used as a conduit for services to feed the wider site. The basement will be demolished, and services rerouted as part of the proposed development.

Mott MacDonald have been commissioned to provide Civil and Structural (C&S) design services for RIBA Stage 3 through IHP.

The Christie Hospital campus is in Withington, Greater Manchester, M20 4BX. The site is at easting and northing: 384922, 392593. The site location is shown in Figure 1.1.

Figure 1.1: Site Location



Source: Mott MacDonald via ArcGIS

1.2 Purpose of this Report

The aims of this geotechnical and geoenvironmental desk study are to:

- Review and summarise the available existing geological and geotechnical information relating to the site. This includes a review of geological maps and publications, reports from previous ground investigations and a summary of historical development of the site.
- Summarise available information and identify site-specific geotechnical and geoenvironmental hazards and risks which may place a constraint upon the proposed development site.
- Identify and evaluate all potential sources and impacts of any ground contamination, groundwater contamination and/or ground gas relevant to the site
- Provide recommendations for further assessment including indicative minimum key ground investigation requirements.

2 Sources of Information and Desk Study

2.1 Sources of information

The following documents have been reviewed during the compilation of this desk study.

2.1.1 Topographic maps

Topographic imagery has been supplied by Groundsure [1], including an extract from:

- 1:1,250 Ordnance Survey MasterMap

2.1.2 Geological and hydrogeological maps, memoirs and borehole logs

Geological mapping has been supplied by Groundsure [1], including an extract from:

- Bedrock and superficial geology British Geological Survey 1:10,000 and 1:50,000 scale mapping

In addition, the British Geological Survey (BGS) borehole log database GeoIndex [2] has been used to provide information on the anticipated ground conditions.

2.1.3 Previous ground investigations and reports

The report for the ground investigation [3] shown in Table 2.1 has been reviewed and is contained in Appendix E. This report is for the Paterson Redevelopment Project which borders the site to the south.

Eighteen further exploratory hole locations are present within 100m of the site, shown in GeoIndex, however they are all confidential and have not been reviewed.

Table 2.1: Existing Geotechnical Information

Title	Date
The Christie, Manchester Paterson Redevelopment Project Report No. CCG-C-18-10614	April 2019

2.1.4 Statutory services

A statutory services search will be conducted prior to any construction.

2.1.5 Other

- Various PDF datasets acquired for the scheme from Groundsure, report No. GS-5X4-DZK-BV6-99O, dated 25th July 2023.
- BGS Lexicon of Named Rock Units: http://www.bgs.ac.uk/lexicon/
- Magic Interactive Mapping: https://magic.defra.gov.uk/MagicMap.aspx
- Zetica UXO: https://zeticauxo.com/

2.2 Limitations

This document has reviewed the above information related to the site extent. No guarantee can be given of its accuracy.

3 Field Studies

3.1 Walkover Survey

An initial structural site walkover was undertaken by Mott MacDonald on 9th January 2022. The site is a live hospital and the existing building footprint occupies the majority of area within the site boundary. As such, there was limited opportunity to view the existing ground.

Photos from the walkover are presented in the site walkover note presented in Appendix C.

3.2 Previous Ground Investigations

An intrusive ground investigation was previously undertaken for the Paterson Building (as shown on Figure 4.1), adjacent to the site. A Factual Report was produced in April 2019 by CC Geotechnical Ltd on behalf of Ove Arup & Partners Ltd (Arup) and Interserve Construction Limited [3]. A Contamination Risk Assessment was also produced by Arup.

The ground investigation was undertaken by CC Geotechnical Ltd in January and February 2019 with the scope of the ground investigation comprising:

- 4No. cable percussion with rotary core follow-on boreholes
- 1No. window sample borehole
- 3No. machine excavated trial pits.
- 9No. hand dug foundation inspection pits.
- 3No. falling head permeability tests.
- 3No. combined gas and groundwater monitoring installations.
- Geotechnical & geo-environmental contamination testing.

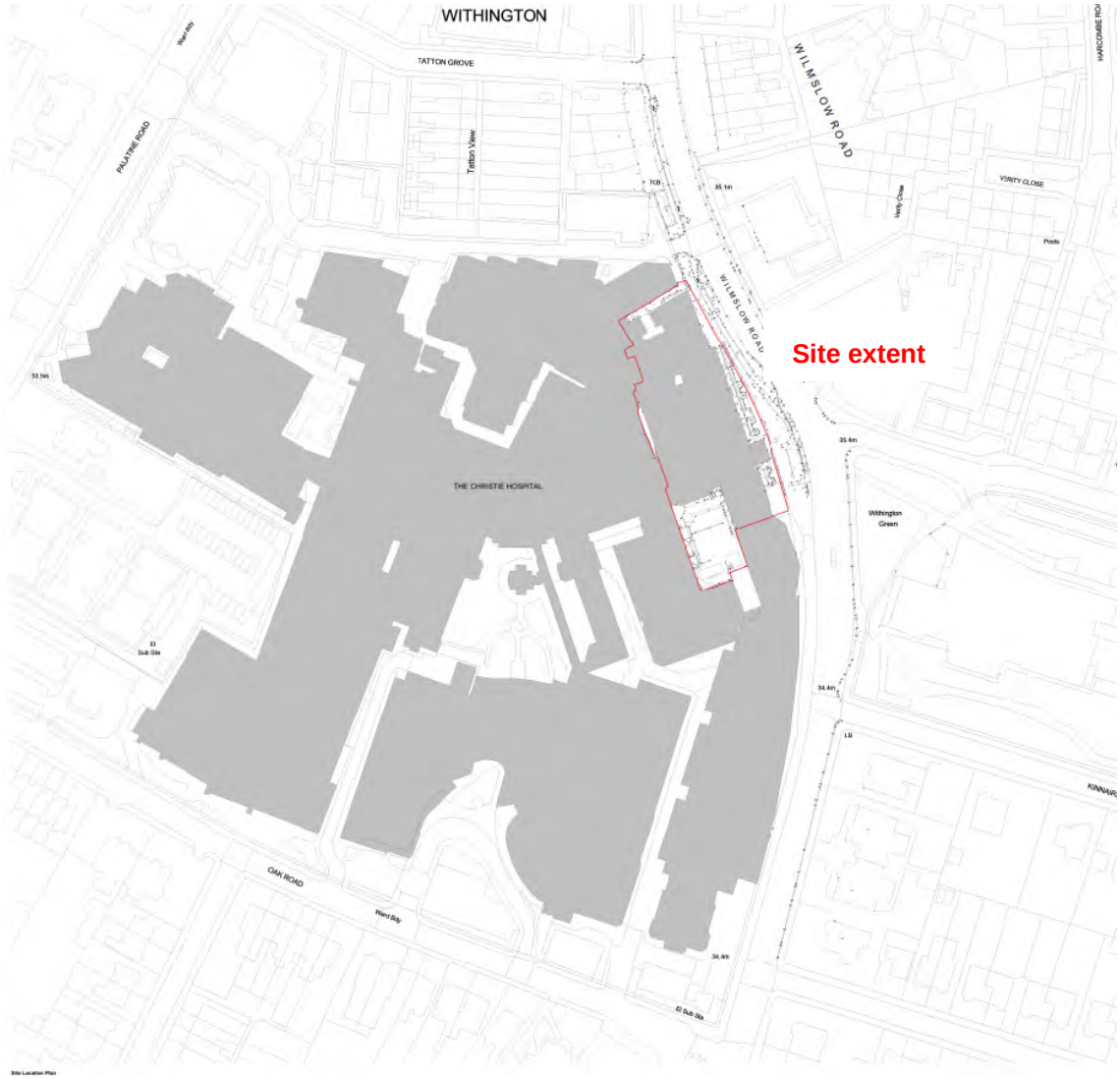
The report is contained in Appendix E.

4 Site Description

4.1 Site Location

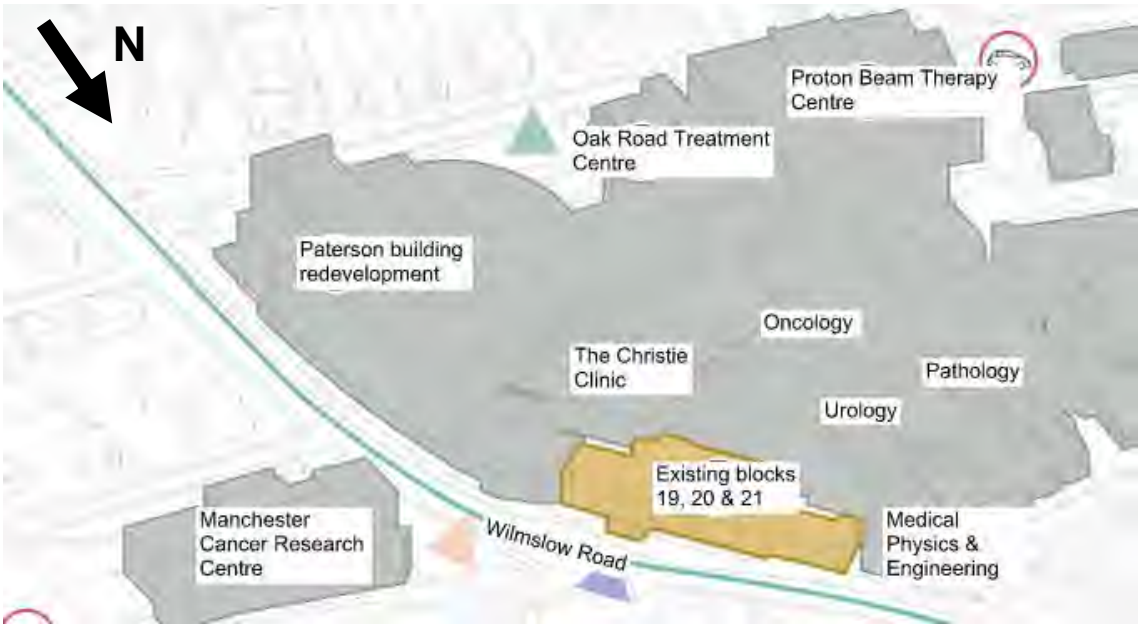
The Christie Hospital campus is in Withington, Greater Manchester and is bordered by Wilmslow Road (including a cycle lane) to the East. The development site consists of existing Blocks 19 and 20 which are to be demolished along with the partial demolition of Block 21 and are to be replaced with a new CT department. The site is surrounded on three sides by existing hospital buildings. An access road is present adjacent to the northern boundary of the site, connecting Wilmslow Road with Palatine Road, to the west of the site. The site plan is shown below in Figure 4.1 and Figure 4.2.

Figure 4.1: Site Location Plan



Source: DAY Architectural Ltd

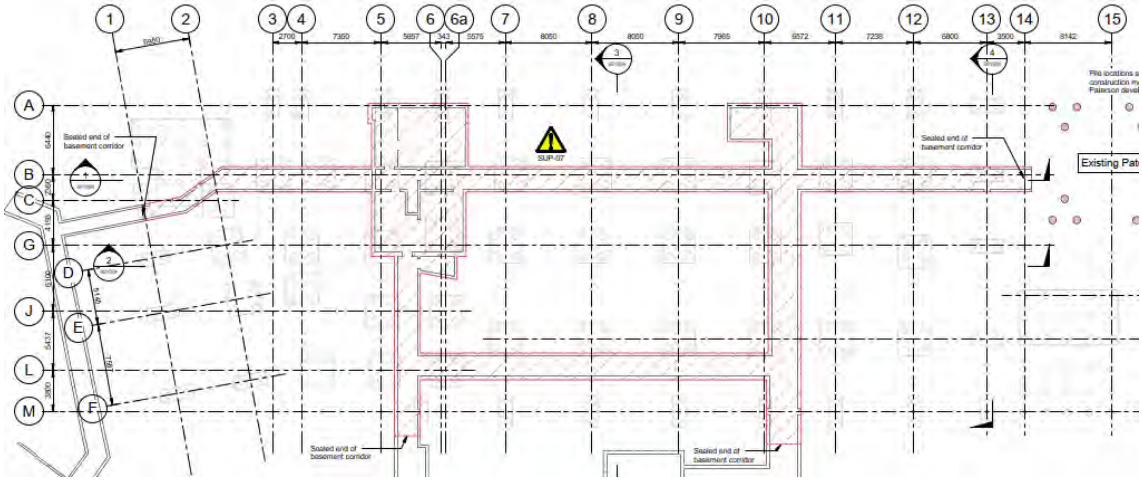
Figure 4.2: Site Plan



Source: Adapted from Day Architectural Briefing Presentation

Blocks 19 and 20 are generally two storeys high (ground + first floor), except for an extension which has been provided on top of block 19 on the Paterson building side. Block 21 is one storey high (ground floor only). There is an existing basement that is used as a conduit for services to feed the wider site. Current proposals are to demolish the existing basement beneath the site and reroute the services. The basement extents to be demolished have been overlain onto the proposed foundation layout and are shown below Figure 4.3.

Figure 4.3: Basement extents to be demolished



Source: Mott MacDonald

A review of the available as-built information was undertaken but proved to be unsuccessful in determining the overall structural form of existing Blocks 19, 20 & 21, therefore the nature and extent of the existing foundations are currently unknown.

4.2 Geography/Topography

The site is relatively flat at approximately 35m above ordnance datum (AOD).

4.2.1 Land Use

The site is part of the Christie Hospital, described above in Section 4.

4.2.2 Site History

Historical mapping, provided by Groundsure [1], has been reviewed. The Groundsure report is included as Appendix A.

A summary of the historical development of the study area is presented in Table 4.1.

Table 4.1: Historical Land Use

Year (Scale)	Site History
1849 (1:10,560)	The northern half of the site comprise a field with the southern half part of the 'Withington Lodge' and 'Withington Green' landscape garden, yard and buildings. A road is adjacent to the site, mostly following the present-day alignment of Wilmslow Road. An unnamed watercourse is shown approx. 60m to the west of the site, flowing north-east to south west, and appears to be culverted beneath Tatton View. A large fishpond is shown approx 100m to the south east. Surrounding land use within 500m is agricultural / rural in nature, with no commercial / industrial land use of note.
1881 (1:2,500)	The site is now identified as being part of 'Groombridge House', with buildings structure present in the central west area of the site. There has been residential developments in the surround area, making the area less rural / agricultural in nature.
1882 to 1923 (multiple)	Generally, little to no change on site and off site. On 1893 mapping (1:1,500) fishpond to the south-east is no longer shown. On 1907 (1:2,500) mapping further residential development off site is noted.
1934 (1:2,500)	'Christie Hospital & Holt Radium Institute' is constructed on site, with an associated hospital building and grounds occupying the entire site area. Off site, there's further residential development. Unnamed watercourse to the west of the site appears to have been culverted further towards the south west.
1934-1938 (1:10,560)	Little to no change on site and off site.
1938 (1:10,560)	Little to no change on site, with further residential development off site starting to resemble present-day layout.
1955 (1:10,560)	Little to no change on site and off site.
1957 (1:1,250)	Development of hospital building on site to resemble much of the present-day layout. Little to no change off site.
1958-1959 (1:2,500)	Little to no change on site and off site.
1965-1966 (1:10,560)	Little to no change on site and off site.
1974-1975 (1:1,250)	Further extension of the buildings on site, within the north of the site, with hospital development southwards starting to resemble present-day layout.
1981 to 2010 (multiple)	Generally, little to no change on site and off site, with urban development layout on site and off site slowly resembling present-day layout over time.
2023 (1:10,000)	Generally, little to no change on site and off site. It is understood that the Paterson Building which was immediately south of the site suffered fire damage in 2017 and is currently being redeveloped. On the 2023 mapping, the Paterson Building was shown as an area of undeveloped ground.

4.3 Geology

The BGS 1:10,000 and 1:50,000 geological maps, provided by Groundsure [1], have been reviewed and indicate the site to be underlain by superficial Devensian Till, underlain by the Wilmslow Sandstone Formation (part of the Sherwood Sandstone Group). The Chester Formation is indicated to be present approximately 20m to the south-west of the site. Artificial ground is not shown to be present on the site, however, is likely to be present given the current/historical land use.

The BGS Lexicon states that the Devensian Till is likely to comprise *"unsorted and unstratified drift, generally over-consolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier. It consists of a mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton)."* [4]

The BGS Lexicon states that the Wilmslow Sandstone Formation is likely to comprise *"red-brown to brick-red, fine to medium grained, generally pebble free, cross-bedded sandstones, with sporadic siltstones."* [4]

The BGS 1:50,000 Map, provided by Groundsure [1], indicates the south west site boundary is bound by two faults trending northwest to southeast, with the northern fault down throwing to the northeast and the southern fault down-throwing to the east/southeast. The fault lines mark the boundary between the Wilmslow Sandstone and the Chester Formation. The Chester Formation is indicated to be dipping 10 degrees to the east.

The site is not located within a Coal Mining Reporting Area.

4.3.1 Borehole Records

One ground investigation has been undertaken, for the Paterson Building, adjacent to the south of the site, as shown on Figure 4.1. A summary of the exploratory holes associated with the ground investigations is presented in Section 5.

4.3.2 Landslips

There are no recorded landslips within 500m of the site boundary [1].

4.4 Natural Ground Hazards

Table 4.2 summarises the natural ground hazards across the site.

Table 4.2: Summary of Natural Ground Hazards

Hazard	Risk within site	Details/description
Shrink / swell	Very low	BGS records [1] indicate the whole site is classified as: Ground conditions predominantly low plasticity
Running sands	Very low	BGS records [1] indicate the whole site is classified as: Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly
Compressible ground	Negligible	BGS records [1] indicate the whole site is classified as: Compressible strata are not thought to occur
Collapsible ground	Very low	BGS records [1] indicate the whole site is classified as: Deposits with potential to collapse when loaded

Hazard	Risk within site	Details/description
		and saturated are unlikely to be present.
Landslide stability	Very low	BGS records [1] indicate the whole site is classified as: Slope instability problems are not likely to occur
Ground dissolution	Negligible	BGS records [1] indicate the whole site is classified as: Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.

4.5 Hydrology/hydrogeology

There are no water courses in the site area. Historical mapping identifies an unnamed watercourse is culverted approximately 60m to the west of the site. Shaw Brook, a stream, is present 180m north of the site.

The site is not located within a designated Flood Zone, therefore has a less than 1 in 1000 chance of river and coastal flooding. There is negligible risk of surface water flooding on site. There is 1 in 30 year (depth of 0.3 – 1m) risk of surface water flooding within 50m of the site. There is a moderate risk of groundwater flooding on site, with a moderate to high risk of groundwater flooding within 50m of the site.

The superficial Till underlying the site is described as Secondary Undifferentiated. Secondary Undifferentiated is defined as “Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type” [1].

The bedrock geology of the Wilmslow Sandstone is described as a Principal Aquifer. Principal Aquifers are defined by the Environment Agency 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” [1].

The site has a Secondary superficial aquifer - Medium Vulnerability classification [1].

4.6 Environmental constraints

There are no designated environmentally sensitive sites within 0.5km of the sites [1]. However, the site is located within a SSSI Impact Risk Zone.

4.7 Mining and quarrying

There are no active or closed surface or underground workings recorded on site or within 500m of the site. There are no coal mining or non-coal mining areas within 500m of the site [1].

There are two historical surface ground workings, identified from historical mapping, within 250m of the site:

- Water body – 85m south east
- Pond – 200m south west

4.8 Heritage and Archaeology

There are two listed buildings within 500m of the site:

- Red Lion Inn – Grade II listed, 125m north
- Milestone Adjacent to Withington Fire Station – Grade II listed, 165m north

The Withington conservation area is located 35m north west of the site.

Greater Manchester Archaeological Advisory Service (GMAAS) have reviewed the Site and do not consider there to be any features of archaeological significance present on the Site. A Letter from GMAAS supporting this conclusion is submitted in support of the planning application.

4.9 UXO risk

An Unexploded Ordnance (UXO) risk map has been viewed through the Zetica website [5] which shows that the site is in an area with a moderate risk of unexploded bombs.

A Pre-Desk Study Assessment has been obtained from Zetica to assess the UXO risk at this stage and is presented in Appendix D. The Pre-Desk Study Assessment confirms that the site and surrounding area is located within an area of moderate risk of unexploded bombs and recommends that a detailed UXO desk study and risk assessment is undertaken.

A detailed UXO Risk Assessment was undertaken by 1st Line Defence for the Paterson Building development [6]. This report assessed that the Paterson Building site has a low risk of Unexploded Ordnance. The recommended risk measures for the site included a UXO risk management plan and site specific UXO awareness briefings. This UXO risk assessment does not include the site boundary of blocks 19, 20 and 21 and therefore it is recommended to undertake a detailed site specific UXO risk assessment.

4.10 Waste/Landfill

A review of Environment Agency and BGS datasets included within the Groundsure report, indicates that there are no recorded active or historical landfills located on site or within 500m of the site.

5 Ground Conditions

5.1 General

The previous ground investigation information, primarily the 2019 ground investigation for the Paterson Building (adjacent to the southern site boundary), has been reviewed to give an understanding of the ground conditions in the area.

5.2 Anticipated Strata

The following strata are anticipated to be found on site:

- Made Ground
- Devensian Till
- Wilmslow Sandstone Formation

5.2.1 Made Ground

The Paterson Building ground investigation identified Made Ground to be present in all boreholes and trial pits to depths of between 0.7m and 2.20m [34.72m AOD – 35.26m AOD].

The Made Ground typically comprised a horizon of topsoil, overlying brown clayey, sandy gravel. The granular content typically comprised of brick, limestone, concrete and sandstone. Organic material was also noted to be present. No visual or olfactory evidence of contamination was recorded in the exploratory hole logs.

Due to the nature of Made Ground and the site's history, the composition and thickness of the Made Ground on site may vary from the Paterson Building investigation.

5.2.2 Devensian Till

Devensian Till was present in the Paterson Building ground investigation to depths of between 2.20m BGL and 2.70m BGL [31.43m AOD - 33.06m AOD].

The Till deposits typically comprised either clayey, silty, gravelly SAND or sandy, silty CLAY. The granular Till deposits were typically loose to medium dense with SPT N values of between 7 and 15. The cohesive Till deposits were typically firm to stiff with SPT N values of between 10 and 22. In-situ hand vane penetrometer readings were taken within the cohesive Till with reported values of between 50kPa and 110kPa.

3No. Particle Size Distribution tests were undertaken on granular Till deposits and 1No. test on cohesive Till deposits. The PSD tests on the granular Till deposits typically classified as clayey, silty, gravelly, fine to coarse grained SAND. The PSD test on the cohesive Till deposits classified as slightly sandy, slightly gravelly, silty CLAY.

1No. Atterberg limit tests was undertaken on granular Till deposits and 4No. tests on cohesive Till deposits. The test on the granular Till gave a Plasticity Index of 15%, the tests on the cohesive Till gave a range Plasticity Index results of 7-31%.

1No. consolidated undrained triaxial test was undertaken on the cohesive Till and the resulting shear strength parameters reported for cohesion was 11kPa and an angle of shearing resistance of 21.5°.

5.2.3 Sandstone

In the Paterson Building ground investigation, weathered sandstone was present to depths of between 3.50m BGL and 5.00m BGL [29.92m AOD - 31.76m AOD].

The weathered sandstone was typically recovered as fine to coarse red/brown sand. The sandstone recovery within the weathered zone was often non-intact. Beneath the weathered sandstone, the underlying competent sandstone was typically described as *"very weak to weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are extremely close to medium spaced, horizontal, clean, rough, tight to open."*

Due to the location of the Paterson Building, this sandstone is likely to be part of the Chester Formation, whereas the bedrock underlying the site is anticipated to be the Wilmslow Sandstone Formation. The Wilmslow Sandstone Formation is typically finer grained and less pebbly than the Chester Formation, however the depth to bedrock is unlikely to vary significantly.

It is noted that the Sherwood Sandstone (Wilmslow and Chester Formation) in and around the area of Manchester can sometimes exhibit a completely weathered upper horizon, sometimes extending to significant depths.

24No. point load tests were undertaken on the core samples of sandstone and reported point load index values of between 0.06MPa and 0.32MPa with estimated uniaxial compressive strengths of between 1.18MPa and 6.31MPa. UCS tests on the sandstone reported values of between 1.25MPa and 13MPa for the sandstone. The Elastic Modulus and Poisons Ratio were also measures to be between 0.52GPA and 3.74GPA and between 0.25 and 0.32 respectively.

5.2.4 Summary ground model

A summary of the anticipated geology on site, based on the levels of the Paterson Building ground investigation, is included below in Table 5.1.

Table 5.1: Indicative Ground Model

Stratum	Depth to top of stratum (mbgl)	Elevation of top of stratum (mAOD)	Thickness (m)
Made Ground	0	34.72 – 35.26	0.70-2.20
Devensian Till	0.70 – 2.20	32.52 – 34.22	0.50-2.20
Weathered Sandstone	2.20 – 2.70	31.43 – 33.06	1.30-2.80
Very weak to weak Sandstone (Wilmslow Formation)	3.50 – 5.00	29.92 – 31.76	Not proven

5.2.5 Summary of geotechnical parameters

A summary of the geotechnical parameters, based on the limited testing in the Paterson Building ground investigation, is included below in Table 5.2.

Table 5.2: Geotechnical parameters

Stratum	SPT N	c_u (kPa)	φ (°)	c' (kPa)	UCS (MPa)
Devensian Till	7 - 22	50-110	21.5*	11*	-
Sandstone	-	-	-	-	1.18 - 13

Source: *based on one test – from Paterson Building GI [3]

5.3 Geo-environmental Laboratory Testing and Assessment

An Arup contamination risk assessment based on 2019 ground investigation for the Paterson Building noted that 23no. soil samples were tested for a suite of contaminants, including the following: Antimony, arsenic, beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, vanadium, zinc, chromium (VI) total cyanide, water soluble boron, total organic carbon and total phenols.

The results were compared against generic assessment criteria (GAC) for a commercial end-use with an organic matter content of 6%. Of the 23no. samples tested, there were no exceedances of the GAC, nor were there any notably elevated concentrations of contaminants.

5.4 Groundwater and ground gas conditions

5.4.1 Groundwater

No groundwater strikes were encountered within any of the exploratory holes in the Paterson Building ground investigation.

During the Paterson Building ground investigation, groundwater monitoring standpipes were installed in 3No. boreholes at 2.30mBGL, 3.00mBGL and 5.00mBGL. Groundwater was only recorded within the deepest standpipe with a standing water level of approximately 4.00mBGL.

5.4.1.1 Permeability

3No. falling head tests were performed in the three boreholes in the Paterson Building ground investigation which included standpipe installations. The permeability test response zones were situated within the Devensian Till and Sherwood Sandstone Group. The falling head tests all indicated permeability of the order of 10^{-7} m/s.

5.4.2 Ground gas

Gas monitoring was carried out within 3No. monitoring installations in the Paterson Building ground investigation, and a total of 4No. monitoring visits were undertaken between 13th February 2019 and 4th March 2019. All of the response zones were located within the Made Ground. The monitoring readings were taken during dry conditions and rising pressure trends, and therefore the recorded gas flow rates may not be at their highest.

The maximum methane (CH_4) and carbon dioxide (CO_2) concentrations recorded were 0.0% and 5.8% volume respectively.

It was recommended in the Arup Contamination Risk Assessment that the Paterson Building site is characterised as Characteristic Situation (CS) 1 with a very low hazard rating.

6 Preliminary Engineering Assessment

6.1 General

The development site consists of existing Blocks 19 and 20 which are to be demolished along with the partial demolition of Block 21 and are to be replaced with a new CT department. The existing basement beneath Blocks 19 and 20 is also to be demolished.

6.2 Foundations

Based on the anticipated ground conditions and building proposal, it is envisaged that a piled foundation solution will be required. Competent intact sandstone is likely to be the favoured bearing stratum for the proposed building, which is indicated to be present at a depth of approximately 3.50m-5.00m BGL. This needs to be confirmed with site specific ground investigation.

The review of the available as-built information was unsuccessful; therefore the nature and extent of the existing foundations are unknown. Trial pits are proposed to investigate existing building foundation details and depths where possible to inform the design.

6.3 Geotechnical constraints

The following constraints and engineering considerations have been identified:

- Composition and thickness of Made Ground is unknown.
- Weathering profile of the Wilmslow Formation is unknown.
- Presence of faults on the south west site boundary.
- Presence and extent of existing foundations is unknown.
- Existing basement structure.

7 Preliminary Contaminated Land Risk Assessment

7.1 Regulatory Context

Contamination associated with land that is being redeveloped is managed through the planning system. Contaminated land must be considered in the context of the development proposal and remediated such that the land is suitable for its intended use. Once remediated, land should not be capable of being determined as 'contaminated land' under the provisions of Part 2A of the Environmental Protection Act 1990 [7].

This report adopts a strategy for the assessment of potential risks from land contamination based on current guidance documents. Particular reference is made to CIRIA C552 [8] and the Environment Agency (EA) Land Contamination Risk Management (LCRM) online guidance [9].

Following the procedures in LCRM, a key element of the Preliminary Risk Assessment is the development of a conceptual model which may be refined or revised as more information and understanding is obtained through the risk assessment process. The conceptual model is described in terms of the contaminant Sources, transport Pathways and possible Receptors that may be present, and the potential 'Pollutant Linkages' between them, as defined in the relevant legislation and guidance.

Classification of consequence and probability uses definitions published by the National House Building Association (NHBC), EA and Chartered Institute of Environmental Health (CIEH) [10], which has been developed from the Department of the Environment's guidance [11] and the aforementioned Defra's guidance. The methodology differs from that presented in CIRIA C552 particularly in terms of the definitions of classification of consequence, which includes a consideration of immediacy of hazards. The methodology is detailed further in Appendix B.

7.2 Conceptual Site Model

The preceding Sections have summarised available information for the site and have been used to inform this Preliminary Risk Assessment. The Proposed Development will be the demolition of existing two and three storey hospital buildings (full demolition of Blocks 19 and 20 and partial demolition of Block 21) and associated basement, to enable construction of a new hospital building housing a CT scanner, X-ray facility and associated accommodation at ground floor level with two floors of ward accommodation over.

A key element of an environmental risk assessment is the development of a Conceptual Site Model (CSM) which is done by undertaking a Source – Pathway – Receptor analysis of the site:

- Sources (S) are potential or known contaminant sources e.g., arising from a former land use, specific pollution event;
- Pathways (P) are environmental systems through which a contaminant could migrate e.g., air, water;
- Receptors (R) are sensitive environmental receptors that could be adversely affected by a contaminant e.g., site end-users, groundwater.

Where a Source, relevant Pathway and Receptor are present, a pollutant linkage is considered to exist whereby there is a circumstance through which environmental harm could occur, and a potential environmental liability is considered to exist.

It is assumed that a robust environmental management plan will be adopted for any construction works, and as a result no contamination will occur during construction (e.g. fuel leaks and spills). Similarly, it is assumed that no contaminated material will be brought onto site for the Proposed Development.

Potential Sources, Pathways and Receptors identified for the site are presented below, with the Preliminary CSM for the site presented within Table 7.1.

7.2.1 Sources

The following sources are considered to potentially be present:

- S1: Made Ground on site – the site has been occupied by The Christie Hospital since the early 1930s (first mapped on 1934 mapping as 'Christie Hospital & Holt Radium Institute'). Made Ground is anticipated on site as the development platform for the above ground structures, as well as the material within which the existing basements are constructed in. Given the age of the development, Made Ground may contain elevated concentrations of heavy metals and organic compounds (e.g., fuel oils / solvents) (excluding asbestos).
- S2: Wilmslow Road surface water run-off – the site is located adjacent to Wilmslow Road, where elevated heavy metals and organic compounds (e.g., accidental fuel spills) from motorised road traffic may have entered surface water drainage systems and percolated towards the site.
- S3: Hazardous ground gases associated with underlying ground material – the site is anticipated to be underlain by Made Ground, overlying superficial Glacial Till deposits which is underlain by sandstone bedrock of the Wilmslow Sandstone Formation and the Chester Formation. The Glacial Till and sandstone bedrock are not considered to be credible sources of hazardous ground gases, with the Made Ground potentially a credible source of hazardous ground gases (arising from degradable material potentially within it, and the potential historical spillage of organic compounds (e.g., petroleum hydrocarbon, chlorinated solvents))
- S4: Underlying ground material – the site is anticipated to be underlain by Made Ground overlying Glacial Till and sandstone bedrock of the Wilmslow Sandstone Formation and the Chester Formation. The geochemical condition of these strata may potentially pose an aggressive environment to buried concrete and cementitious structures and services
- S5: Asbestos – the buildings on site have occupied the site since the early 1930s (first mapped on 1934 mapping), where asbestos would likely have been used during construction. Mott MacDonald Limited's Design Stage Report [12] mentions the presence of unmanaged asbestos within existing basements on site. Given the age of the development, asbestos is also potentially present within Made Ground on site.

Note that Mott MacDonald Limited is not insured for, and therefore will not undertake surveys to identify asbestos contamination and will not provide guidance on the management and treatment of this item. Should the presence of asbestos contamination be suspected during development, Mott MacDonald Limited would recommend the appointment of a specialist contractor to address the issue and would not provide advice on risk or remedial measures.

7.2.2 Pathways

The following pathways are considered:

- P1: Human uptake pathways:
  - Ingestion of exposed soils
  - Dermal contact with exposed soils
  - Inhalation of soils/dust/volatised compounds

- P2: Overland flow
- P3: Horizontal and vertical percolation within the unsaturated zone
- P4: Horizontal and vertical migration within the saturated zone
- P5: Horizontal and vertical gas migration within the underlying ground material
- P6: Direct contact.

7.2.3 Receptors

The following receptors are considered:

- R1: Site end-users e.g., hospital staff, visitors, pedestrians and cycle path users
- R2: Construction and maintenance workers
- R3: Controlled waters – Glacial Till Secondary Undifferentiated aquifer and sandstone bedrock Principal Aquifer
- R4: Above ground structures
- R5: Buried concrete and cementitious structures.

7.2.4 Preliminary Conceptual Site Model

Table 7.1: Preliminary Conceptual Site Model

Sources	Pathways	Receptors	Consequences	Probabilities	Risks
S1: Made Ground on site	P1: Human uptake pathways: ● Ingestion ● Dermal contact ● Inhalation	R1: Site end-users	Medium – exposure to contaminants within soil could adversely affect human health	Unlikely – the Proposed Development will cover the site in hardstanding, breaking the contaminant linkage pathways between the source and receptor. Should areas of soft landscaping be present, it is assumed that suitable clean material will be used. Furthermore, potential exposure duration from soft landscaping to receptors are short-term, particularly pedestrians and cycle path users which are passing traffic.	Low
		R2: Construction and maintenance workers		Likely – due to the nature of construction works, workers will likely encounter soil and potentially groundwater. The exposure probability will be mitigated by the Contractor through safe working methods	Moderate (unmitigated) – mitigated by the Contractor through safe working methods.
	P3: Horizontal and vertical percolation within the unsaturated zone P4: Horizontal and vertical migration within the saturated zone	R3: Controlled waters	Mild – exposure to contaminants arising from Made Ground on site could have a mild adverse effect on water quality. Given the age of the development on site, mobile contaminants would likely have fully/largely leached away	Likely – Made Ground is anticipated sitewide to directly overlie the natural superficial Glacial Till and bedrock	Moderate / low
S2: Wilmslow Road surface water run-off	P2: Overland flow P3: Horizontal and vertical percolation within the unsaturated zone P4: Horizontal and vertical migration within the saturated zone	R3: Controlled waters	Mild – exposure to contaminants washed off from the adjacent road could have a mild adverse effect on water quality. These are likely to be mobile contaminants	Low likelihood – Surface water run-off will likely only occur during heavy precipitation events and drain into surface water drainage and highway drainage system, which will likely include oil water separators. The potential for migration onto site assumes there are cracks within the drainage system. The combination of the two events suggests a low likelihood	Low

Sources	Pathways	Receptors	Consequences	Probabilities	Risks
S3: Hazardous ground gases associated with underlying ground material	P1: Human uptake pathways: ● Inhalation P5: Horizontal and vertical gas migration within the underlying ground material	R1: Site end-users	Medium – a build-up of hazardous ground gases could adversely affect human health.	Unlikely – given the Proposed Development will be like the existing development currently on site. Ground gas monitoring undertaken as part of the 2019 GI for the adjacent Paterson Building recorded the presence of carbon dioxide in the 3no. borehole installations monitored. However, there is a low likelihood of a contaminant linkage pathway as it is assumed that hazardous ground gases are not posing an existing risk to the building on site currently	Low
		R2: Construction and maintenance workers		Likely – Due to the nature of construction works, workers will likely enter excavations or enclosed areas where a build-up of hazardous ground gases can occur. Historical ground gas monitoring undertaken as part of the 2019 GI for the adjacent Paterson Building did record the presence of carbon dioxide. This will be mitigated by the Contractor through safe working methods.	Moderate (unmitigated) – mitigated by the Contractor through safe working methods.
		R4: Above ground structures	Severe – a build-up of the hazardous ground gas methane within an enclosed structure can result in an explosive air mix	Unlikely – whilst the building will be sat atop existing ground material, the natural geology is not considered credible sources of hazardous ground gases, and historical ground gas monitoring undertaken as part of the 2019 GI for the adjacent Paterson Building did not record the presence of methane	Very low
S4: Underlying ground material	P6: Direct contact	R5: Buried concrete and cementitious structures	Medium – geochemical condition of ground materials can pose an aggressive environment for concrete / cementitious structures, adversely affecting the structural integrity of buried structures	Likely – buried concrete / cementitious structures will be in direct contact with underlying ground material, to enable construction of the Proposed Development	Moderate (unmitigated) – to be mitigated by the selection of appropriate concrete specification for the site
S5: Asbestos	Asbestos is potentially present within Made Ground and the building structures on site. Should the presence of asbestos be suspected during intrusive works and development, an accredited specialist contractor is recommended to be consulted to advice on management.				

8 Geotechnical Risk Register

Based on the available information on the development, the geotechnical hazards associated are presented in Table 8.1.

Table 8.1: Geotechnical Risk Register

Risk ID	Hazard	Consequence	Qualitative Risk Rating	Mitigation	Post Mitigation Qualitative Risk Rating
GEO-01	Unknown/ unforeseen ground conditions	Ground conditions could adversely affect the design if different from assumptions. Risk of failure or excessive settlement of structures	Medium risk	Undertake site specific ground investigation and geotechnical testing to define a suitable ground model and engineering properties.	Low risk
GEO-02	Variable Made Ground	Made Ground may be encountered and can offer poor founding material. Risk of failure or excessive settlement.	Medium risk	Undertake a site specific ground investigation to determine the extent and engineering properties of any Made Ground.	Low risk
GEO-03	Please refer to Section 7 for the Preliminary Contaminated Land Risk Assessment.				
GEO-04	Unknown groundwater levels	Incorrect assumptions could lead to inappropriate design.	Medium risk	Undertake a site specific ground investigation and include standpipe installation and groundwater monitoring as part of the scheme specific ground investigation to determine groundwater conditions.	Low risk
GEO-05	Ground obstructions	Potential for obstructions to be encountered e.g. historical foundations and/or basement structure. Difficult excavation to form foundations. Impact on project cost and programme.	High risk	Undertake a site specific ground investigation to determine the ground conditions, including foundation observation pits as required.	Medium risk

Risk ID	Hazard	Consequence	Qualitative Risk Rating	Mitigation	Post Mitigation Qualitative Risk Rating
GEO-06	Buried services strike	Potential delays to programme, affect businesses or users served by any existing utility and safety risks to operatives.	High risk	1) Records of existing services should be obtained and consulted prior to intrusive GI and contractor to have in place suitable service avoidance techniques (e.g. inspection pits and PAS128 / CAT survey). 2) GPR survey to be undertaken. However, it should be noted that due to the historic modifications on the site, the services may not be within the top 1-2m to the current ground level. 3) All available services information/drawings for the site area to be passed to the Construction Contractor in pre-construction information. 4) Construction Contractor to satisfy themselves as to the adequacy of available information and make additional enquires as necessary.	Low risk
GEO-07	Ground aggressivity to concrete	Certain ground conditions containing sulphates, nitrates and chloride can be aggressive to concrete, causing foundations to fail.	Medium risk	Undertake a site-specific ground investigation and include laboratory testing assessing ground aggressivity to concrete.	Low risk
GEO-08	UXO	Potential delays to programme and safety risks to operatives.	High risk	The Zetica risk maps consider the regional area to be moderate risk. A detailed UXO Risk Assessment was undertaken for the Paterson Building development. This report assessed that the Paterson Building site has a low risk of Unexploded Ordnance. A detailed desk study for the site is required prior to works.	Low risk
GEO-09	Faults present south west of site	Movement of faults could impact design of structures and impact on construction	Medium risk	Undertake a site specific ground investigation to establish areas that might be at risk.	Low risk

9 Conclusions and Recommendations

9.1 Geotechnical Risks

Ground conditions are likely to comprise Made Ground associated with the historical and current development of the site, underlain by Devensian Till. The superficial deposits are underlain by sandstone associated with the Wilmslow Sandstone Formation.

A geotechnical risk register has been produced as part of this report and the main risks and potential remediation and foundation options presented below:

- Unknown/unforeseen ground conditions, which is to be mitigated by undertaking scheme specific ground investigation and testing.
- Variable Made Ground, which is to be mitigated by undertaking scheme specific ground investigation and testing.
- Unknown groundwater levels, which is to be mitigated by undertaking scheme specific ground investigation and groundwater monitoring.
- Potential for foundations at shallow depth down, leading to difficult excavation conditions.

9.2 Contamination Risks

Reviewed information has identified the anticipated Made Ground underlying the site to be the primary source of contaminants, potentially containing elevated concentrations of heavy metals and organic compounds. Given the age of the development, asbestos may also be present within Made Ground and the building/services. Note that should the presence of asbestos contamination be suspected during development, Mott MacDonald Limited would recommend the appointment of a specialist contractor to address the issue and would not provide advice on risk or remedial measures.

Excluding asbestos, the Preliminary Conceptual Site Model has assessed the risk from Made Ground to site end-users as low, to construction and maintenance works as moderate (unmitigated) and to controlled waters as moderate / low. Risk to workers will be mitigated by the Contractor through safe working methods. It should be noted that the site will be a hospital building on completion of the works, therefore a final hardstanding surface will be present. This would therefore break the source-pathway-receptor linkage for much of the site. Soil within areas of soft landscaping, for example planters, should be proven not to pose an unacceptable risk to human health.

Surface water run-off from the adjacent Wilmslow Road may be a potential source of elevated heavy metals or organic compounds to controlled waters underlying the site. The risk has been assessed as low.

Hazardous ground gases may be generated within the existing Made Ground underlying the site. The superficial Till and sandstone bedrock are not considered to credible sources of hazardous ground gases, with Made Ground a source arising from degradable material potentially within. The risk to site end-users has been assessed as low, to construction and maintenance workers as moderate (unmitigated) and to above ground structures as very low. Risk to workers will be mitigated by the Contractor through safe working methods.

The underlying ground material may also provide an aggressive geochemical environment to buried concrete and cementitious structures and services. The risk has been assessed as high

(unmitigated), which will be mitigated by the selection of appropriate concrete specification for the site.

9.3 Recommendations

As a result of the identified geotechnical and geo-environmental risks, it is recommended that a targeted intrusive ground investigation is undertaken at the site in order to confirm the ground conditions and engineering properties of the strata specifically relating to the proposed development. This will then inform detailed design, initial waste characterisation of excavated soils and any remediation, if required.

9.3.1 Ground Investigation

The ground investigation should be carried out in accordance with BS 5930:2015+A1:2020 [13] and BS 10175:2011+A2:2017 [14].

Due to the constrained nature and existing buildings on the site, the exploratory holes will need to be undertaken in the verge/pavement along Wilmslow Road, in the north/east of the site, highlighted in green in Figure 9.1 below. Site areas highlighted in red are either inaccessible to plant or access is to be maintained for hospital operation. Site areas highlighted in orange would require removal of planting to provide suitable access for investigation.

The exact number and location of exploratory holes is to be developed at the next stage and shall minimise disruption to existing buried services as far as reasonably practicable, but we welcome feedback from Environmental Health at this stage in relation to suitable locations for exploration.

The results of this targeted investigation will be reviewed in cognisance with the existing Paterson Ground Investigation to better understand whether the ground conditions vary significantly across the wider site. There is a potential need for validation exploratory holes once the buildings have been demolished to confirm the ground conditions on the west of the site.

Figure 9.1: Available Access for Ground Investigation



Source: Mott MacDonald

The ground investigation scope may include:

- Cable percussion with rotary follow-on boreholes to investigate:
  - Stratigraphy and characteristics of the strata, including the depth to sandstone bedrock.
  - The strength and characteristics of the Till.
  - The strength and characteristics of the sandstone.
- Groundwater and ground gas monitoring installations with response zones targeted to characterise the groundwater and ground gas regime beneath the site.
- Geotechnical laboratory testing of both soil and rock for the characterisation of the geotechnical properties of soil and rock to inform design.
- Select geo-environmental soil and water samples collected during the GI should be laboratory tested at an UKAS accredited laboratory for the following suites of determinants:
  - Soil
    - Metals (antimony, arsenic, barium, beryllium, boron, cadmium, chromium (III & VI), copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, vanadium and zinc)
    - Asbestos (screen & quantification if present)
    - Cyanide, fraction of organic carbon, pH, sulphate, sulphur, loss on ignition, soil organic matter, total organic carbon and moisture content
    - Organic compounds (BTEX speciated, phenols speciated, polycyclic aromatic hydrocarbons (USEPA 16 speciated), total petroleum hydrocarbon criteria working group (aliphatic-aromatic split) and volatile organic carbons (speciated USEPA method 8260 target list)
  - Soil leachate
    - Metals (antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (III & VI), copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, vanadium and zinc)
    - Ammoniacal nitrogen, chloride, cyanide, fluoride, pH, sulphate, hardness as $CaCO_3$ and dissolved organic carbon
    - Organic compounds (phenols speciated, polycyclic aromatic hydrocarbons (USEPA 16 speciated) and total petroleum hydrocarbon criteria working group (aliphatic-aromatic split)
  - Water
    - Metals (antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (III & VI), copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, sodium, vanadium and zinc)
    - Dissolved organic carbon, ammoniacal nitrogen, chloride, cyanide, fluoride, nitrate, pH, sulphate, sulphur, hardness as $CaCO_3$, total dissolved solids and alkalinity (bicarbonate)
    - Organic compounds (phenols speciated, polycyclic aromatic hydrocarbons (USEPA 16 speciated), total petroleum hydrocarbon criteria working group (aliphatic-aromatic split) and volatile organic compounds (speciated USEPA method 8260 target list)
- In the event that soils need to be removed for off-site disposal, some Waste Acceptance Criteria (WAC) testing during the ground investigation may be beneficial, although landfilling of soils should be avoided where possible. Removal of materials from site, if required, should be discussed with a licensed waste carrier;

- Should any Made Ground or any natural soils with visual or olfactory evidence of contamination be encountered during wider geotechnical investigations then these should also be sent for laboratory chemical analyses.

10 References

1. PDF datasets for environmental and geological datasets (obtained from Groundsure report no. 10029049, July 2023)
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3. CC Geotechnical Ltd (2019) Ground Investigation Report for site at The Christie, Manchester Paterson Redevelopment Project. CCG-C-18-10614
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10. National House-Building Council, Environment Agency and Chartered Institute of Environmental Health. (2008) *Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D66:2008 Volume 1*.
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13. British Standards Institution. (2020) BS 5930:2015+A1:2020, Code of Practice for Ground Investigations
14. British Standards Institution. (2017) BS 10175:2011+A2:2017, Code of Practice for Investigation of potentially contaminated sites

Appendices

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A. Groundsure

Note that the red line boundary in the Groundsure report does not accurately represent the development red line boundary. However, this does not impact the results of the Groundsure report as the search radius generally extends 500m from the given red line boundary. For an accurate red line boundary, refer to Figure 4.1.

Groundsure LOCATION INTELLIGENCE

Enviro+Geo Insight

384918 392598,

Order Details

Date: 25/07/2023

Your ref: 10029049

Our Ref: GS-5X4-DZK-BV6-99O

Site Details

Location: 384914 392590

Area: 0.28 ha

Authority: Manchester City Council ↗



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OS MasterMap site plan p.13 >

Aerial image p. 9 >

groundsure.com/insightuserguide ↗

Contact us with any questions at:
info@groundsure.com ↗
01273 257 755

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
14 >	1.1 >	Historical industrial land uses >	3	0	16	2	-
15 >	1.2 >	Historical tanks >	0	0	3	0	-
16 >	1.3 >	Historical energy features >	0	0	8	6	-
17	1.4	Historical petrol stations	0	0	0	0	-
17 >	1.5 >	Historical garages >	0	0	2	2	-
17	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped >	On site	0-50m	50-250m	250-500m	500-2000m
18 >	2.1 >	Historical industrial land uses >	6	0	19	3	-
20 >	2.2 >	Historical tanks >	0	0	7	0	-
20 >	2.3 >	Historical energy features >	0	0	17	11	-
21	2.4	Historical petrol stations	0	0	0	0	-
22 >	2.5 >	Historical garages >	0	0	2	4	-
Page	Section	Waste and landfill >	On site	0-50m	50-250m	250-500m	500-2000m
23	3.1	Active or recent landfill	0	0	0	0	-
23	3.2	Historical landfill (BGS records)	0	0	0	0	-
24	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
24	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
24	3.5	Historical waste sites	0	0	0	0	-
24	3.6	Licensed waste sites	0	0	0	0	-
24 >	3.7 >	Waste exemptions >	0	0	7	4	-
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
26 >	4.1 >	Recent industrial land uses >	0	1	12	-	-
27 >	4.2 >	Current or recent petrol stations >	0	0	0	1	-
28	4.3	Electricity cables	0	0	0	0	-
28	4.4	Gas pipelines	0	0	0	0	-
28	4.5	Sites determined as Contaminated Land	0	0	0	0	-

28	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
28	4.7	Regulated explosive sites	0	0	0	0	-
29	4.8	Hazardous substance storage/usage	0	0	0	0	-
29	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
29	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
29 >	4.11 >	Licensed pollutant release (Part A(2)/B) >	0	0	0	3	-
30 >	4.12 >	Radioactive Substance Authorisations >	0	0	21	0	-
32	4.13	Licensed Discharges to controlled waters	0	0	0	0	-
33	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
33	4.15	Pollutant release to public sewer	0	0	0	0	-
33	4.16	List 1 Dangerous Substances	0	0	0	0	-
33	4.17	List 2 Dangerous Substances	0	0	0	0	-
33 >	4.18 >	Pollution Incidents (EA/NRW) >	0	0	0	3	-
34	4.19	Pollution inventory substances	0	0	0	0	-
34	4.20	Pollution inventory waste transfers	0	0	0	0	-
34 >	4.21 >	Pollution inventory radioactive waste >	0	0	1	0	-

Page	Section	Hydrogeology >	On site	0-50m	50-250m	250-500m	500-2000m
36 >	5.1 >	Superficial aquifer >	Identified (within 500m)				
38 >	5.2 >	Bedrock aquifer >	Identified (within 500m)				
40 >	5.3 >	Groundwater vulnerability >	Identified (within 50m)				
41	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
41	5.5	Groundwater vulnerability- local information	None (within 0m)				
42 >	5.6 >	Groundwater abstractions >	0	0	0	0	1
43	5.7	Surface water abstractions	0	0	0	0	0
43	5.8	Potable abstractions	0	0	0	0	0
43	5.9	Source Protection Zones	0	0	0	0	-
44	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	Hydrology >	On site	0-50m	50-250m	250-500m	500-2000m
45 >	6.1 >	Water Network (OS MasterMap) >	0	0	3	-	-

46	6.2	Surface water features	0	0	0	-	-
46 >	6.3 >	WFD Surface water body catchments >	1	-	-	-	-
46 >	6.4 >	WFD Surface water bodies >	0	0	0	-	-
47 >	6.5 >	WFD Groundwater bodies >	1	-	-	-	-
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
48	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
49 >	7.2 >	Historical Flood Events >	0	0	2	-	-
49	7.3	Flood Defences	0	0	0	-	-
49	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
50	7.5	Flood Storage Areas	0	0	0	-	-
51	7.6	Flood Zone 2	None (within 50m)				
51	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding >					
52 >	8.1 >	Surface water flooding >	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding >					
54 >	9.1 >	Groundwater flooding >	Moderate-High (within 50m)				
Page	Section	Environmental designations >	On site	0-50m	50-250m	250-500m	500-2000m
55	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
56	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
56	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
56	10.4	Special Protection Areas (SPA)	0	0	0	0	0
56	10.5	National Nature Reserves (NNR)	0	0	0	0	0
57 >	10.6 >	Local Nature Reserves (LNR) >	0	0	0	0	1
57 >	10.7 >	Designated Ancient Woodland >	0	0	0	0	2
57	10.8	Biosphere Reserves	0	0	0	0	0
58	10.9	Forest Parks	0	0	0	0	0
58	10.10	Marine Conservation Zones	0	0	0	0	0
58 >	10.11 >	Green Belt >	0	0	0	0	1
58	10.12	Proposed Ramsar sites	0	0	0	0	0

59	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
59	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
59	10.15	Nitrate Sensitive Areas	0	0	0	0	0
59	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
60 >	10.17 >	SSSI Impact Risk Zones >	1	-	-	-	-
61	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations >	On site	0-50m	50-250m	250-500m	500-2000m
62	11.1	World Heritage Sites	0	0	0	-	-
63	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
63	11.3	National Parks	0	0	0	-	-
63 >	11.4 >	Listed Buildings >	0	0	2	-	-
64 >	11.5 >	Conservation Areas >	0	1	0	-	-
64	11.6	Scheduled Ancient Monuments	0	0	0	-	-
64	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations >	On site	0-50m	50-250m	250-500m	500-2000m
65 >	12.1 >	Agricultural Land Classification >	Urban (within 250m)				
66	12.2	Open Access Land	0	0	0	-	-
66	12.3	Tree Felling Licences	0	0	0	-	-
66	12.4	Environmental Stewardship Schemes	0	0	0	-	-
66	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
67	13.1	Priority Habitat Inventory	0	0	0	-	-
67	13.2	Habitat Networks	0	0	0	-	-
67	13.3	Open Mosaic Habitat	0	0	0	-	-
67	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
68 >	14.1 >	10k Availability >	Identified (within 500m)				
69	14.2	Artificial and made ground (10k)	0	0	0	0	-
70 >	14.3 >	Superficial geology (10k) >	1	0	2	1	-

71	14.4	Landslip (10k)	0	0	0	0	-
72 >	14.5 >	Bedrock geology (10k) >	1	1	2	2	-
73 >	14.6 >	Bedrock faults and other linear features (10k) >	0	1	1	1	-
Page	Section	**Geology 1:50,000 scale** >	On site	0-50m	50-250m	250-500m	500-2000m
74 >	15.1 >	50k Availability >	Identified (within 500m)				
75	15.2	Artificial and made ground (50k)	0	0	0	0	-
75	15.3	Artificial ground permeability (50k)	0	0	-	-	-
76 >	15.4 >	Superficial geology (50k) >	1	0	1	1	-
77 >	15.5 >	Superficial permeability (50k) >	Identified (within 50m)				
77	15.6	Landslip (50k)	0	0	0	0	-
77	15.7	Landslip permeability (50k)	None (within 50m)				
78 >	15.8 >	Bedrock geology (50k) >	1	1	0	2	-
79 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
79 >	15.10 >	Bedrock faults and other linear features (50k) >	0	1	0	1	-
Page	Section	**Boreholes** >	On site	0-50m	50-250m	250-500m	500-2000m
80 >	16.1 >	BGS Boreholes >	0	6	33	-	-
Page	Section	**Natural ground subsidence** >					
83 >	17.1 >	Shrink swell clays >	Very low (within 50m)				
84 >	17.2 >	Running sands >	Very low (within 50m)				
85 >	17.3 >	Compressible deposits >	Negligible (within 50m)				
86 >	17.4 >	Collapsible deposits >	Very low (within 50m)				
87 >	17.5 >	Landslides >	Very low (within 50m)				
88 >	17.6 >	Ground dissolution of soluble rocks >	Negligible (within 50m)				
Page	Section	**Mining and ground workings** >	On site	0-50m	50-250m	250-500m	500-2000m
90	18.1	BritPits	0	0	0	0	-
91 >	18.2 >	Surface ground workings >	0	0	2	-	-
91	18.3	Underground workings	0	0	0	0	0
91	18.4	Underground mining extents	0	0	0	0	-
91	18.5	Historical Mineral Planning Areas	0	0	0	0	-

92	18.6	Non-coal mining	0	0	0	0	0
92 >	18.7 >	JPB mining areas >	Identified (within 0m)				
92	18.8	The Coal Authority non-coal mining	0	0	0	0	-
92	18.9	Researched mining	0	0	0	0	-
93	18.10	Mining record office plans	0	0	0	0	-
93	18.11	BGS mine plans	0	0	0	0	-
93	18.12	Coal mining	None (within 0m)				
93	18.13	Brine areas	None (within 0m)				
94	18.14	Gypsum areas	None (within 0m)				
94	18.15	Tin mining	None (within 0m)				
94	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
95	19.1	Natural cavities	0	0	0	0	-
95	19.2	Mining cavities	0	0	0	0	0
95	19.3	Reported recent incidents	0	0	0	0	-
95	19.4	Historical incidents	0	0	0	0	-
96	19.5	National karst database	0	0	0	0	-
Page	Section	Radon >					
97 >	20.1 >	Radon >	Less than 1% (within 0m)				
Page	Section	Soil chemistry >	On site	0-50m	50-250m	250-500m	500-2000m
99 >	21.1 >	BGS Estimated Background Soil Chemistry >	1	1	-	-	-
99	21.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
99	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects >	On site	0-50m	50-250m	250-500m	500-2000m
100	22.1	Underground railways (London)	0	0	0	-	-
100	22.2	Underground railways (Non-London)	0	0	0	-	-
101	22.3	Railway tunnels	0	0	0	-	-
101	22.4	Historical railway and tunnel features	0	0	0	-	-
101	22.5	Royal Mail tunnels	0	0	0	-	-

101	22.6	Historical railways	0	0	0	-	-
101	22.7	Railways	0	0	0	-	-
102	22.8	Crossrail 1	0	0	0	0	-
102	22.9	Crossrail 2	0	0	0	0	-
102 >	**22.10 >**	**HS2 >**	0	0	1	0	-

Recent aerial photograph



Capture Date: 22/04/2019

Site Area: 0.28ha

Recent site history - 2015 aerial photograph



Capture Date: 11/06/2015

Site Area: 0.28ha

Recent site history - 2009 aerial photograph



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Capture Date: 02/06/2009

Site Area: 0.28ha

Recent site history - 2000 aerial photograph



Capture Date: 27/06/2000

Site Area: 0.28ha

OS MasterMap site plan



Site Area: 0.28ha

1 Past land use



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

1.1 Historical industrial land uses

Records within 500m	21

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Hospital**	**1934 - 1966**	**866582**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Hospital**	**1988**	**915943**
A	**On site**	**Hospital**	**1978**	**937402**
B	69m SE	Hospital	1983	885335
B	69m SE	Hospital	1989	953034
D	101m N	Electricity Substation	1923	837775
D	105m N	Police Station	1905	832604
E	131m N	Electricity Substation	1916	837776
D	132m N	Police Station	1923	963531
D	134m N	Police Station	1916	853406
D	139m N	Police Station	1892	893832
D	143m N	Police Station	1911	967729
D	146m N	Fire Station	1988	952196
D	146m N	Police Station	1966	985287
D	148m N	Police Station	1978	850586
D	163m N	Fire Station	1966 - 1978	897537
2	202m S	Laundry	1916 - 1923	918549
G	209m SE	Nursery	1955	956141
G	217m SE	Nursery	1934 - 1938	979927
I	414m SE	Laundry	1916 - 1923	867993
6	440m N	Police Station	1988	832603

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**3**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
C	92m W	Tanks	1974 - 1997	125503
C	93m W	Tanks	1984 - 1992	145189
C	94m W	Unspecified Tank	1993 - 1997	128640

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**14**

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
C	109m W	Electricity Substation	1974 - 1997	84021
C	110m W	Electricity Substation	1984 - 1992	82514
E	138m N	Electricity Substation	1984 - 1997	70891
E	152m N	Electricity Substation	1974	74354
E	155m N	Electricity Transformers	1984	63458
F	157m S	Electricity Substation	1996	62382
F	157m S	Electricity Transformer	1974	63787
1	179m SW	Electricity Substation	1984 - 1997	75794
H	345m NE	Electricity Substation	1982 - 1992	75397
H	345m NE	Electricity Substation	1958	70944
5	376m W	Electricity Substation	1974 - 1996	75311
7	447m S	Electricity Substation	1974 - 1996	74177
8	460m NW	Electricity Substation	1992	77878
I	488m SE	Electricity Substation	1982 - 1992	67764

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	4

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
F	174m S	Garage	1957	20354
F	217m S	Garage	1957	20355
3	271m NW	Garage	1974 - 1984	24704
4	315m NW	Garage	1974 - 1984	27274

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m	0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



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Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

2.1 Historical industrial land uses

Records within 500m	28

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18 >**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Hospital**	**1938**	**866582**
A	**On site**	**Hospital**	**1934**	**866582**
A	**On site**	**Hospital**	**1955**	**866582**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Hospital**	**1978**	**937402**
A	**On site**	**Hospital**	**1966**	**866582**
A	**On site**	**Hospital**	**1988**	**915943**
B	69m SE	Hospital	1983	885335
B	69m SE	Hospital	1989	953034
D	101m N	Electricity Substation	1923	837775
D	105m N	Police Station	1905	832604
E	131m N	Electricity Substation	1916	837776
D	132m N	Police Station	1923	963531
D	134m N	Police Station	1916	853406
D	139m N	Police Station	1892	893832
D	143m N	Police Station	1911	967729
D	146m N	Police Station	1966	985287
D	146m N	Fire Station	1988	952196
D	148m N	Police Station	1978	850586
D	163m N	Fire Station	1966	897537
D	163m N	Fire Station	1978	897537
F	202m S	Laundry	1923	918549
H	209m SE	Nursery	1955	956141
H	217m SE	Nursery	1938	979927
H	217m SE	Nursery	1934	979927
F	224m S	Laundry	1916	918549
M	414m SE	Laundry	1916	867993
M	423m SE	Laundry	1923	867993
1	440m N	Police Station	1988	832603

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	7

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18 >**

ID	Location	Land Use	Date	Group ID
C	92m W	Tanks	1974	125503
C	93m W	Tanks	1984	145189
C	93m W	Tanks	1992	145189
C	93m W	Tanks	1993	125503
C	93m W	Tanks	1997	125503
C	94m W	Unspecified Tank	1993	128640
C	94m W	Unspecified Tank	1997	128640

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m	28

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18 >**

ID	Location	Land Use	Date	Group ID
C	109m W	Electricity Substation	1974	84021
C	109m W	Electricity Substation	1993	84021
C	109m W	Electricity Substation	1997	84021
C	110m W	Electricity Substation	1984	82514
C	110m W	Electricity Substation	1992	82514
E	138m N	Electricity Substation	1984	70891
E	138m N	Electricity Substation	1992	70891

ID	Location	Land Use	Date	Group ID
E	139m N	Electricity Substation	1993	70891
E	139m N	Electricity Substation	1997	70891
E	152m N	Electricity Substation	1974	74354
E	155m N	Electricity Transformers	1984	63458
F	157m S	Electricity Substation	1996	62382
F	157m S	Electricity Transformer	1974	63787
G	179m SW	Electricity Substation	1993	75794
G	179m SW	Electricity Substation	1997	75794
G	179m SW	Electricity Substation	1984	75794
G	179m SW	Electricity Substation	1992	75794
K	345m NE	Electricity Substation	1982	75397
K	345m NE	Electricity Substation	1992	75397
K	345m NE	Electricity Substation	1958	70944
L	376m W	Electricity Substation	1974	75311
L	376m W	Electricity Substation	1996	75311
N	447m S	Electricity Substation	1996	74177
N	448m S	Electricity Substation	1974	74177
O	460m NW	Electricity Substation	1992	77878
O	460m NW	Electricity Substation	1992	77878
M	488m SE	Electricity Substation	1982	67764
M	490m SE	Electricity Substation	1992	67764

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	6

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 18 >**

ID	Location	Land Use	Date	Group ID
F	174m S	Garage	1957	20354
F	217m S	Garage	1957	20355
I	271m NW	Garage	1974	24704
I	272m NW	Garage	1984	24704
J	315m NW	Garage	1984	27274
J	315m NW	Garage	1974	27274

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



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3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	0

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	0

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m	11

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

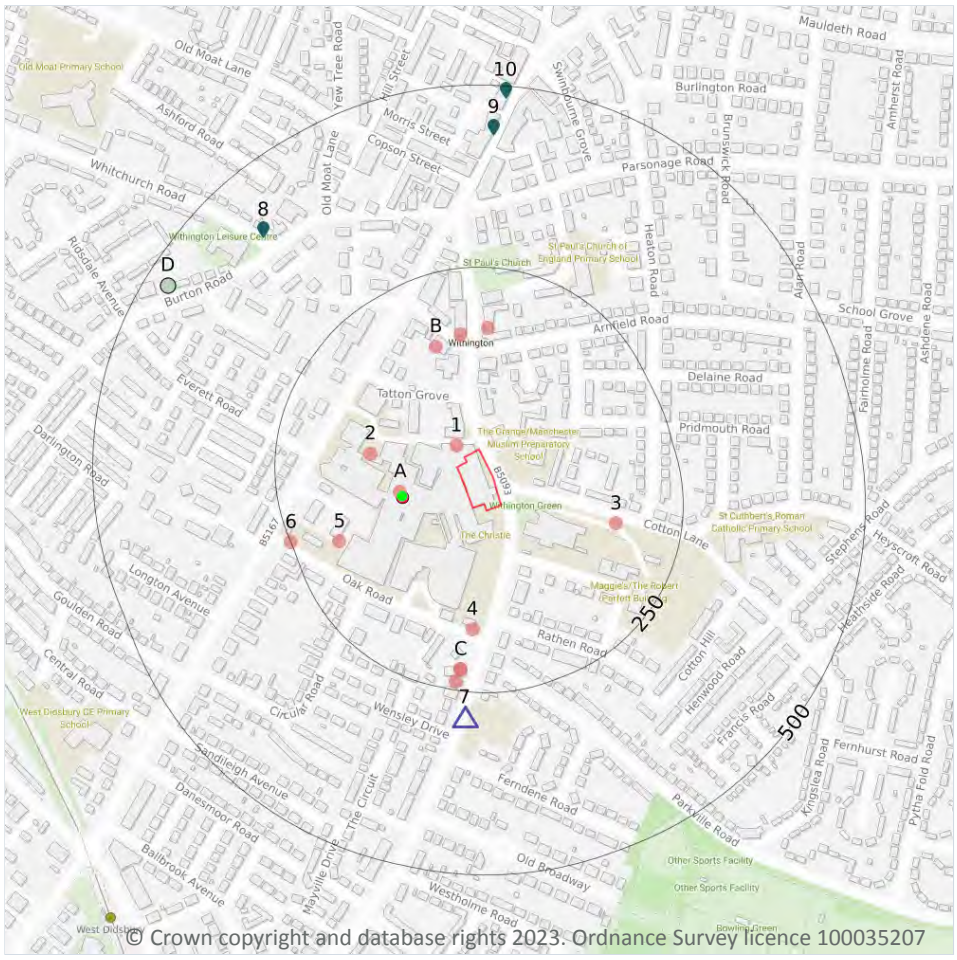
Features are displayed on the Waste and landfill map on **page 23 >**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	71m SE	555, WILMSLOW ROAD, MANCHESTER, M20 4GJ	WEX197684	Using waste exemption	Not on a farm	Use of waste in construction

ID	Location	Site	Reference	Category	Sub-Category	Description
A	71m SE	555, WILMSLOW ROAD, MANCHESTER, M20 4GJ	WEX197684	Storing waste exemption	Not on a farm	Storage of waste in a secure place
B	81m W	The Christie Private Care Pharmacy Dept, Wilmslow Road, Manchester, M20 4BX	WEX166515	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
B	82m W	Christie Hospital NHS Trust Wilmslow Road Manchester Lancs M20 4BX	EPR/DF0931EC /A001	Treating waste exemption	Non-Agricultural Waste Only	Crushing waste fluorescent tubes
B	85m W	550, WILMSLOW ROAD, MANCHESTER, M20 4BX	WEX076137	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
B	85m W	HCA International - The Christie Clinic, Pharmacy Department, 3rd Floor Oak Road Treatment Centre, Manchester, M20 4BX	WEX012986	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
B	85m W	550, WILMSLOW ROAD, MANCHESTER, M20 4BX	WEX327395	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
C	404m N	8, COPSON STREET, MANCHESTER, M20 3HE	WEX092955	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
C	404m N	8, COPSON STREET, MANCHESTER, M20 3HE	WEX364185	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
C	404m N	8, COPSON STREET, MANCHESTER, M20 3HE	WEX237730	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal
1	458m N	Wilmslow Road Pharmacy, 480 Wilmslow Road, Withington, Manchester, M20 3BG	WEX327968	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



4.1 Recent industrial land uses

Records within 250m	13

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Company	Address	Activity	Category
1	20m NW	Gas Governor Station	Greater Manchester, M20	Gas Features	Infrastructure and Facilities
A	85m W	The Christie Clinic	550, Wilmslow Road, Manchester, Greater Manchester, M20 4BX	Hospitals	Health Practitioners and Establishments

ID	Location	Company	Address	Activity	Category
2	121m W	Electricity Sub Station	Greater Manchester, M20	Electrical Features	Infrastructure and Facilities
B	153m N	Electricity Sub Station	Greater Manchester, M20	Electrical Features	Infrastructure and Facilities
3	160m E	Electricity Sub Station	Greater Manchester, M20	Electrical Features	Infrastructure and Facilities
B	160m N	P C Centre Northwest Ltd	528, Wilmslow Road, Manchester, Greater Manchester, M20 4BT	Electrical Equipment Repair and Servicing	Repair and Servicing
4	164m S	Electricity Sub Station	Greater Manchester, M20	Electrical Features	Infrastructure and Facilities
B	167m N	Withington Fire Station	507, Wilmslow Road, Manchester, Greater Manchester, M20 4AW	Fire Brigade Stations	Central and Local Government
5	188m SW	Electricity Sub Station	Greater Manchester, M20	Electrical Features	Infrastructure and Facilities
C	221m S	Alpinos Cars Ltd	568, Wilmslow Road, Manchester, Greater Manchester, M20 3DB	Secondhand Vehicles	Motoring
C	221m S	Manor Park Garage	568, Wilmslow Road, Manchester, Greater Manchester, M20 3DB	Vehicle Repair, Testing and Servicing	Repair and Servicing
C	238m S	Top Shine Car Wash	Didsbury Car Wash, 570-572, Wilmslow Road, Manchester, Greater Manchester, M20 3DB	Vehicle Cleaning Services	Personal, Consumer and Other Services
6	250m W	Electricity Sub Station	Greater Manchester, M20	Electrical Features	Infrastructure and Facilities

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m **1**

Open, closed, under development and obsolete petrol stations.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Company	Address	LPG	Status
7	285m S	OBSOLETE	568, Wilmslow Road, Withington, Manchester, Greater Manchester, M20 3DB	Not Applicable	Obsolete

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m	3

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Address	Details	
8	416m NW	LMS Cleaners, 4 Withington Road, Withington, Manchester, M20 1FX	Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
9	442m N	Gregory's Laundry And Drycleaners, 465 Wilmslow Road, Withington, Manchester, M20 3BG	Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

ID	Location	Address	Details	
10	494m N	Johnsons Cleaners UK Ltd, 440-442 Wilslow Road, Withington, Manchester M14 5AG	Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	**21**

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Address	Details	
A	85m W	University Of Manchester, Christie Hospital,wilmslow Road, Manchester, M20 4BX	Operator: University Of Manchester Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: BZ5701 Date of approval: 03/10/2005	Effective from: 03/10/2005 Last date of update: 06/01/2006 Status: Effective
A	85m W	Christie Nhs Foundation Trust, Christie Hospital,wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: AB1479 Date of approval: 10/11/1998	Effective from: 10/11/1998 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital,wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: AB1479 Date of approval: 27/04/2004	Effective from: 27/04/2004 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital,wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: AB1479 Date of approval: 03/02/2006	Effective from: 03/02/2006 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital,wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: AB1479 Date of approval: 31/05/2007	Effective from: 31/05/2007 Last date of update: 01/01/2015 Status: Superseded By Variation

ID	Location	Address	Details	
A	85m W	Christie Nhs Foundation Trust, Christie Hospital,wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: AB1479 Date of approval: 14/07/2008	Effective from: 14/07/2008 Last date of update: 01/01/2015 Status: Revoked/cancelled
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 31/03/1991	Effective from: 31/03/1991 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 20/06/1994	Effective from: 20/07/1994 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 10/11/1998	Effective from: 07/12/1998 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 17/08/2000	Effective from: 13/09/2000 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 01/12/2003	Effective from: 01/01/2004 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 07/04/2005	Effective from: 04/05/2005 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 03/02/2006	Effective from: 03/03/2006 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 31/05/2007	Effective from: 28/07/2007 Last date of update: 01/01/2015 Status: Superseded By Variation

ID	Location	Address	Details	
A	85m W	Christie Nhs Foundation Trust, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: Christie Nhs Foundation Trust Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: AB9607 Date of approval: 15/07/2008	Effective from: 15/07/2008 Last date of update: 01/01/2015 Status: Revoked/cancelled
A	85m W	University Of Manchester, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: University Of Manchester Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: BV6099 Date of approval: 08/09/2003	Effective from: 08/09/2003 Last date of update: 01/01/2015 Status: Revoked/cancelled
A	85m W	University Of Manchester, Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: University Of Manchester Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: BZ5710 Date of approval: 15/09/2005	Effective from: 03/10/2005 Last date of update: 01/01/2015 Status: Superseded By Variation
A	85m W	Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: The University of Manchester Type: Keeping And Use Of Radioactive Materials (was Rsa60 Section 1). Permission number: BZ5698 Date of approval: 03/10/2005	Effective from: - Last date of update: 01/01/2020 Status: Replaced
A	85m W	Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: The University of Manchester Type: - Permission number: AB3598DE Date of approval: -	Effective from: 27/02/2019 Last date of update: 01/01/2020 Status: Issued
A	85m W	Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: The University of Manchester Type: Disposal Of Radioactive Waste (was Rsa60 Section 6). Permission number: CD6748 Date of approval: 02/06/2009	Effective from: - Last date of update: 01/01/2020 Status: Replaced
A	85m W	Christie Hospital, Wilmslow Road, Manchester, M20 4BX	Operator: The Christie NHS Foundation Trust Type: - Permission number: GP3593SX Date of approval: -	Effective from: 13/07/2018 Last date of update: 01/01/2020 Status: Issued

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m	**0**

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	0

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	0

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m	3

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Details	
D	469m NW	Incident Date: 02/04/2001 Incident Identification: 1406 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
D	469m NW	Incident Date: 02/04/2001 Incident Identification: 1406 Pollutant: Specific Waste Materials:Other Pollutant Pollutant Description: Tyres:Other	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
D	469m NW	Incident Date: 02/04/2001 Incident Identification: 1406 Pollutant: Specific Waste Materials Pollutant Description: Tyres	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m	0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m	0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.21 Pollution inventory radioactive waste

Records within 500m	1

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

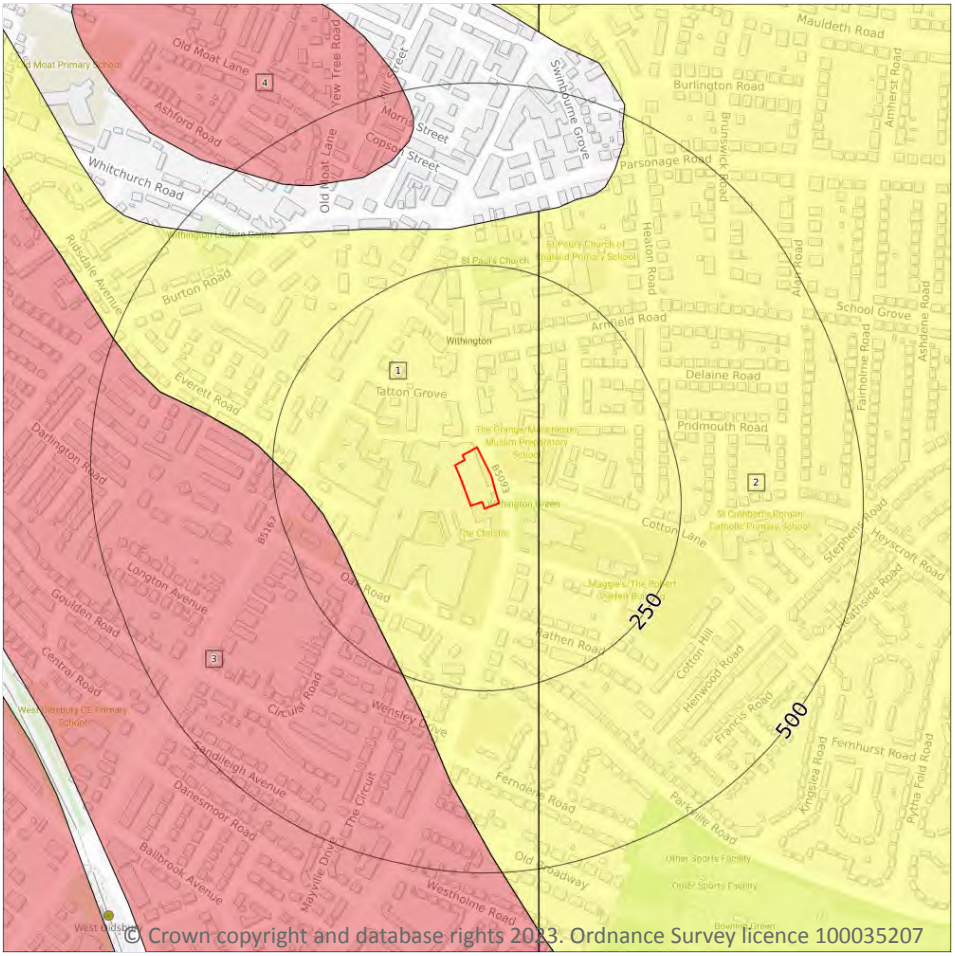
Features are displayed on the Current industrial land use map on **page 26 >**

ID: A, Location: 86m W, Permit: GP3593SX
Operator: The Christie NHS Foundation Trust
Address: Christie Hospital, Wilmslow Road, Manchester M20 4BX
Releases:

Route	Substance	Quantity released
Wastewater	Yttrium 90	1.32GBq -
Wastewater	Technetium 99m	231.87GBq -
Wastewater	Iodine 123	5.6GBq -
Wastewater	Other Beta/Gamma	16.38GBq -
Air	Argon 41	- -
Wastewater	Iodine 131	649.29GBq -
Wastewater	Total Alpha	927MBq -
Wastewater	Total Beta/Gamma (Excl Tritium)	1742.08GBq -
Wastewater	Fluorine 18	129.55GBq -
Wastewater	Lutetium-177	708.1GBq -
Wastewater	Radium-223	927MBq -
Air	Tritium	- -

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Hydrogeology - Superficial aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

5.1 Superficial aquifer

Records within 500m	4

Aquifer status of groundwater held within superficial geology.

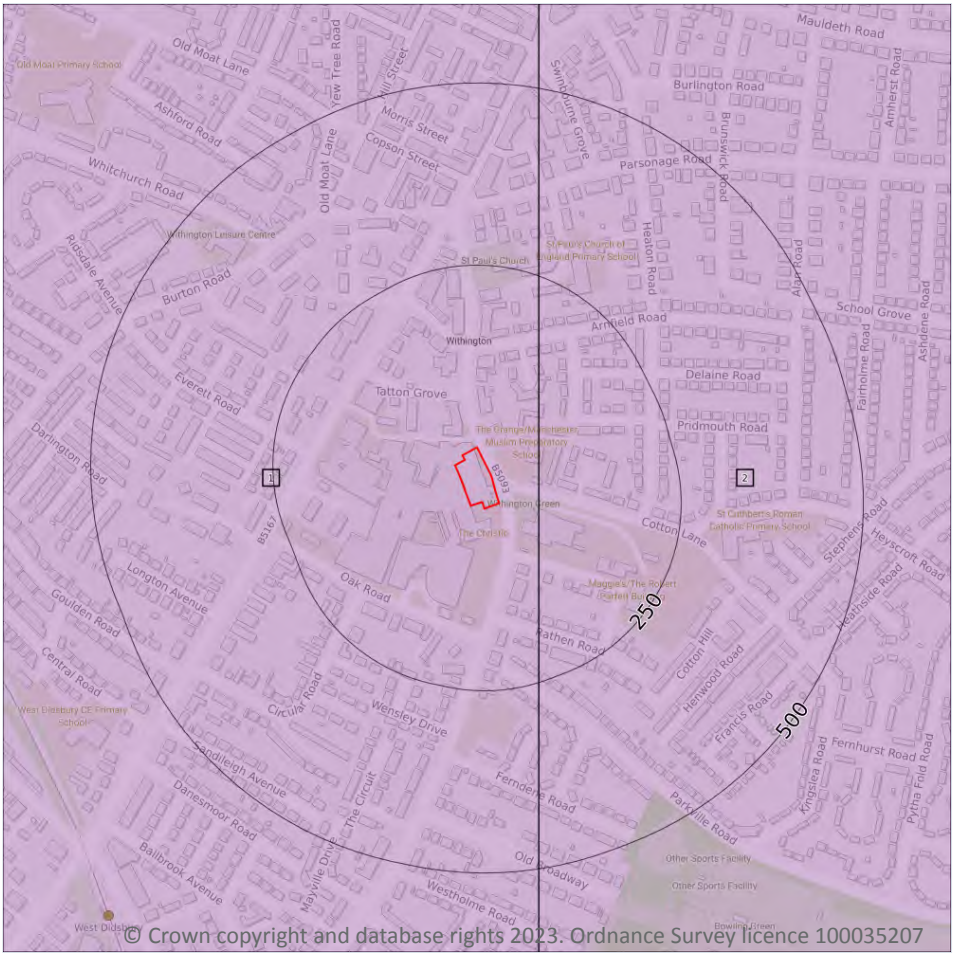
Features are displayed on the Hydrogeology map on **page 36 >**

ID	Location	Designation	Description
1	**On site**	**Secondary Undifferentiated**	**Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type**
2	55m E	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

ID	Location	Designation	Description
3	185m SW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
4	402m N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



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Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive

5.2 Bedrock aquifer

Records within 500m	2

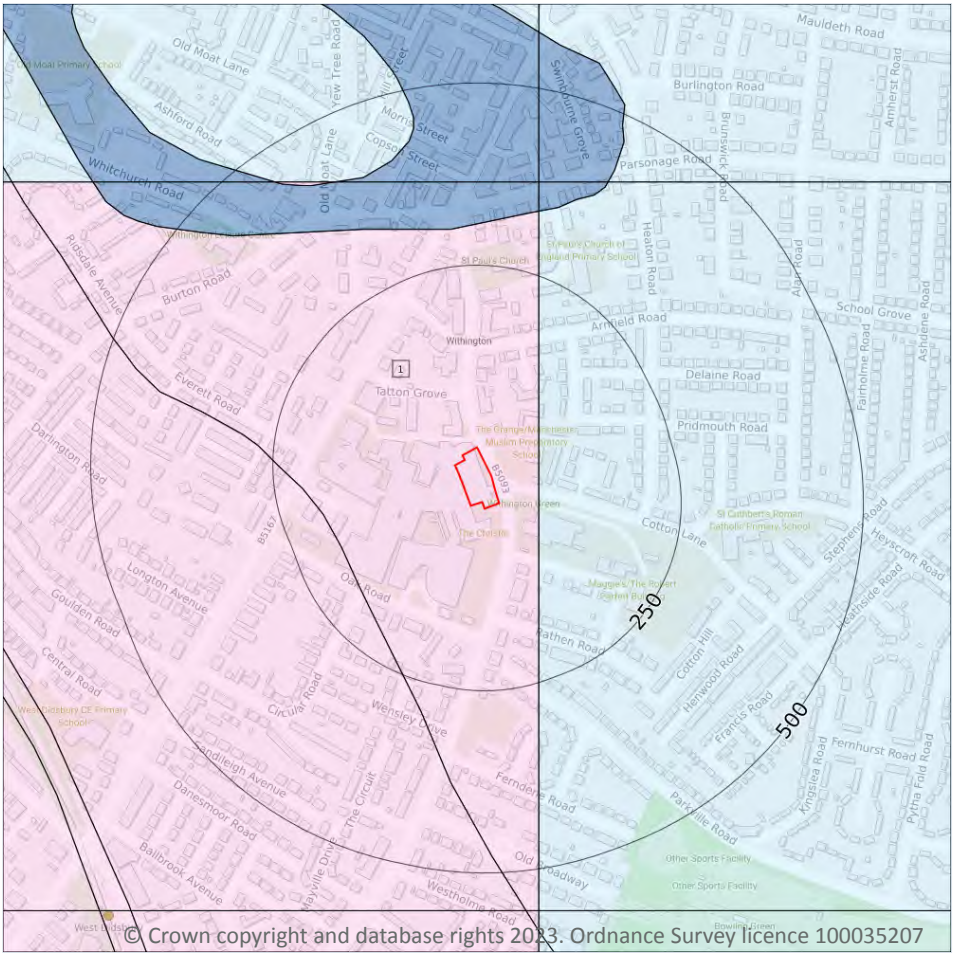
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 38 >**

ID	Location	Designation	Description
1	**On site**	**Principal**	**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. Generally principal aquifers were previously major aquifers**
2	55m E	Principal	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. Generally principal aquifers were previously major aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	1

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 40 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	**On site**	**Summary Classification: Secondary superficial aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer**	**Leaching class: Low Infiltration value: >70% Dilution value: 300-550mm/year**	**Vulnerability: Medium Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: High**	**Vulnerability: Low Aquifer type: Principal Flow mechanism: Mixed**

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	**0**

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

Records on site	**0**

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk ↗.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



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Site Outline

Search buffers in metres (m)

- Source Protection Zone 1 — Inner catchment
- Source Protection Zone 2 — Outer catchment
- Source Protection Zone 3 — Total catchment
- Source Protection Zone 4 — Zone of Special Interest
- Source Protection Zone 1c — Inner catchment - confined aquifer
- Source Protection Zone 2c — Outer catchment - confined aquifer
- Source Protection Zone 3c — Total catchment - confined aquifer
- Drinking water abstraction licences
- Drinking water abstraction licences — Polygon features
- Drinking water abstraction licences — Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

5.6 Groundwater abstractions

Records within 2000m	1

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 42 >**

ID	Location	Details	
-	1795m E	Status: Historical Licence No: 2569013021 Details: Laundry Use Direct Source: Ground Water - North West Region Point: BURNAGE LANE, LEVENSHULME, MANCHESTER Data Type: Point Name: OCS GROUP UK LTD T/A CANNON Easting: 386720 Northing: 392830	Annual Volume (m^3): 91000 Max Daily Volume (m^3): 350 Original Application No: - Original Start Date: 19/03/2004 Expiry Date: 31/03/2014 Issue No: 2 Version Start Date: 17/01/2008 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	**0**

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m	**0**

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m	**0**

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

Records within 500m	0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

6 Hydrology



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Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m	3

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 45 >**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	179m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Shaw Brook

ID	Location	Type of water feature	Ground level	Permanence	Name
A	226m N	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	Shaw Brook
A	227m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Shaw Brook

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	0

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	1

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 45 >**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	**On site**	**River**	**Chorlton Brook (Princess Parkway to Mersey)**	**GB112069061040**	**Bollin Dean Mersey Upper**	**Mersey Upper**

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	1

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the

previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

Features are displayed on the Hydrology map on **page 45 >**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
-	1386m NW	River	Chorlton Brook (Princess Parkway to Mersey)	GB112069061040 ↗	Moderate	Fail	Moderate	2019

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	**1**

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

Features are displayed on the Hydrology map on **page 45 >**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
2	**On site**	**Manchester and East Cheshire Permo-Triassic Sandstone Aquifers**	**GB41201G101100 ↗**	**Poor**	**Poor**	**Poor**	**2019**

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding



Site Outline

Search buffers in metres (m)

River and coastal flooding:

- High
- Medium
- Low
- Very Low
- Historical Flood Events
- Areas Used for Flood Storage
- Areas Benefiting from Flood Defences
- Flood Defences

7.1 Risk of flooding from rivers and the sea

Records within 50m	0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m	2

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

Features are displayed on the River and coastal flooding map on **page 48 >**

ID	Location	Event name	Date of flood	Flood source	Flood cause	Type of flood
1	197m N	Shab	2000-11-16 2000-11-17	Unknown	Other	No data
2	231m NE	Ea01317_10 August 2004_Shaw Brook	2004-08-10 2004-08-11	Main river	Local drainage/surface water	Fluvial

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m	0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m	0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 Flood Storage Areas

Records within 250m	0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

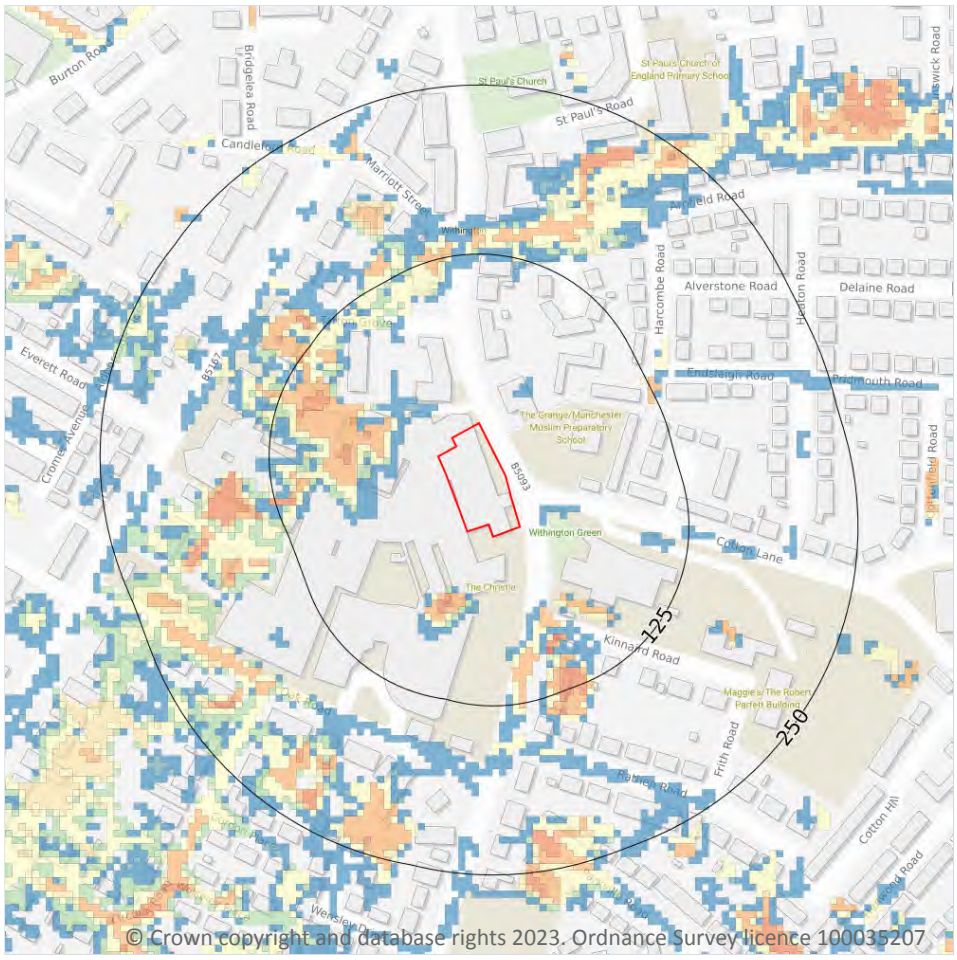
7.7 Flood Zone 3

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**Negligible**
Highest risk within 50m	**1 in 30 year, 0.3m - 1.0m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 52 >**

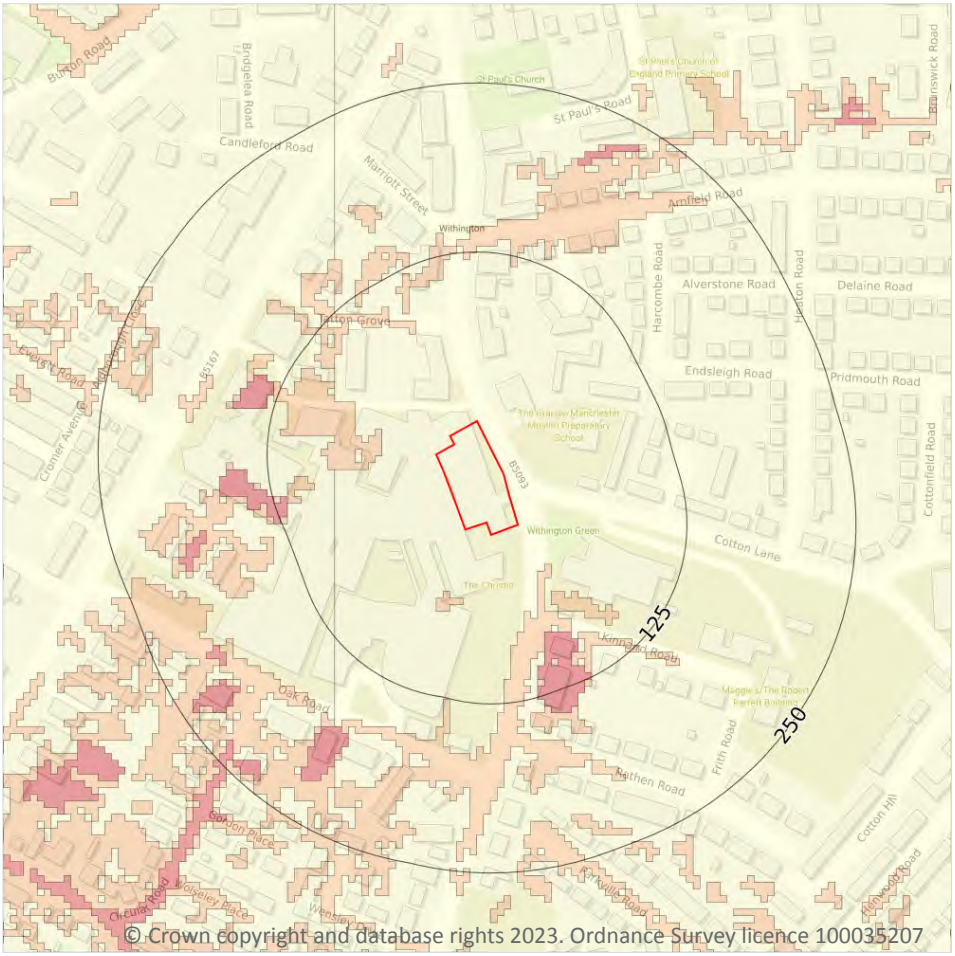
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on

a site. The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Negligible
1 in 250 year	Negligible
1 in 100 year	Negligible
1 in 30 year	Negligible

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



9.1 Groundwater flooding

Highest risk on site	**Moderate**
Highest risk within 50m	**Moderate-High**

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 54 >**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	0

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m	0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m	0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m	1

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

Features are displayed on the Environmental designations map on **page 55 >**

ID	Location	Name	Data source
-	1890m SE	Heaton Mersey Common	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m	2

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 55 >**

ID	Location	Name	Woodland Type
-	1742m NW	Hough End Clough	Ancient & Semi-Natural Woodland
-	1812m NW	Hough End Clough	Ancient & Semi-Natural Woodland

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.8 Biosphere Reserves

Records within 2000m	0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m	0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.11 Green Belt

Records within 2000m	1

Areas designated to prevent urban sprawl by keeping land permanently open.

Features are displayed on the Environmental designations map on **page 55 >**

ID	Location	Name	Local Authority name
1	1593m SW	Merseyside and Greater Manchester	Manchester

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m	0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units



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Site Outline

Search buffers in metres (m)

SSSI Impact Risk Zones

SSSI Units

- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

10.17 SSSI Impact Risk Zones

Records on site	1

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 60 >**

ID	Location	Type of developments requiring consultation
1	On site	**Air pollution - Livestock & poultry units with floorspace > 500m², slurry lagoons & digestate stores > 4000m². Combustion - General combustion processes >50MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.**

This data is sourced from Natural England.

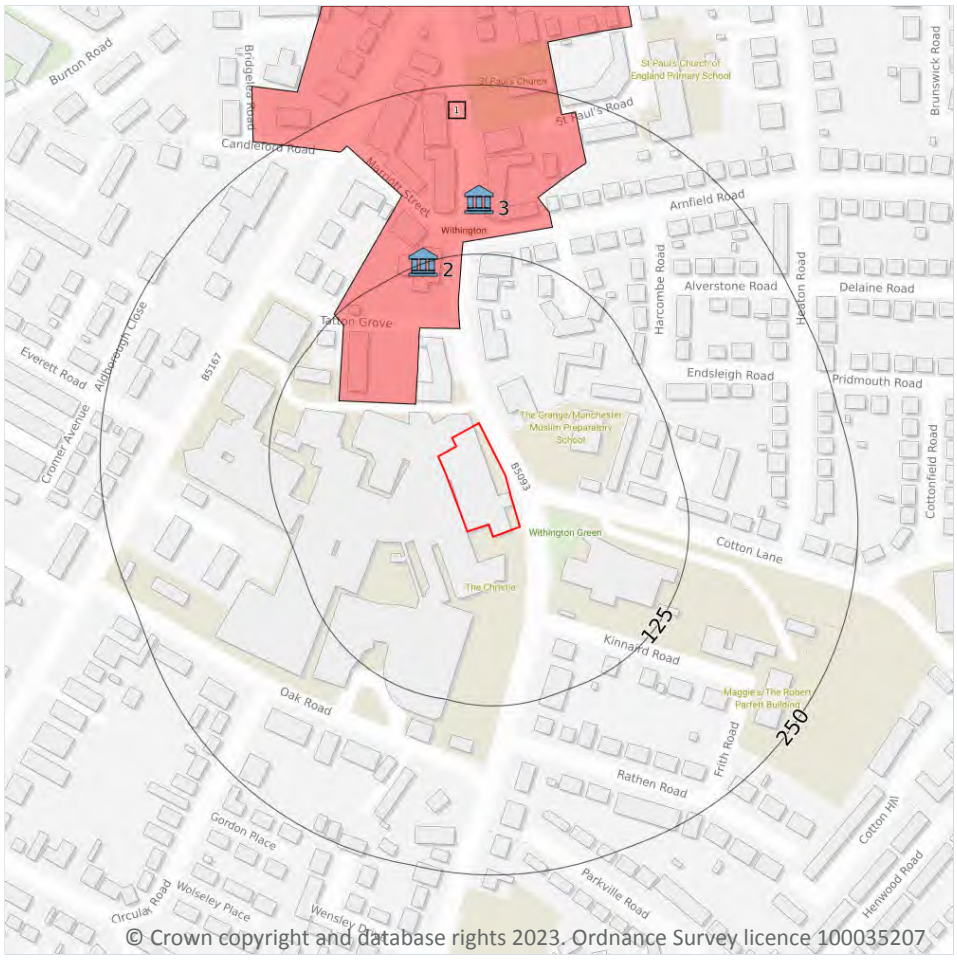
10.18 SSSI Units

Records within 2000m	0

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations



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Site Outline

Search buffers in metres (m)

- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

11.1 World Heritage Sites

Records within 250m	0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m	0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m	2

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

Features are displayed on the Visual and cultural designations map on **page 62 >**

ID	Location	Name	Grade	Reference Number	Listed date
2	126m N	Red Lion Inn	II	1270511	03/10/1974
3	165m N	Milestone Adjacent To Withington Fire Station	II	1415631	24/10/2013

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m	1

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

Features are displayed on the Visual and cultural designations map on **page 62 >**

ID	Location	Name	District	Date of designation
1	37m NW	Withington	Manchester	01/07/1983

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m	0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

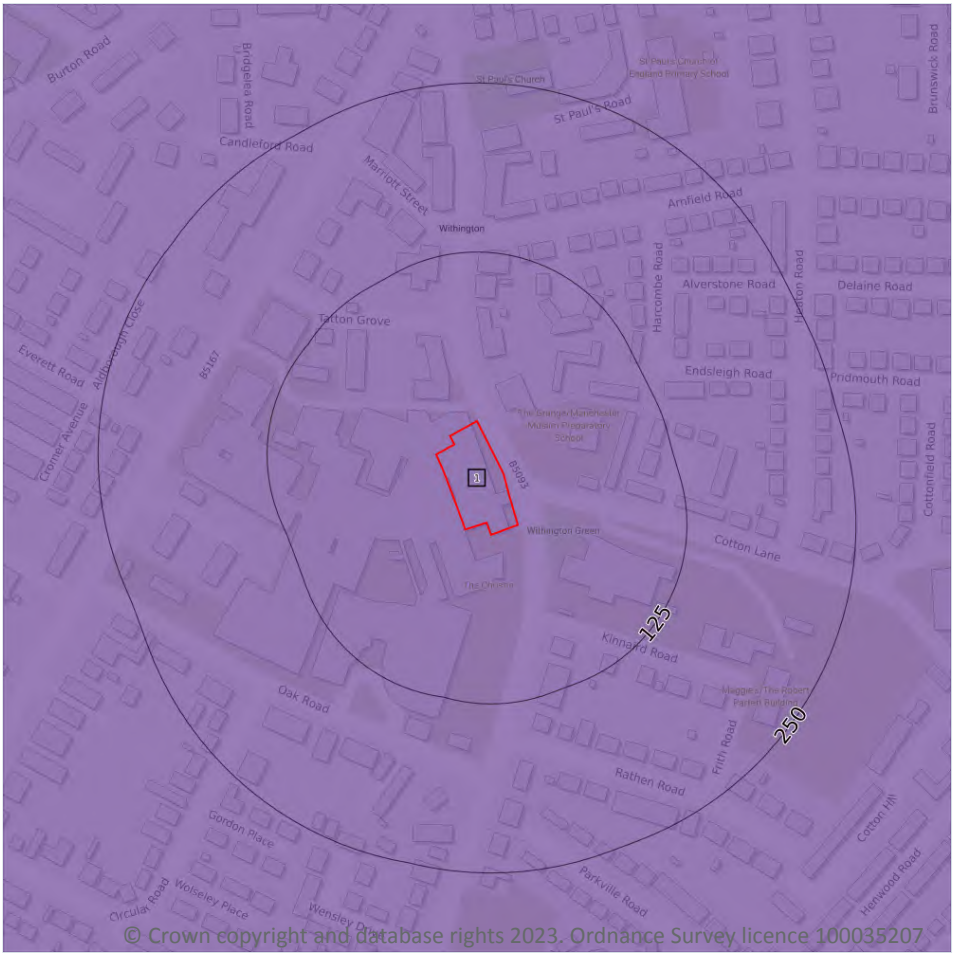
11.7 Registered Parks and Gardens

Records within 250m	0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	1

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 65 >**

ID	Location	Classification	Description
1	**On site**	**Urban**	-

This data is sourced from Natural England.

12.2 Open Access Land

Records within 250m	0

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	0

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m	0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

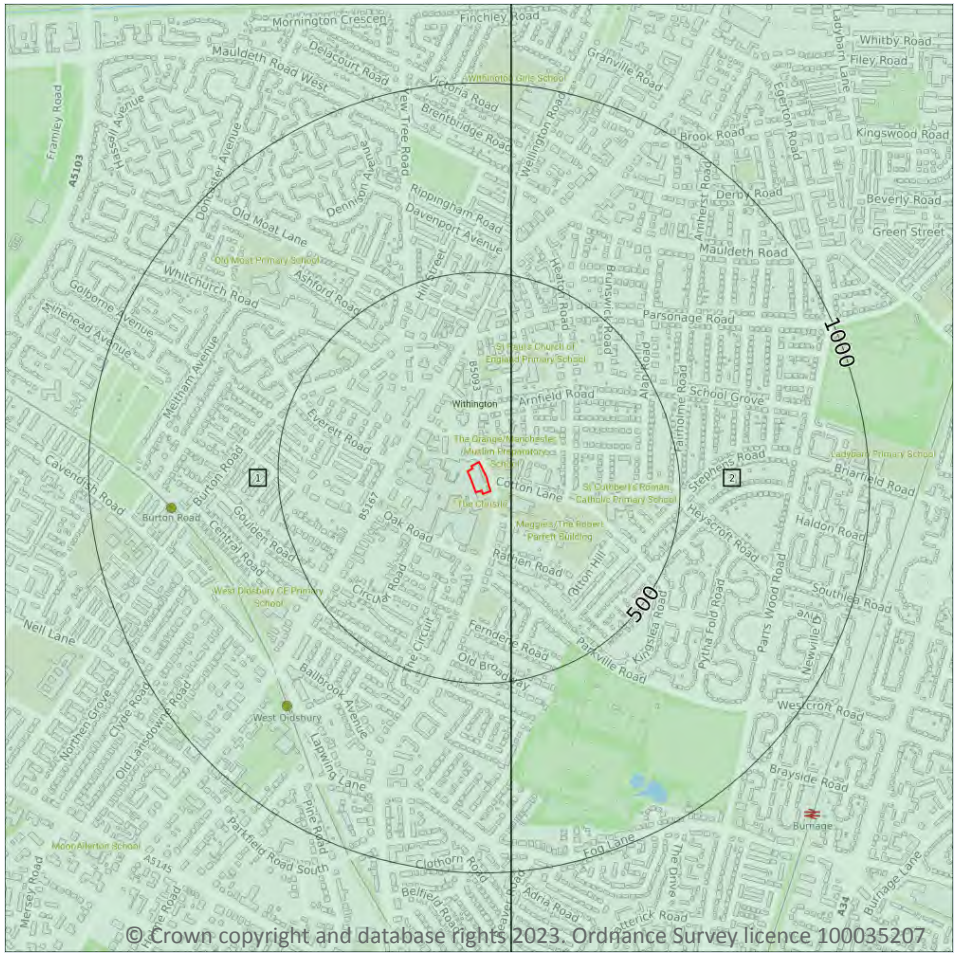
13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



Site Outline

Search buffers in metres (m)

Full coverage

Partial coverage

No coverage

14.1 10k Availability

Records within 500m	2

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 68 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**No coverage**	**SJ89SW**
2	55m E	Full	Full	Full	No coverage	SJ89SE

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground

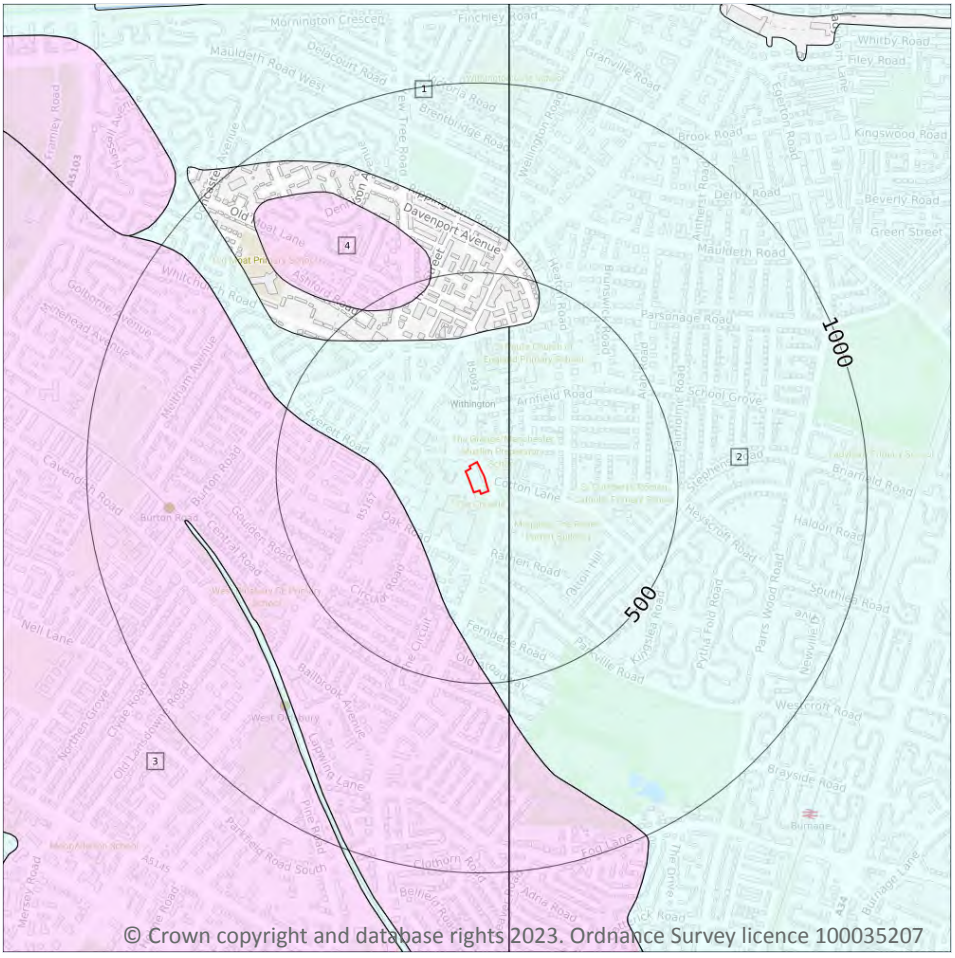
14.2 Artificial and made ground (10k)

Records within 500m	0

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (10k)

Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m **4**

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 70 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**TILLD-DMTN**	**Till, Devensian - Diamicton**	**Diamicton**
2	55m E	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton
3	183m SW	GFSDD-XSV	Glaciofluvial Sheet Deposits, Devensian - Sand And Gravel	Sand And Gravel

ID	Location	LEX Code	Description	Rock description
4	457m NW	GFICD-XSV	Glaciofluvial Ice Contact Deposits, Devensian - Sand And Gravel	Sand And Gravel

This data is sourced from the British Geological Survey.

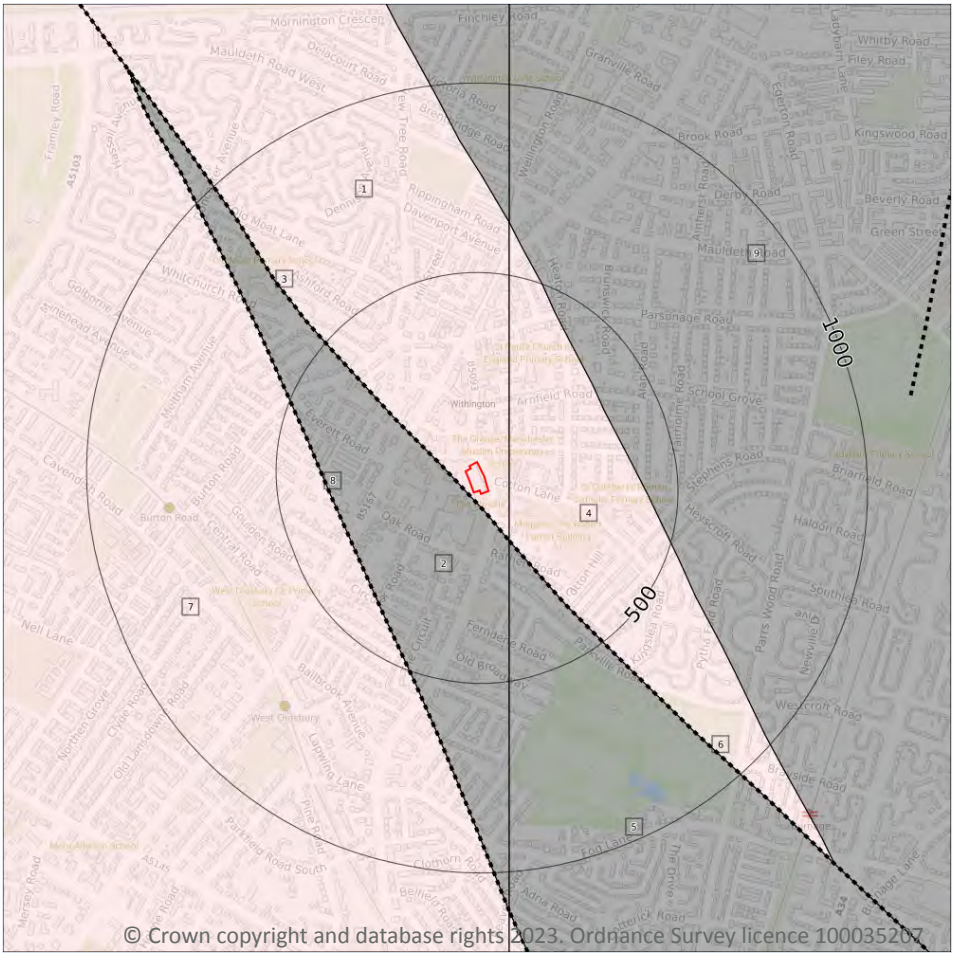
14.4 Landslip (10k)

Records within 500m	**0**

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (10k)

Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m **6**

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 72 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**WLSF-SDST**	**Wilmslow Sandstone Formation - Sandstone**	**Early Triassic Epoch**
2	13m SW	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch
4	55m E	WLSF-SDST	Wilmslow Sandstone Formation - Sandstone	Early Triassic Epoch
5	142m SE	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch

ID	Location	LEX Code	Description	Rock age
7	348m SW	WLSF-SDST	Wilmslow Sandstone Formation - Sandstone	Early Triassic Epoch
9	361m NE	CPB-SDST	Chester Pebble Beds Formation - Sandstone	Early Triassic Epoch

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m	**3**

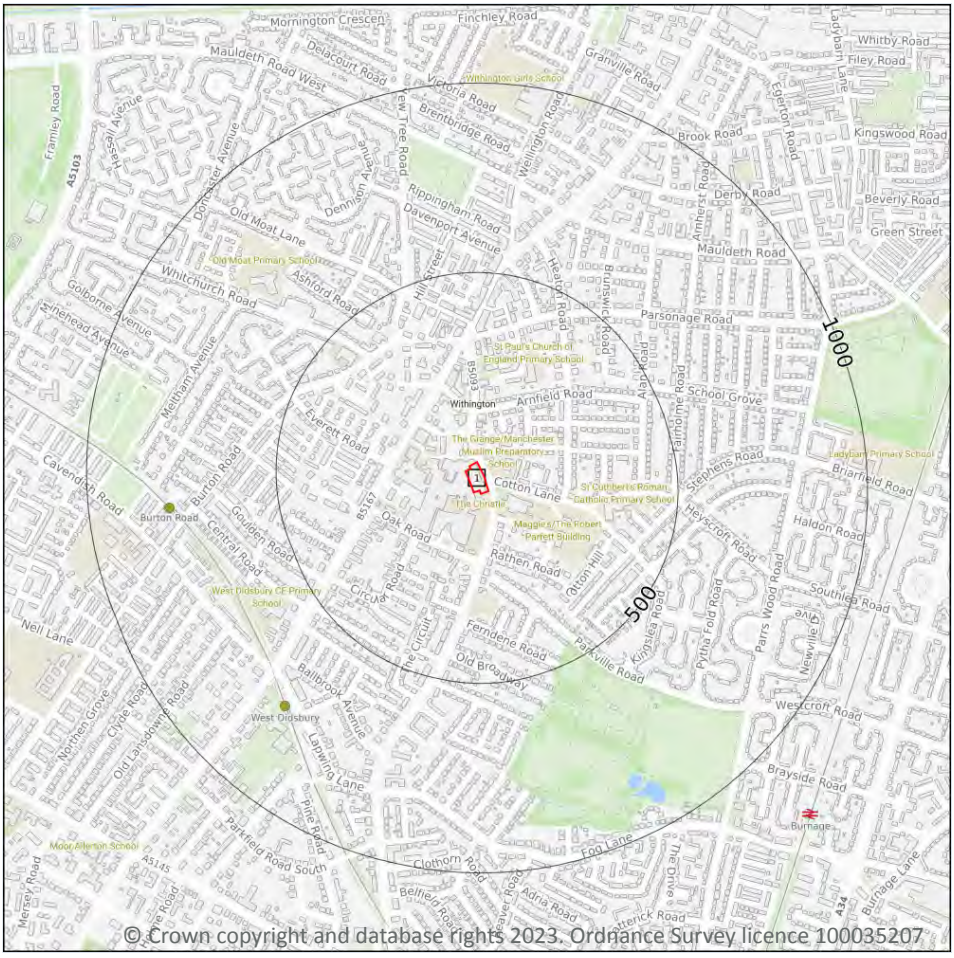
Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 72 >**

ID	Location	Category	Description
3	13m SW	FAULT	Normal fault, inferred; crossmarks on downthrow side
6	142m SE	FAULT	Normal fault, inferred; crossmarks on downthrow side
8	348m SW	FAULT	Normal fault, inferred; crossmarks on downthrow side

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 74 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**No coverage**	**Full**	**Full**	**Full**	**EW098_stockport_v4**

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground

15.2 Artificial and made ground (50k)

Records within 500m	0

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

This data is sourced from the British Geological Survey.

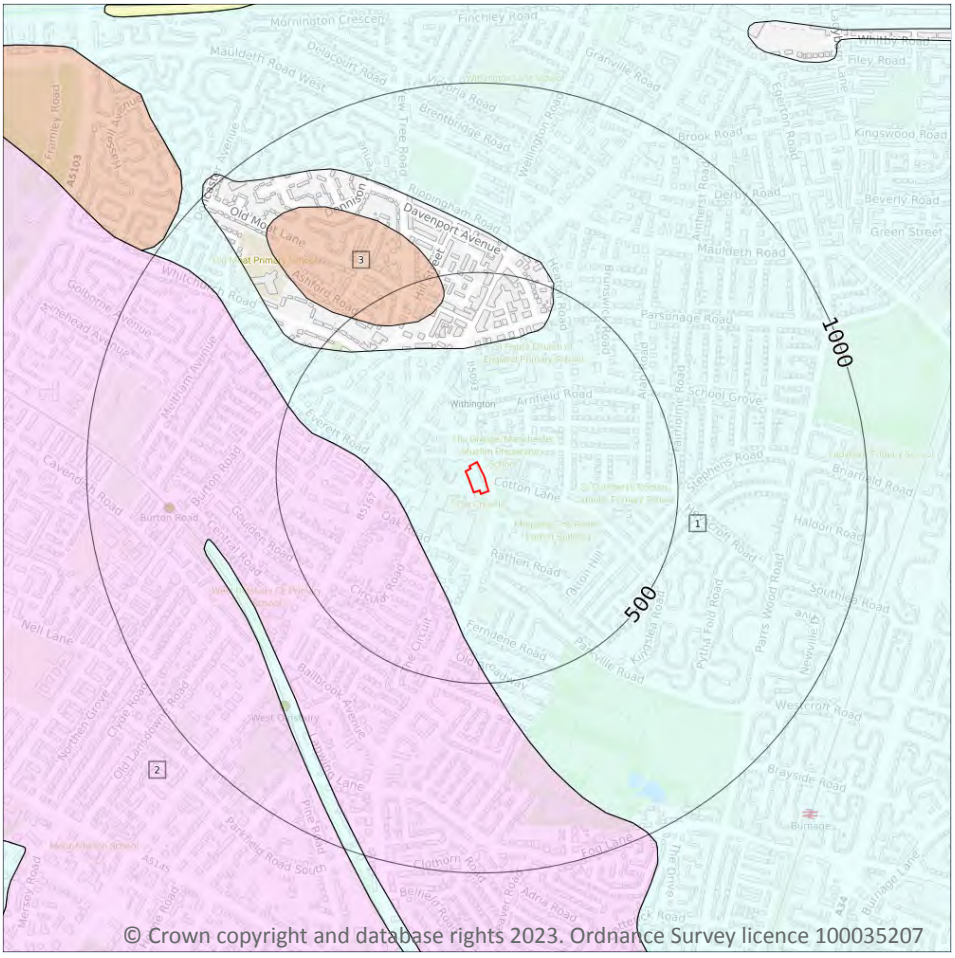
15.3 Artificial ground permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m **3**

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 76 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**TILLD-DMTN**	**TILL, DEVENSIAN**	**DIAMICTON**
2	185m SW	GFSDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
3	402m N	SSA-S	SHIRDLEY HILL SAND FORMATION	SAND

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m	1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Mixed**	**High**	**Low**

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

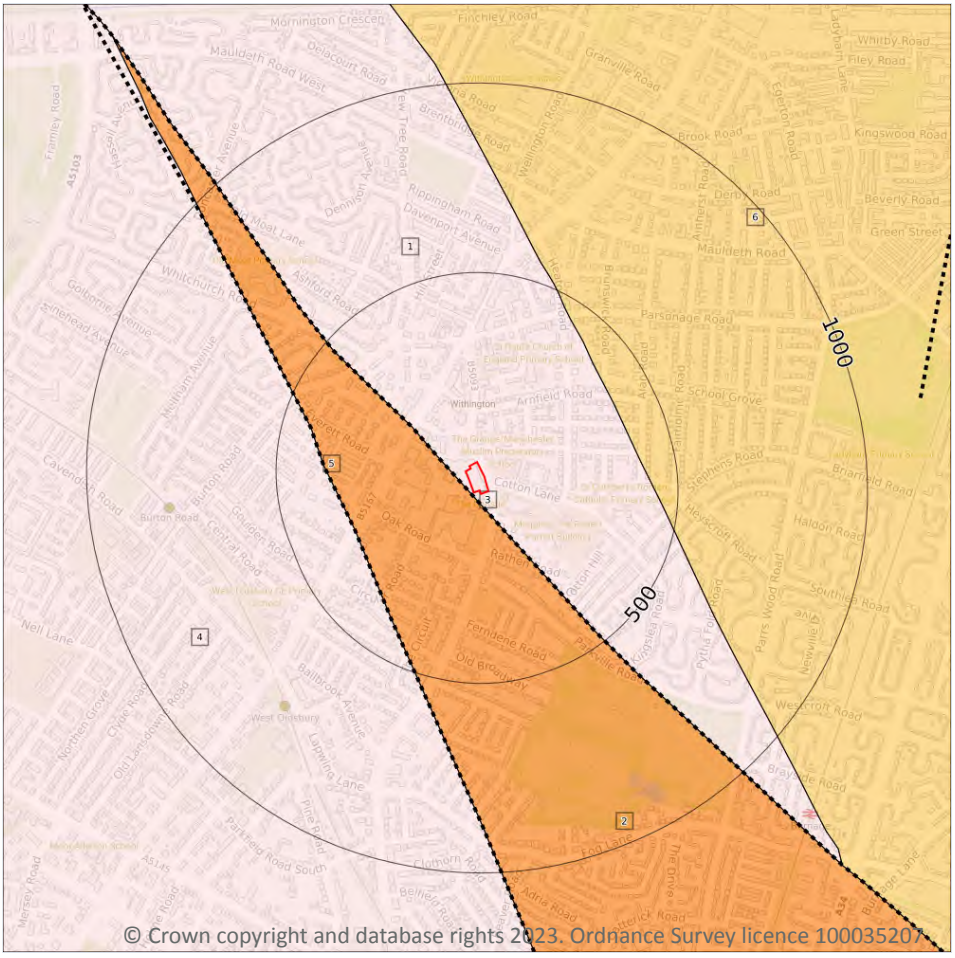
15.7 Landslip permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m **4**

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 78 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**WLSF-SDST**	**WILMSLOW SANDSTONE FORMATION - SANDSTONE**	**-**
2	8m S	CHES-PESST	CHESTER FORMATION - SANDSTONE, PEBBLY (GRAVELLY)	OLENEKIAN
4	328m SW	WLSF-SDST	WILMSLOW SANDSTONE FORMATION - SANDSTONE	-
6	391m NE	CHES-SDST	CHESTER FORMATION - SANDSTONE	OLENEKIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	2

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Intergranular**	**High**	**High**
8m S	Mixed	High	Moderate

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	2

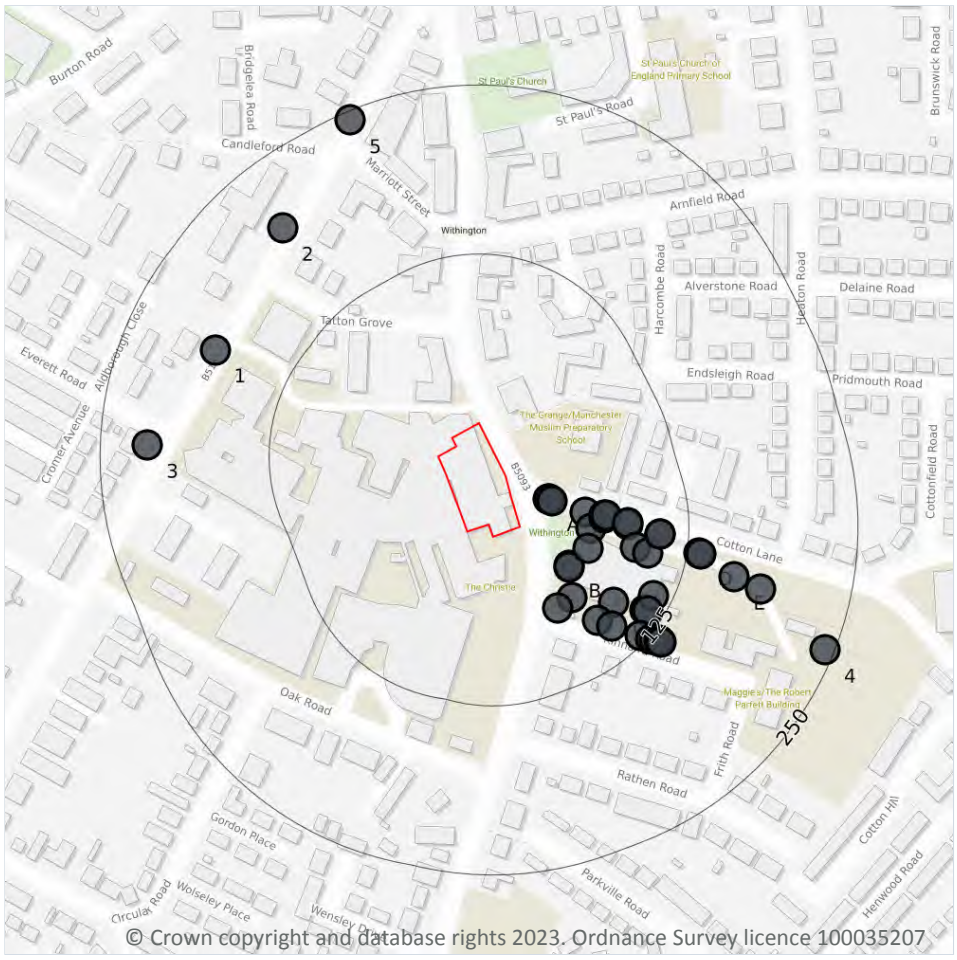
Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 78 >**

ID	Location	Category	Description
3	8m S	FAULT	Fault, inferred
5	328m SW	FAULT	Fault, inferred

This data is sourced from the British Geological Survey.

16 Boreholes



Site Outline

Search buffers in metres (m)

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+
- Unknown

16.1 BGS Boreholes

Records within 250m	39

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on **page 80 >**

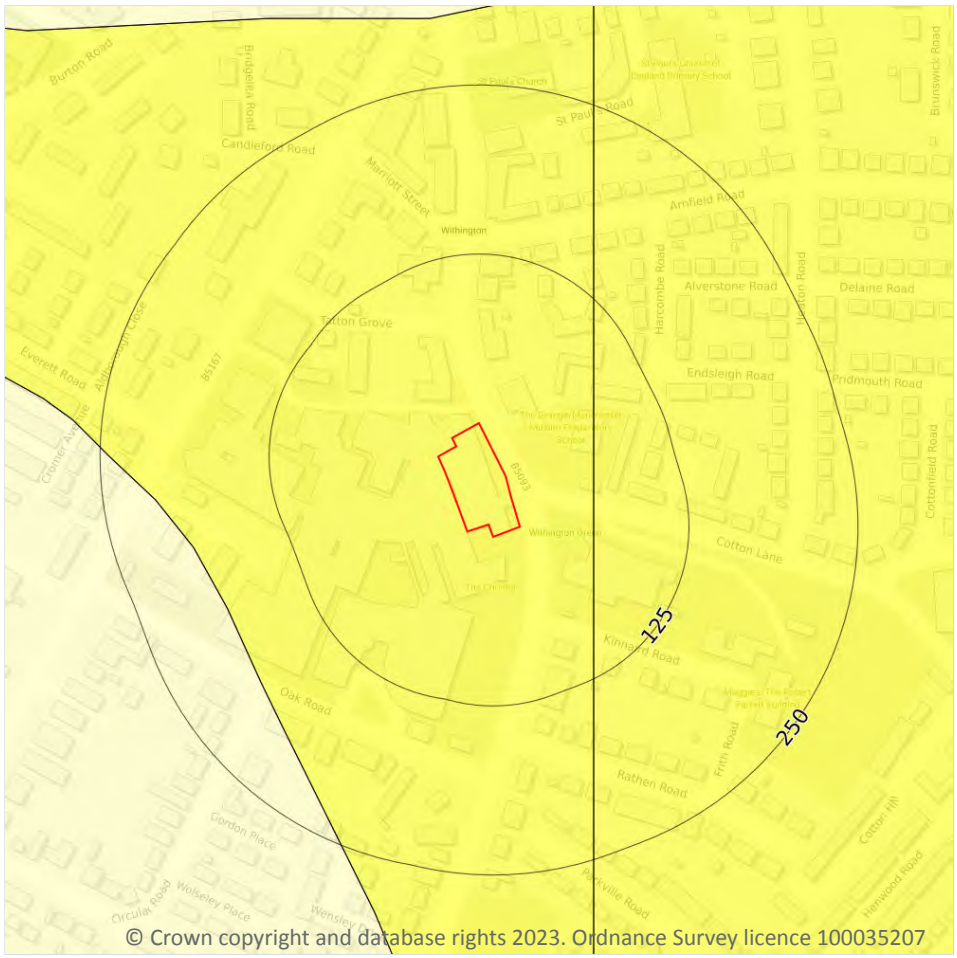
ID	Location	Grid reference	Name	Length	Confidential	Web link
A	26m E	384966 392580	MSCP Christie Hospital GI TPG	-	Y	N/A
A	27m E	384967 392580	MSCP Christie Hospital GI TPF	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
A	28m E	384969 392578	MSCP Christie Hospital GI TPH	-	Y	N/A
B	46m SE	384982 392531	Manchester Cancer Research Centre WS01	-	Y	N/A
B	47m SE	384982 392529	Manchester Cancer Research Centre SA03	-	Y	N/A
B	50m E	384994 392570	MSCP Christie Hospital GI TPE	-	Y	N/A
B	53m E	384998 392558	MSCP Christie Hospital GI TPA	-	Y	N/A
B	53m SE	384996 392543	Manchester Cancer Research Centre BH03	-	Y	N/A
B	63m E	385008 392566	MSCP Christie Hospital GI TPD	-	Y	N/A
B	63m E	385008 392568	MSCP Christie Hospital GI TPC	-	Y	N/A
B	64m E	385009 392568	MSCP Christie Hospital GI TPB	-	Y	N/A
B	65m SE	384984 392507	Manchester Cancer Research Centre CBR03	-	Y	N/A
B	66m SE	384973 392499	Manchester Cancer Research Centre BH02	-	Y	N/A
B	80m E	385025 392561	Manchester Cancer Research Centre WS03	-	Y	N/A
B	80m E	385025 392562	MSCP Christie Hospital GI TP1	-	Y	N/A
B	87m E	385031 392544	Manchester Cancer Research Centre CBR04	-	Y	N/A
C	89m SE	385015 392503	Manchester Cancer Research Centre BH04	-	Y	N/A
C	90m SE	385003 392490	Manchester Cancer Research Centre WS02	-	Y	N/A
B	97m E	385040 392540	Manchester Cancer Research Centre BH06	-	Y	N/A
C	100m SE	385013 392486	Manchester Cancer Research Centre CBR05	-	Y	N/A
B	104m E	385049 392554	MSCP Christie Hospital GI TP2	-	Y	N/A
B	104m E	385049 392554	Manchester Cancer Research Centre CBR06	-	Y	N/A
C	111m SE	385038 392498	Manchester Cancer Research Centre BH05	-	Y	N/A
C	111m SE	385044 392508	Manchester Cancer Research Centre WS05	-	Y	N/A
C	113m SE	385040 392497	Manchester Cancer Research Centre BH05A	-	Y	N/A
C	120m SE	385034 392479	Manchester Cancer Research Centre CBR07	-	Y	N/A
C	128m SE	385042 392476	Manchester Cancer Research Centre SA02	-	Y	N/A
C	130m SE	385045 392476	Manchester Cancer Research Centre WS04	-	Y	N/A
C	133m SE	385048 392475	Manchester Cancer Research Centre SA02A	-	Y	N/A
D	134m E	385078 392540	Manchester Cancer Research Centre CBR08	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
C	135m SE	385050 392474	Manchester Cancer Research Centre CBR09	-	Y	N/A
D	135m E	385079 392539	MSCP Christie Hospital GI TP3	-	Y	N/A
E	163m E	385104 392522	MSCP Christie Hospital GI TP4	-	Y	N/A
1	183m NW	384720 392690	PALATINE ROAD 8	-	Y	N/A
E	184m E	385123 392513	MSCP Christie Hospital GI TP5	-	Y	N/A
2	200m NW	384770 392780	PALATINE ROAD 9	-	Y	N/A
3	215m W	384670 392620	PALATINE ROAD 7	-	Y	N/A
4	243m SE	385171 392468	MSCP Christie Hospital GI TP6	-	Y	N/A
5	244m N	384820 392860	PALATINE ROAD 10	-	Y	N/A

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.1 Shrink swell clays

Records within 50m	1

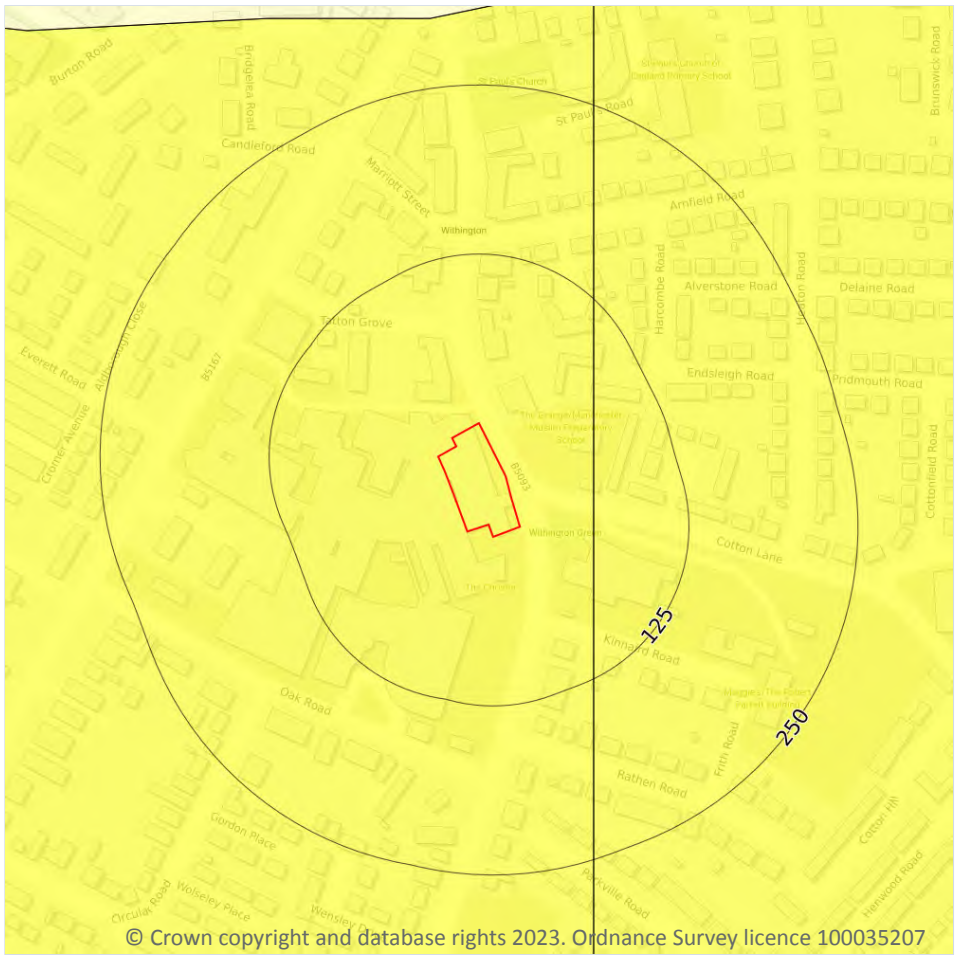
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 83 >**

Location	Hazard rating	Details
On site	**Very low**	**Ground conditions predominantly low plasticity.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.2 Running sands

Records within 50m	1

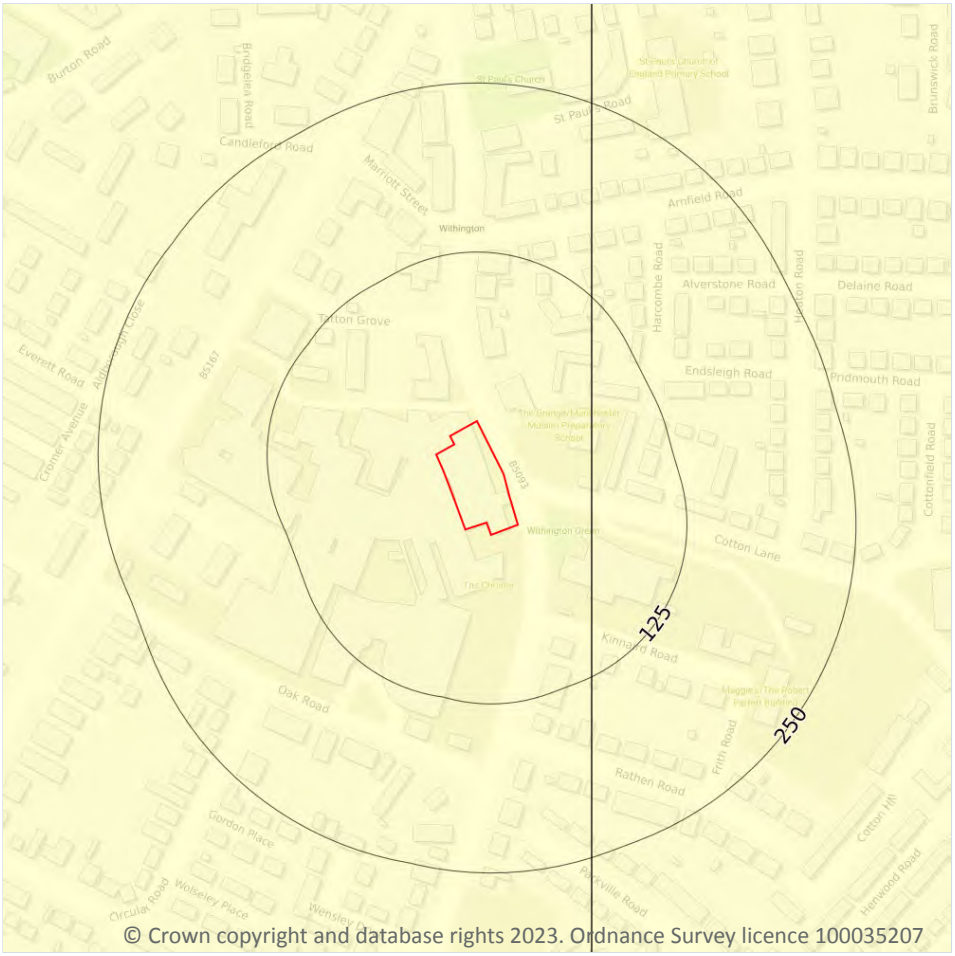
The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 84 >**

Location	Hazard rating	Details
On site	**Very low**	**Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.3 Compressible deposits

Records within 50m	1

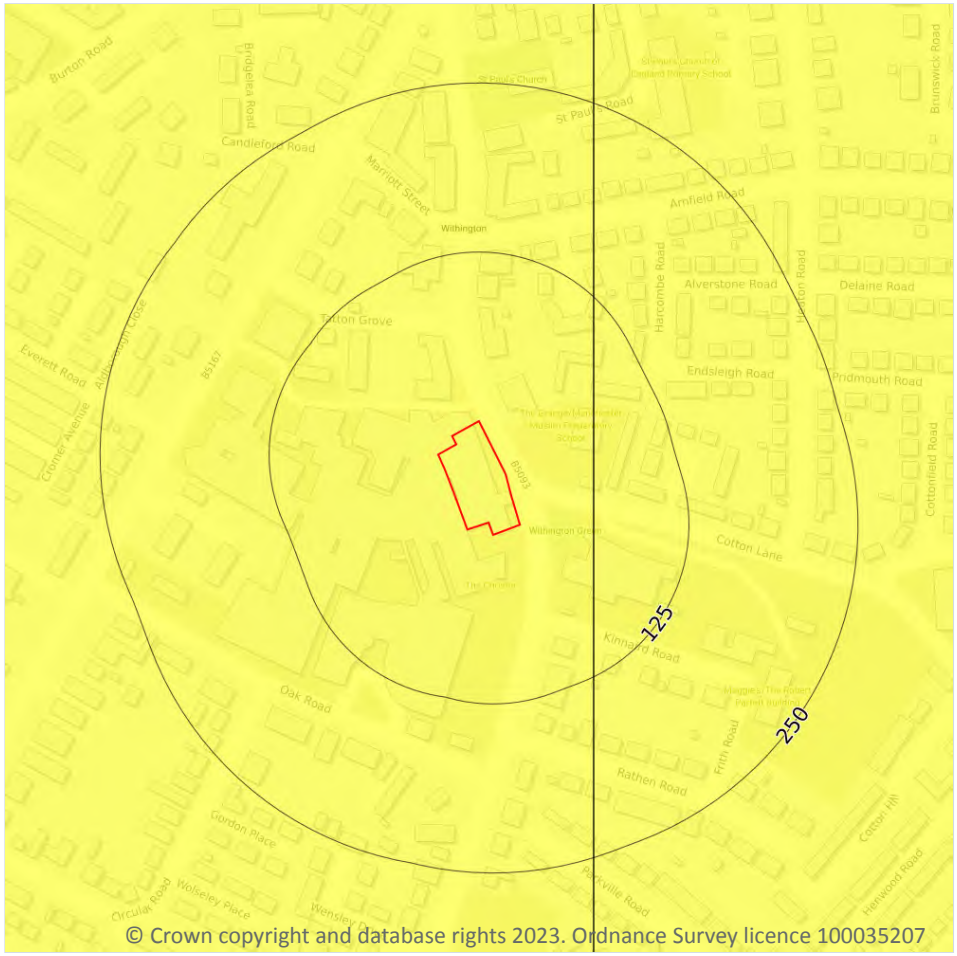
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 85 >**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.4 Collapsible deposits

Records within 50m	1

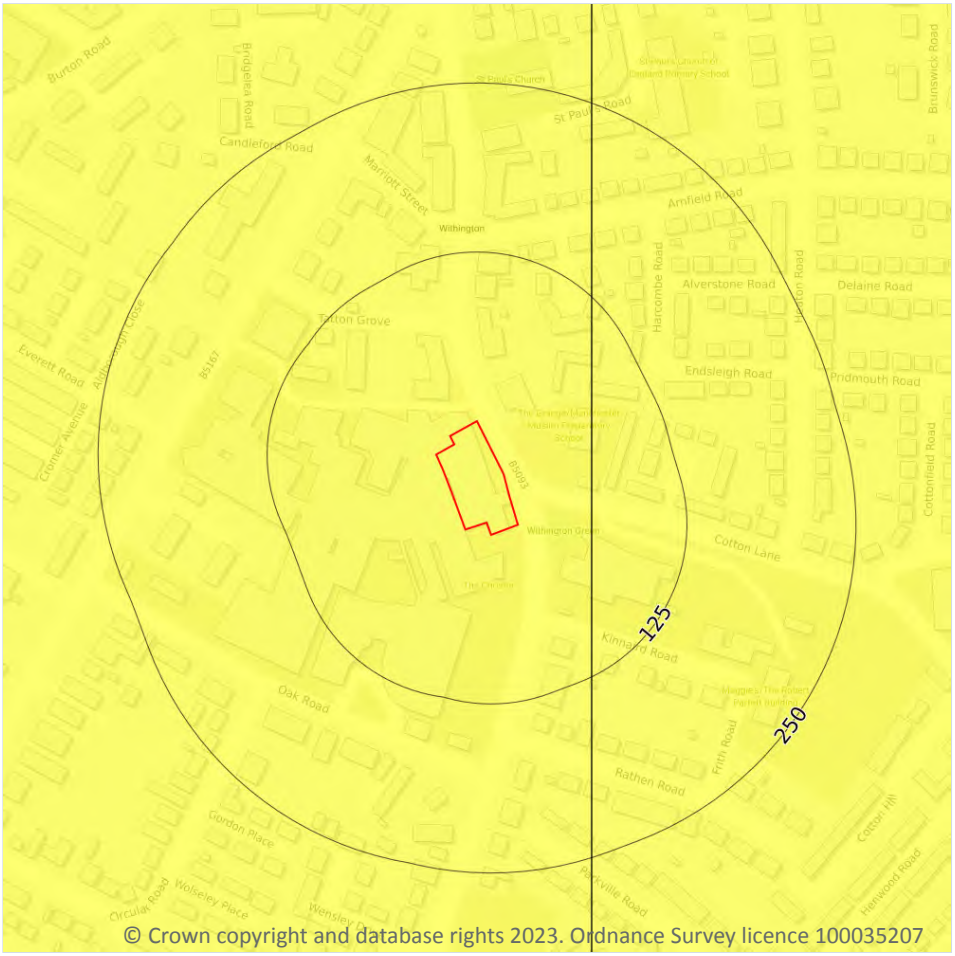
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 86 >**

Location	Hazard rating	Details
On site	**Very low**	**Deposits with potential to collapse when loaded and saturated are unlikely to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.5 Landslides

Records within 50m	1

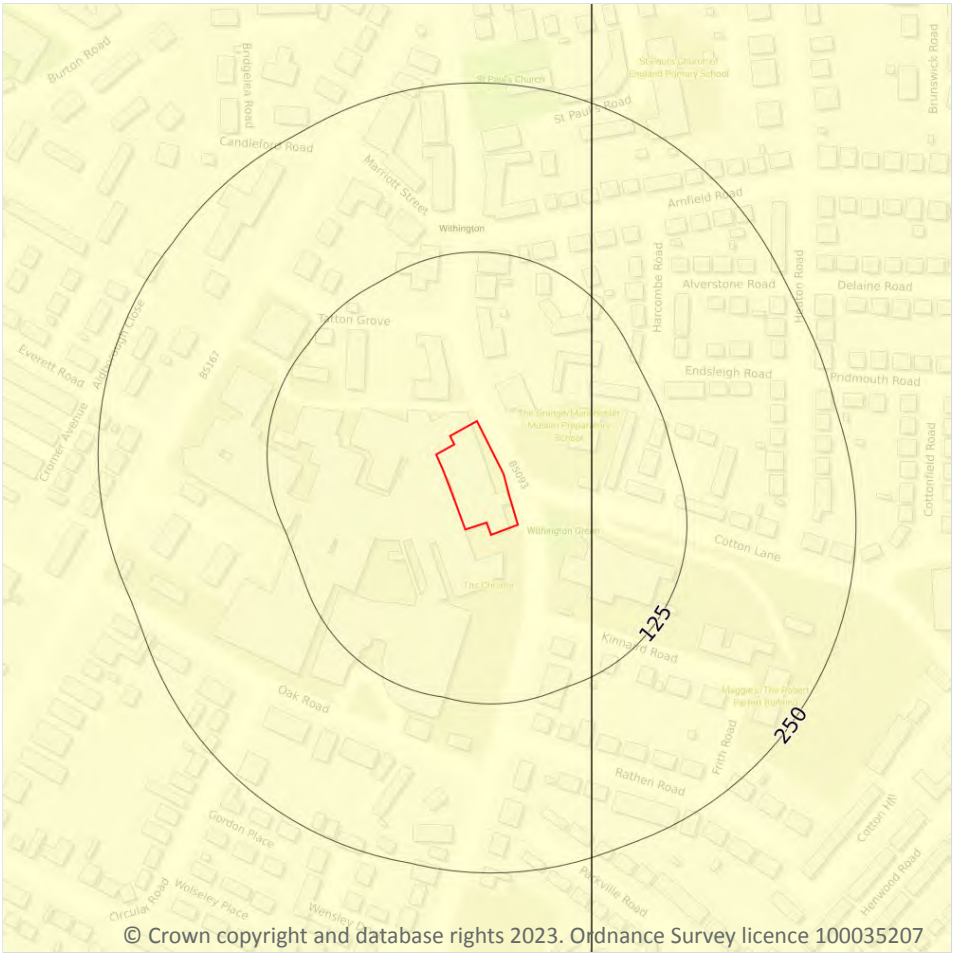
The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on **page 87 >**

Location	Hazard rating	Details
On site	**Very low**	**Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.6 Ground dissolution of soluble rocks

Records within 50m	1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 88 >**

Location	Hazard rating	Details
On site	**Negligible**	**Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.**

This data is sourced from the British Geological Survey.

18 Mining and ground workings



Site Outline

Search buffers in metres (m)

- BritPits
- Surface ground workings
- Underground workings
- Underground mining extents
- Historical mineral planning areas
- TCA non-coal mining

Non Coal Mining

- Sporadic underground mining of restricted extent possible
- Localised small scale underground mining possible
- Small scale mining possible
- Underground mining known or likely within or in close proximity
- Underground mining known within or in very close proximity

18.1 BritPits

Records within 500m	0

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m	2

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on **page 90 >**

ID	Location	Land Use	Year of mapping	Mapping scale
1	86m SE	Water Body	1851	1:10560
2	202m SW	Pond	1851	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.3 Underground workings

Records within 1000m	0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground mining extents

Records within 500m	0

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

This data is sourced from Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	0

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

This data is sourced from the British Geological Survey.

18.7 JPB mining areas

Records on site	1

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

Location	Details
On site	**Whilst outside of an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) may have information such as mining plans and maps held within their archive that have occurred within 1km of this property. Please note, the plans held by JPB may also relate to non-mining records. Further details and a quote for services (if appropriate) can be obtained by emailing this report to enquiries.gs@jpb.co.uk ↗.**

This data is sourced from Johnson Poole and Bloomer.

18.8 The Coal Authority non-coal mining

Records within 500m	0

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure prior to any re-use.

This data is sourced from The Coal Authority.

18.9 Researched mining

Records within 500m	0

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas

of risk have been captured.

This data is sourced from Groundsure.

18.10 Mining record office plans

Records within 500m	0

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.11 BGS mine plans

Records within 500m	0

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.12 Coal mining

Records on site	0

Areas which could be affected by past, current or future coal mining.

This data is sourced from the Coal Authority.

18.13 Brine areas

Records on site	0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.14 Gypsum areas

Records on site	0

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.15 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

18.16 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m	0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m	0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m	0

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

This data is sourced from Groundsure.

19.4 Historical incidents

Records within 500m	0

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.

This data is sourced from Groundsure.

19.5 National karst database

Records within 500m	0

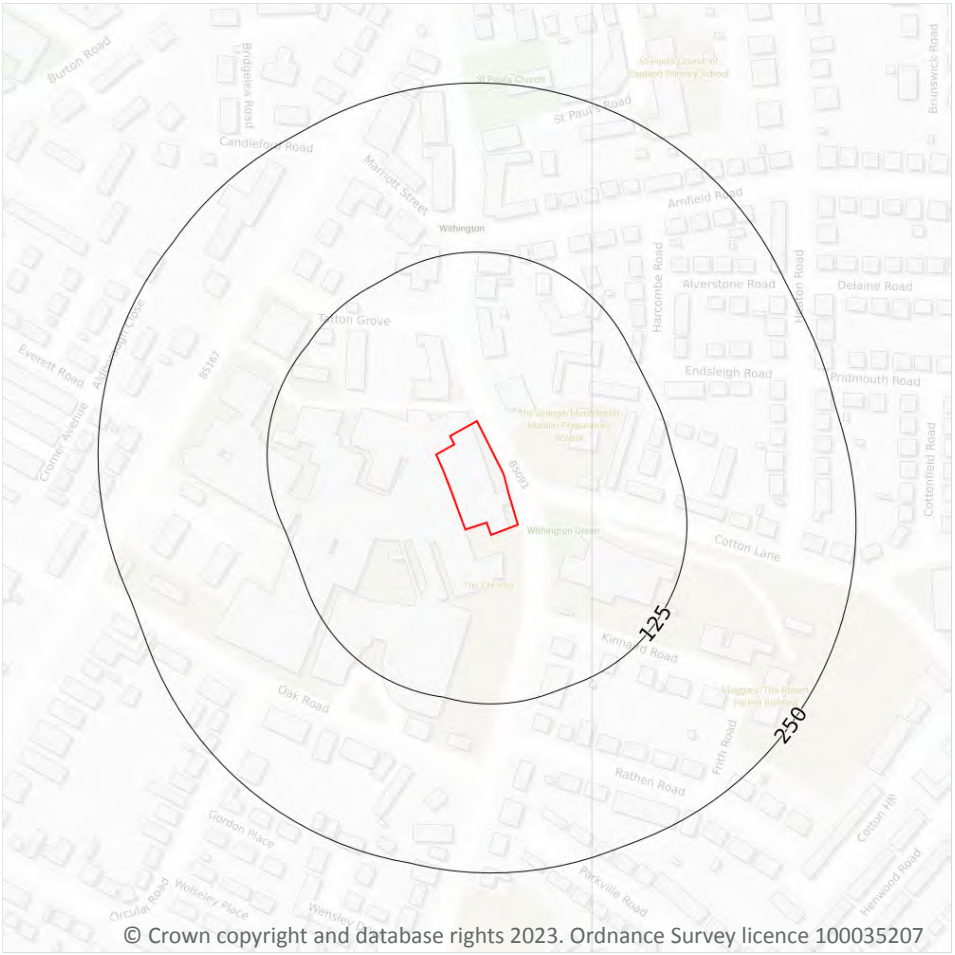
This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

Since the database was set up in 2002 data covering most of the evaporite karst areas of the UK have now been added, along with data covering about 60% of the Chalk, and 35% of the Carboniferous Limestone outcrops. Many of the classic upland karst areas have yet to be included. Recorded so far are: Over 800 caves, 1300 stream sinks, 5600 springs, 10,000 sinkholes.

The database is not yet complete, and not all records have been verified. The absence of data does not mean that karst features are not present at a site. A reliability rating is included with each record.

This data is sourced from the British Geological Survey.

20 Radon



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Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

20.1 Radon

Records on site	1

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on **page 97 >**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Less than 1%**	**None**

This data is sourced from the British Geological Survey and UK Health Security Agency.

21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m	2

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km^2. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km^2; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
8m S	15 - 25 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m	0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km^2).

This data is sourced from the British Geological Survey.

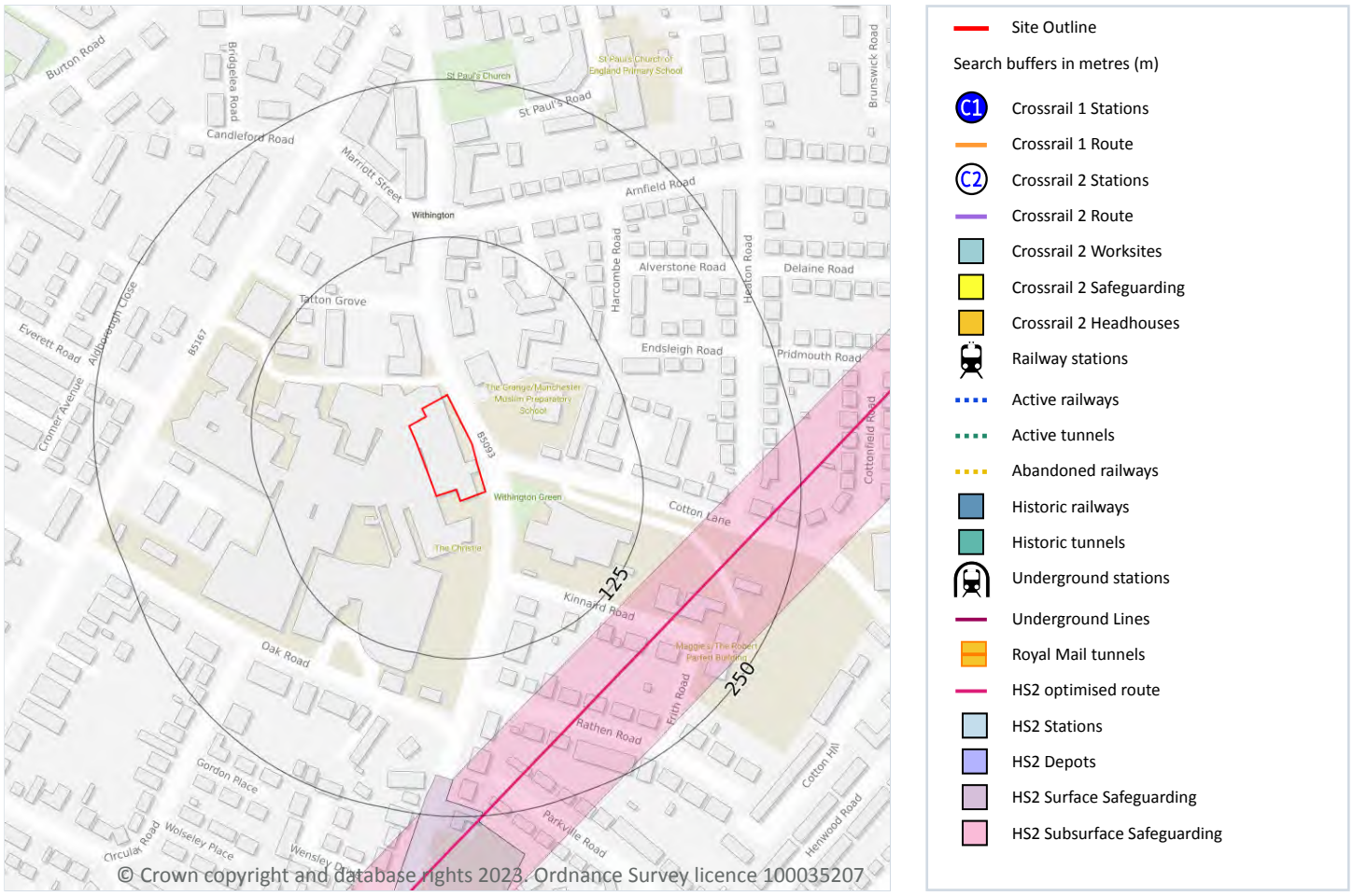
21.3 BGS Measured Urban Soil Chemistry

Records within 50m	0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km^2.

This data is sourced from the British Geological Survey.

22 Railway infrastructure and projects



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22.1 Underground railways (London)

Records within 250m	0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

22.2 Underground railways (Non-London)

Records within 250m	0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

22.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

22.4 Historical railway and tunnel features

Records within 250m	0

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

This data is sourced from Ordnance Survey/Groundsure.

22.5 Royal Mail tunnels

Records within 250m	0

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

This data is sourced from Groundsure/the Postal Museum.

22.6 Historical railways

Records within 250m	0

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

22.7 Railways

Records within 250m	0

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

This data is sourced from Ordnance Survey and OpenStreetMap.

22.8 Crossrail 1

Records within 500m	0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

22.9 Crossrail 2

Records within 500m	0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

22.10 HS2

Records within 500m	1

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

Features are displayed on the Railway infrastructure and projects map on **page 100 >**

Location	Track Type	Speed (mph)	Speed (km/h)	Status
176m SE	Tunnel	143mph	230kph	Current preferred consultation route

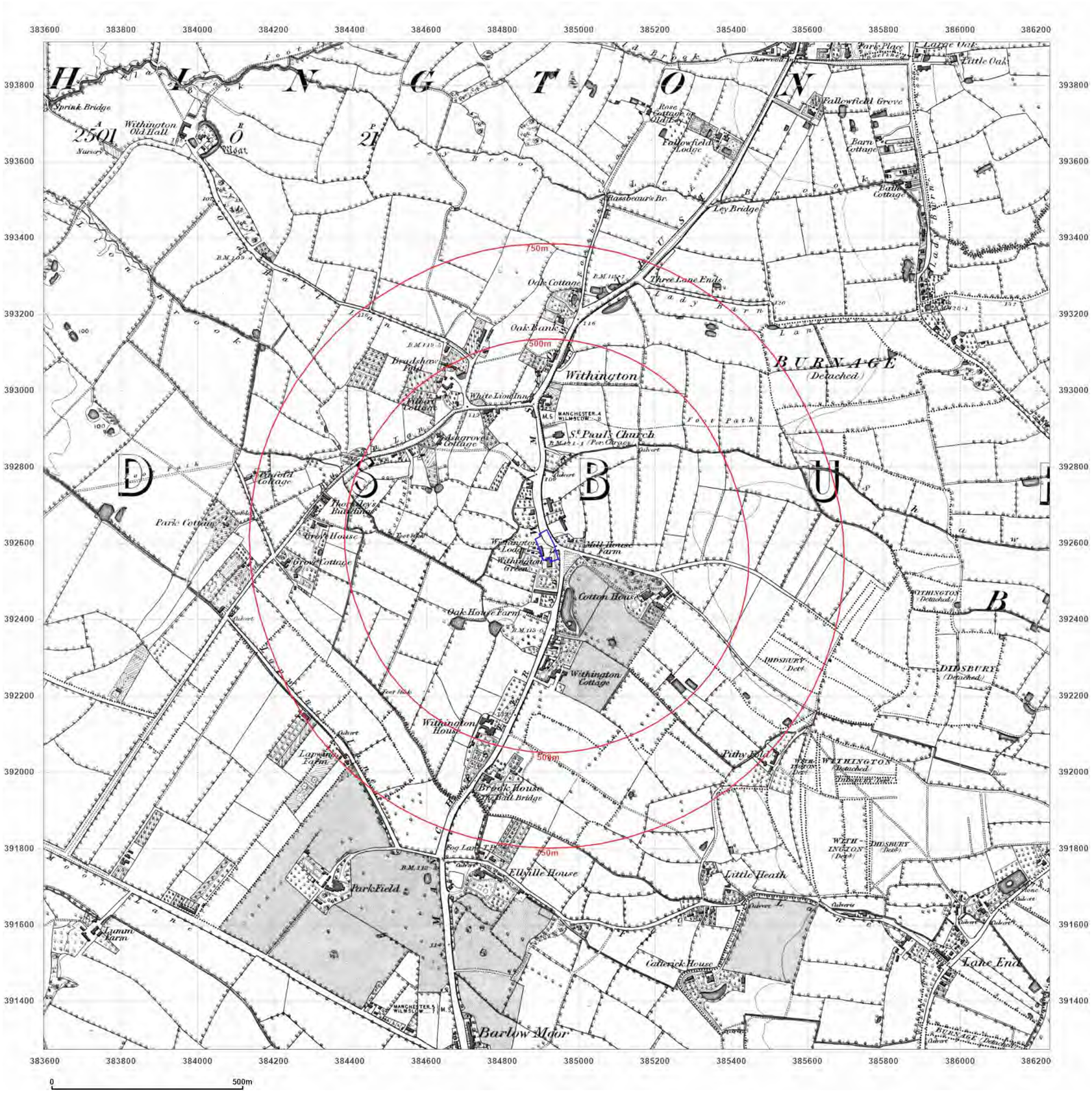
This data is sourced from HS2 ltd.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference ↗.

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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1849**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1845
Revised 1849
Edition 1849
Copyright N/A
Levelled N/A

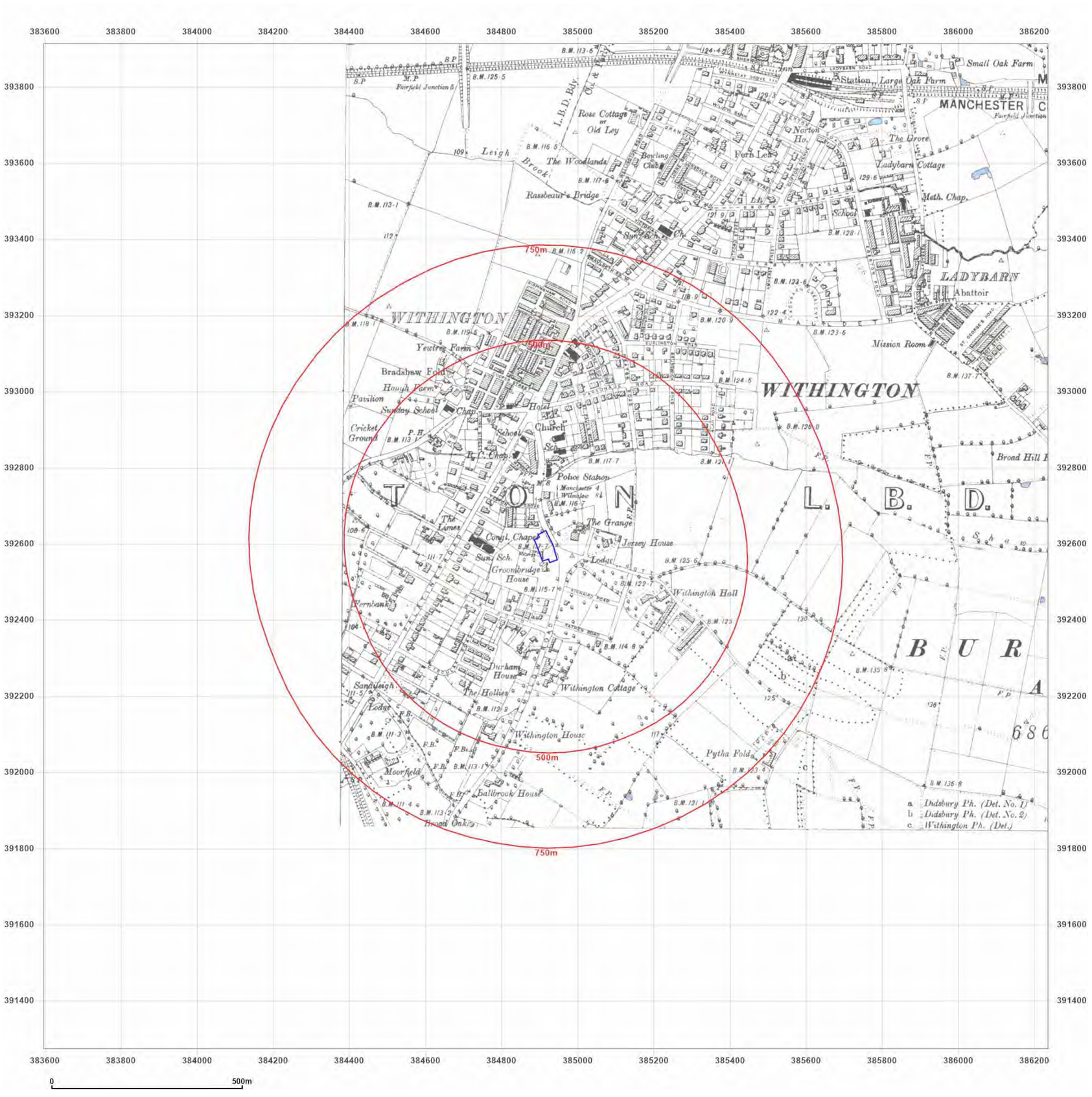
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Site Details:

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
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Map Name: County Series

Map date: **1892**

Scale: 1:10,560

Printed at: 1:10,560

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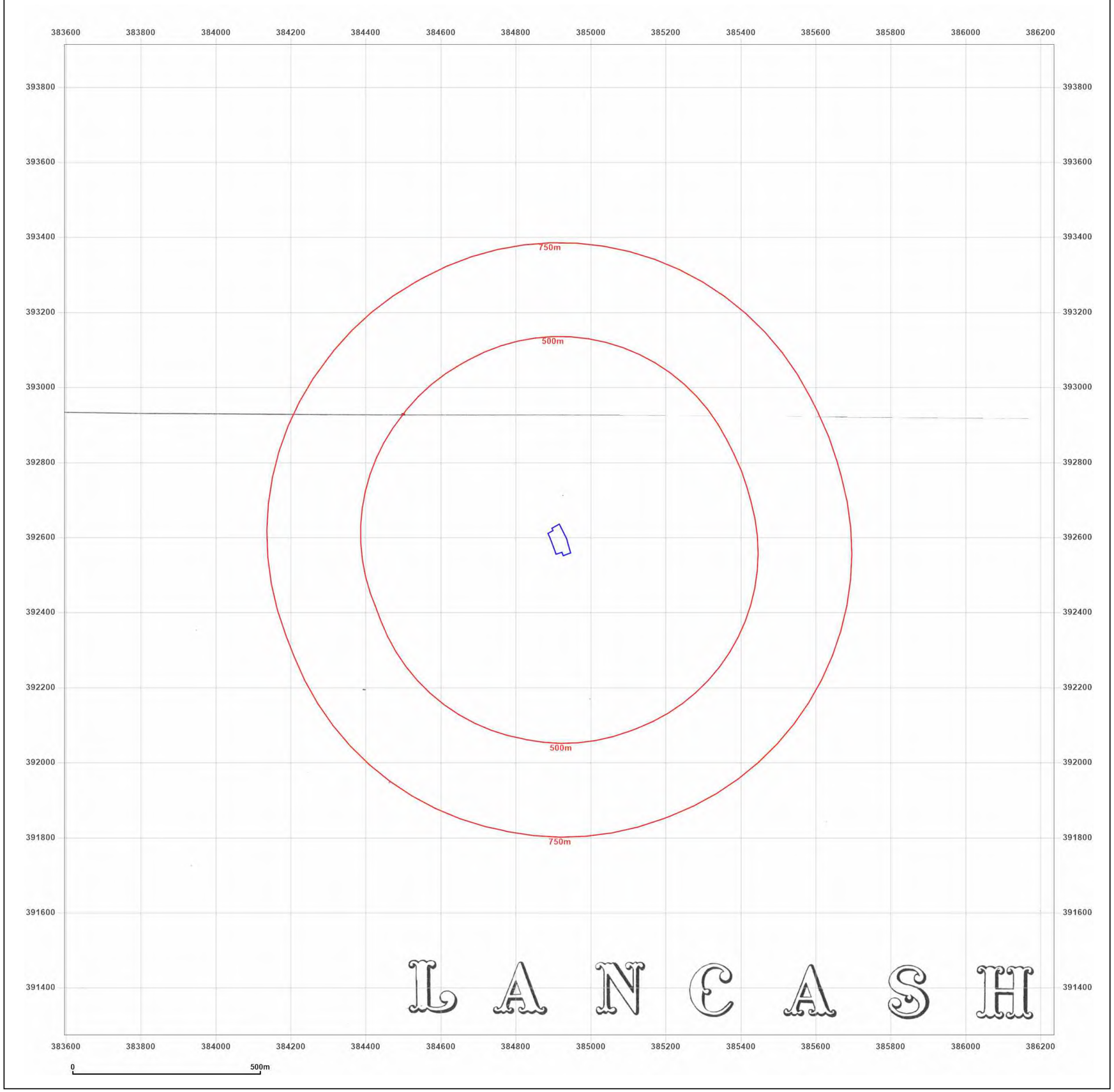
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1897**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1872
Revised 1897
Edition 1897
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Levelled N/A

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1905**

Scale: 1:10,560

Printed at: 1:10,560

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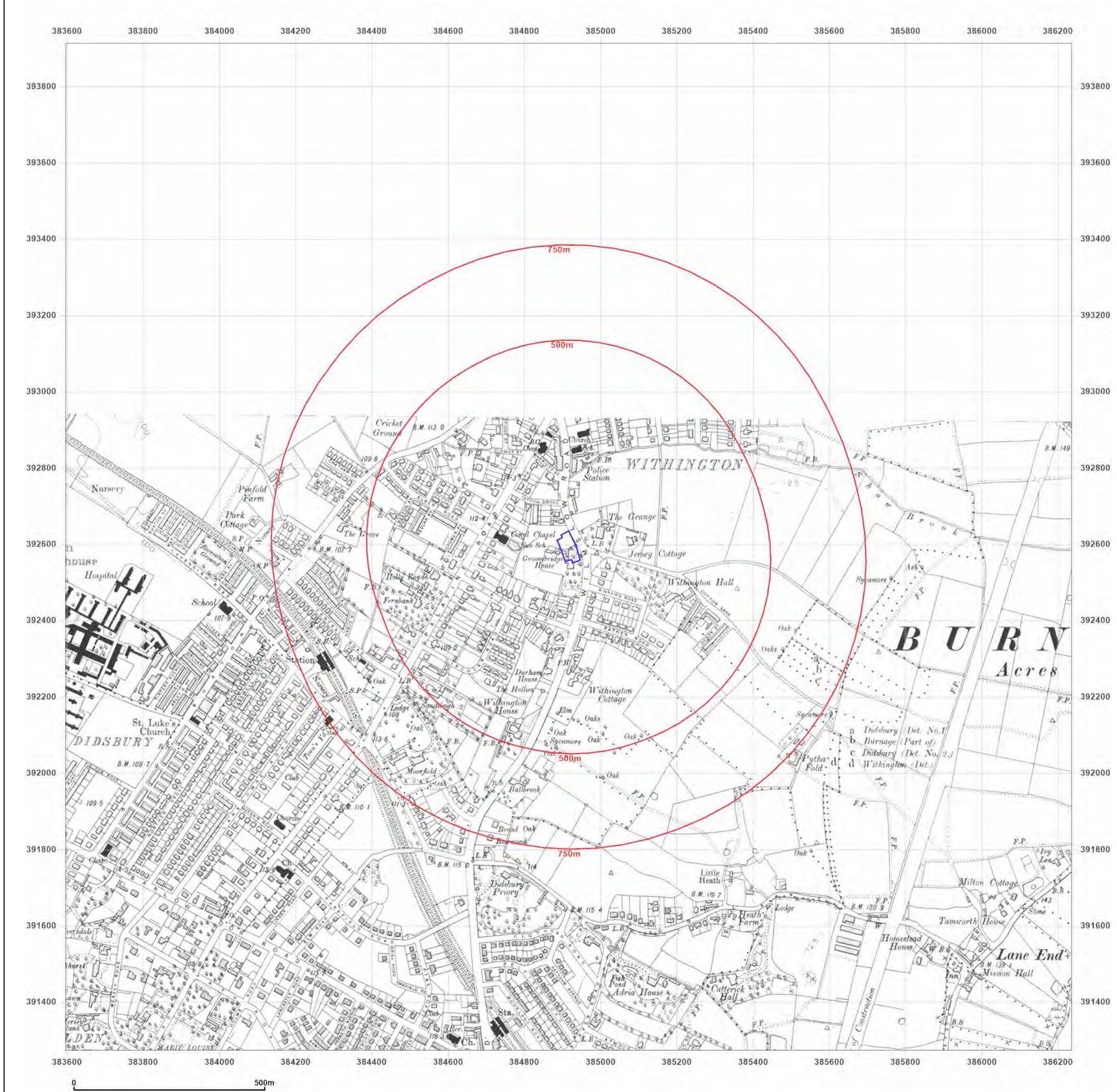
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Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1911**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1872
Revised 1908
Edition 1911
Copyright N/A
Levelled N/A

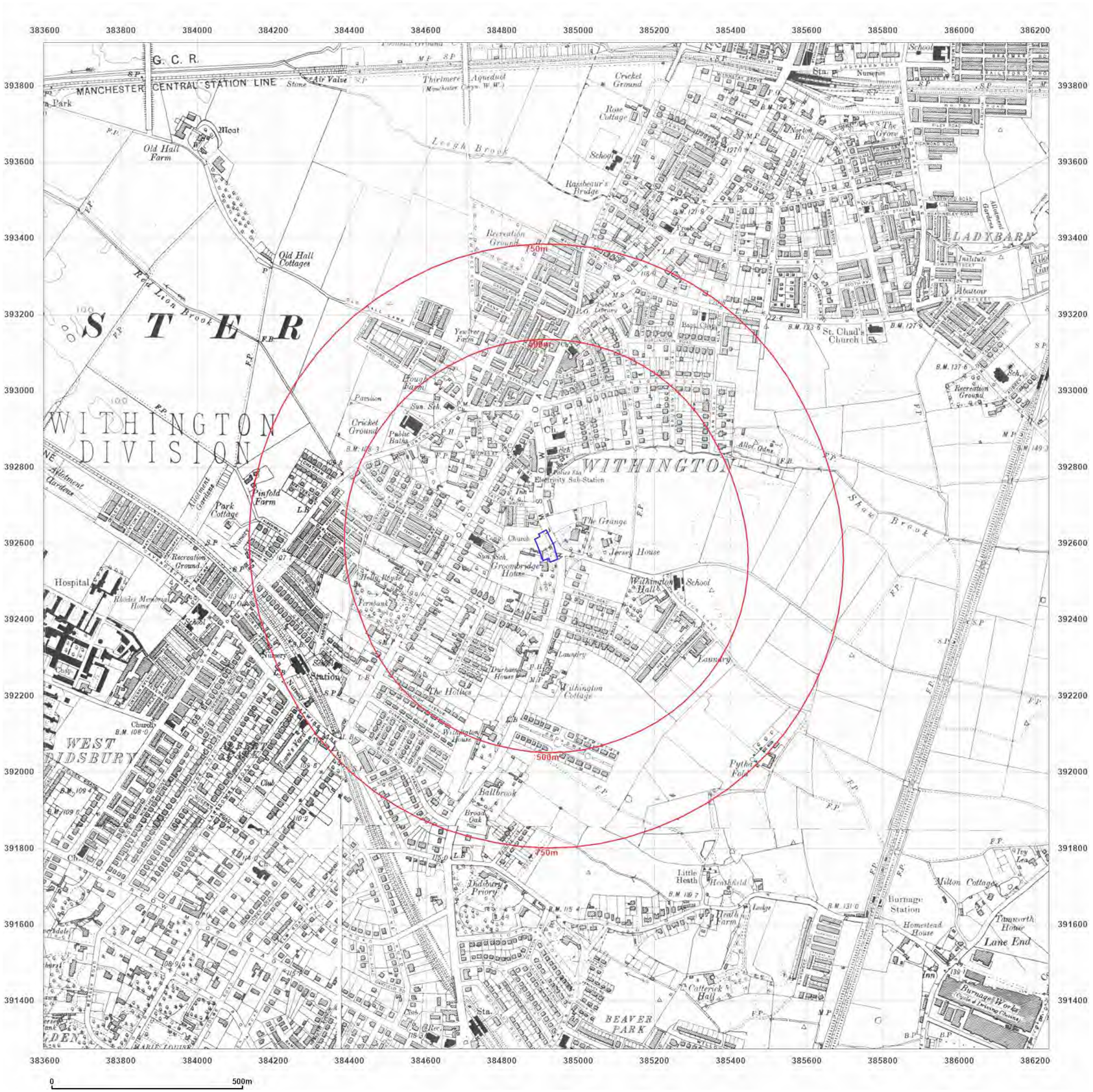
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
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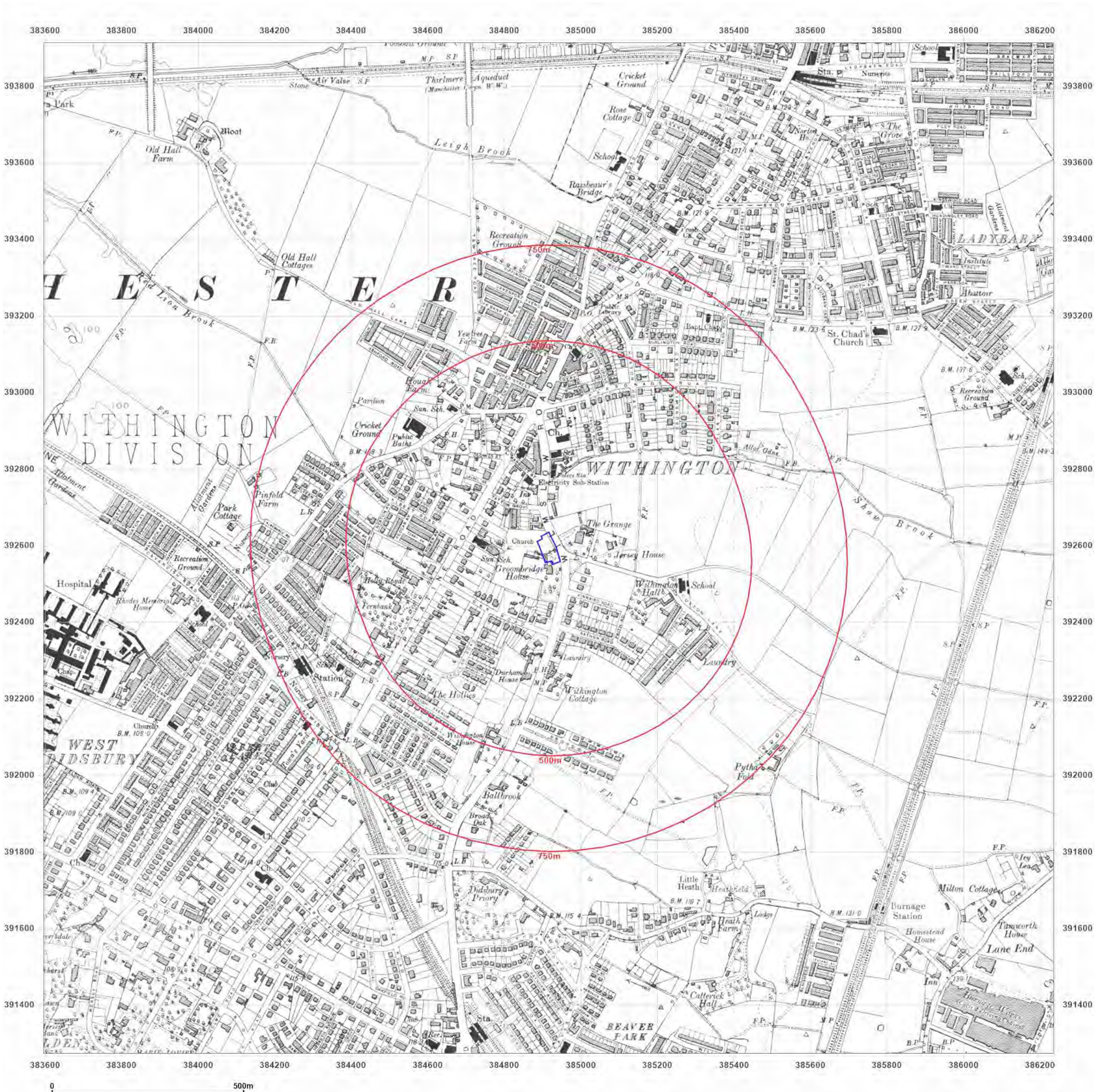
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

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

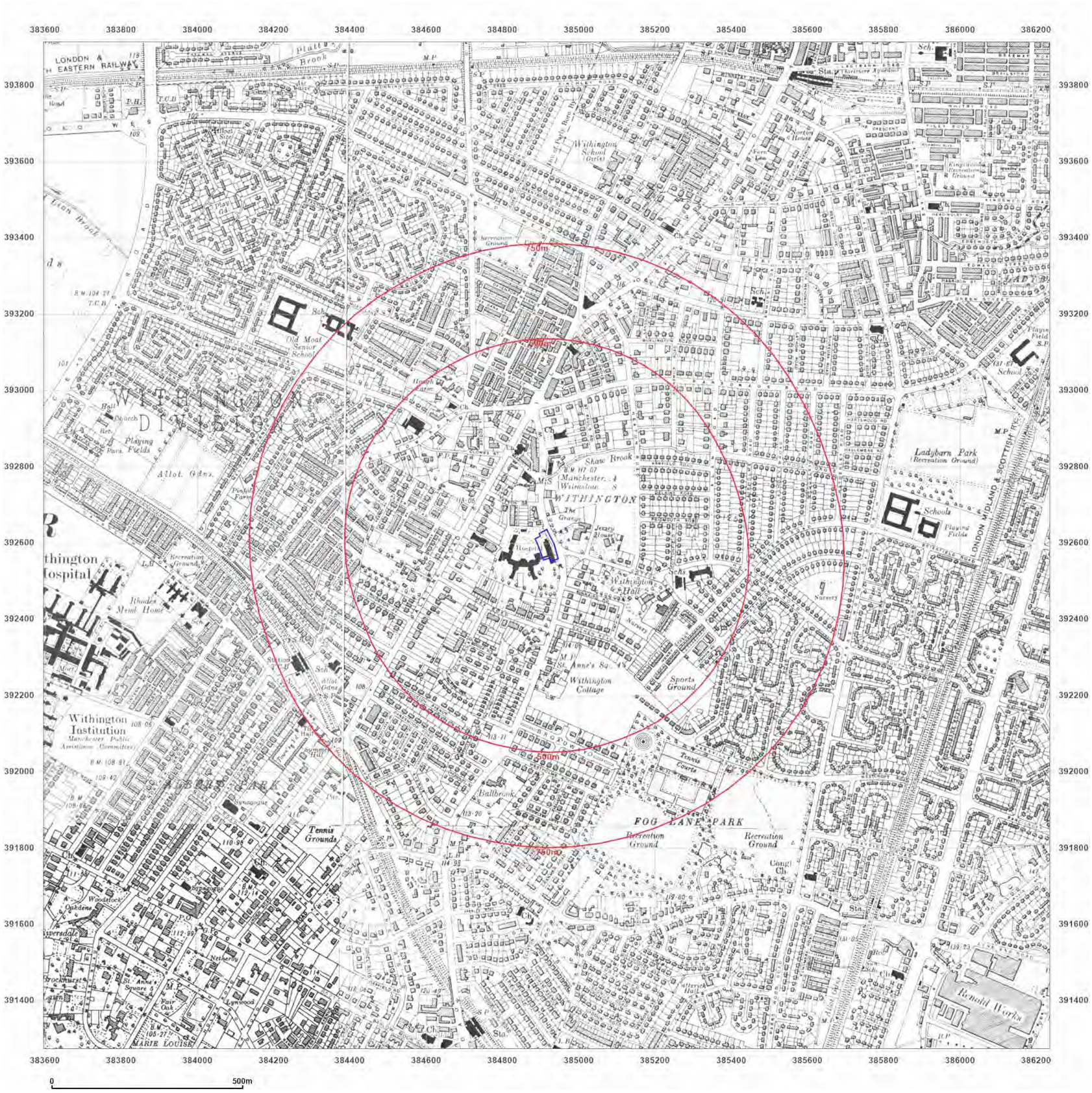
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Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1934-1938**

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Printed at: 1:10,560

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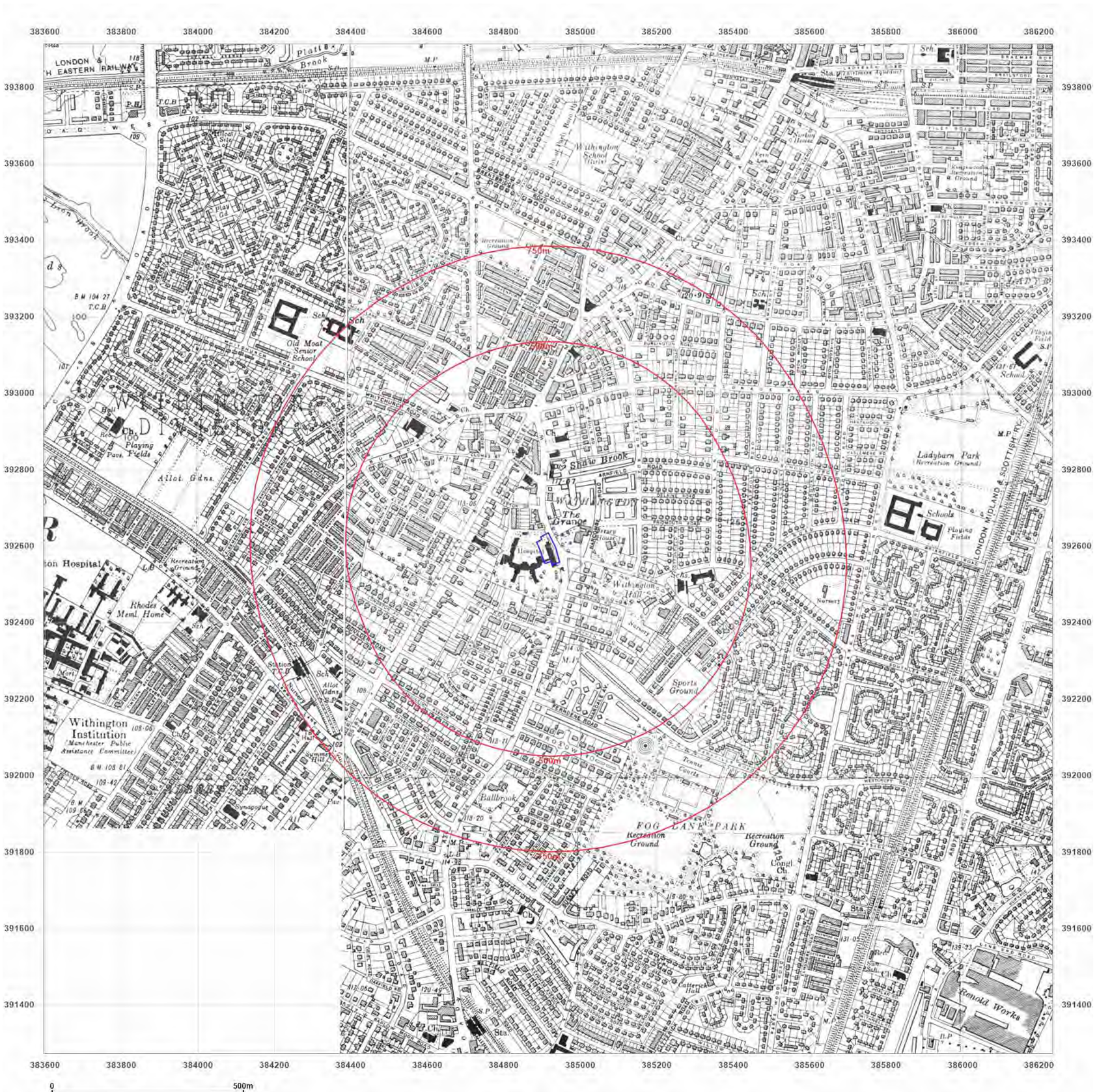
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Report Ref: GS-3OZ-Q1Z-94D-LLF
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Map Name: County Series

Map date: **1938**

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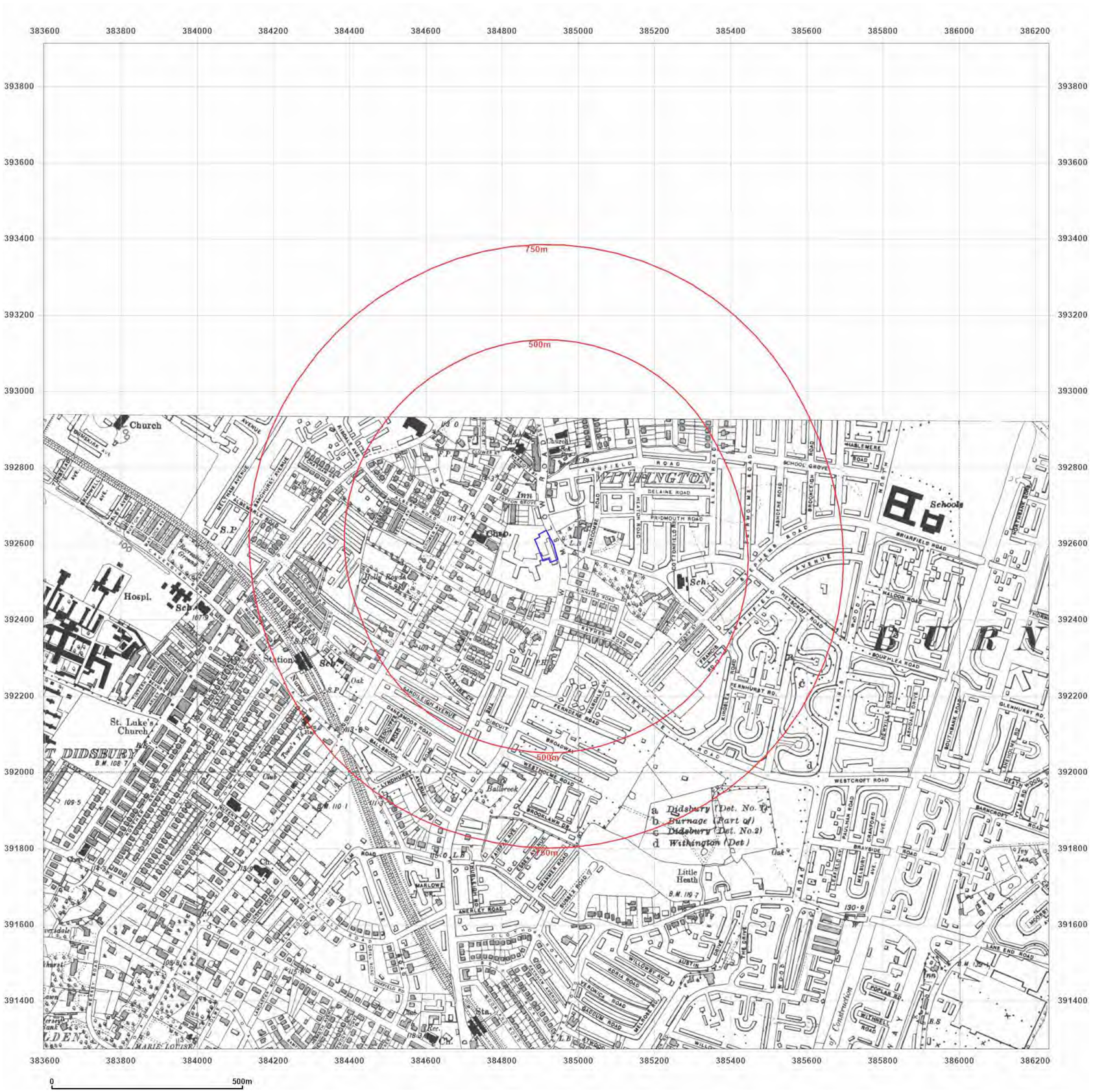
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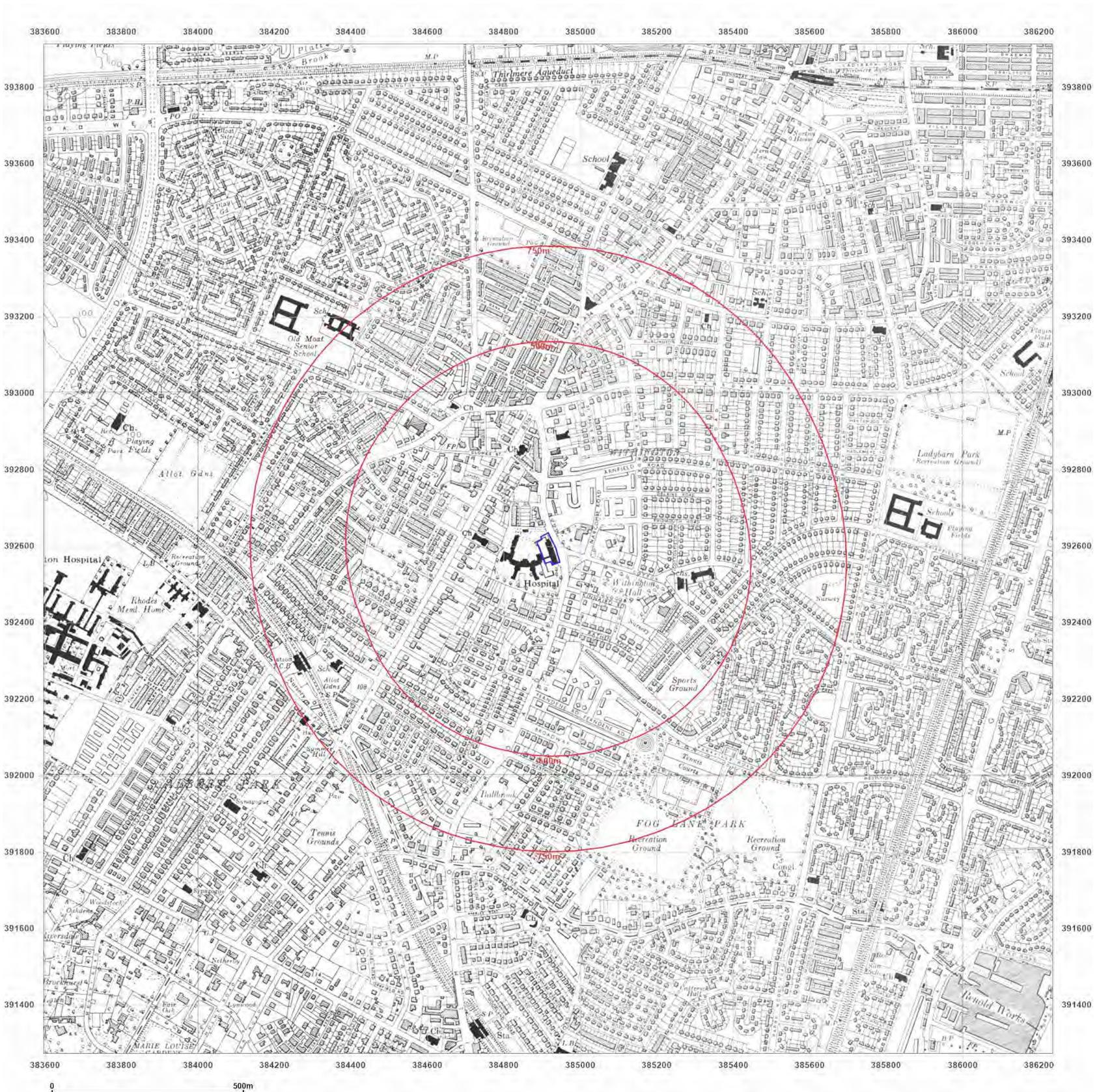
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Revised 1938
Edition 1938
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
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Map Name: Provisional

Map date: **1955**

Scale: 1:10,560

Printed at: 1:10,560

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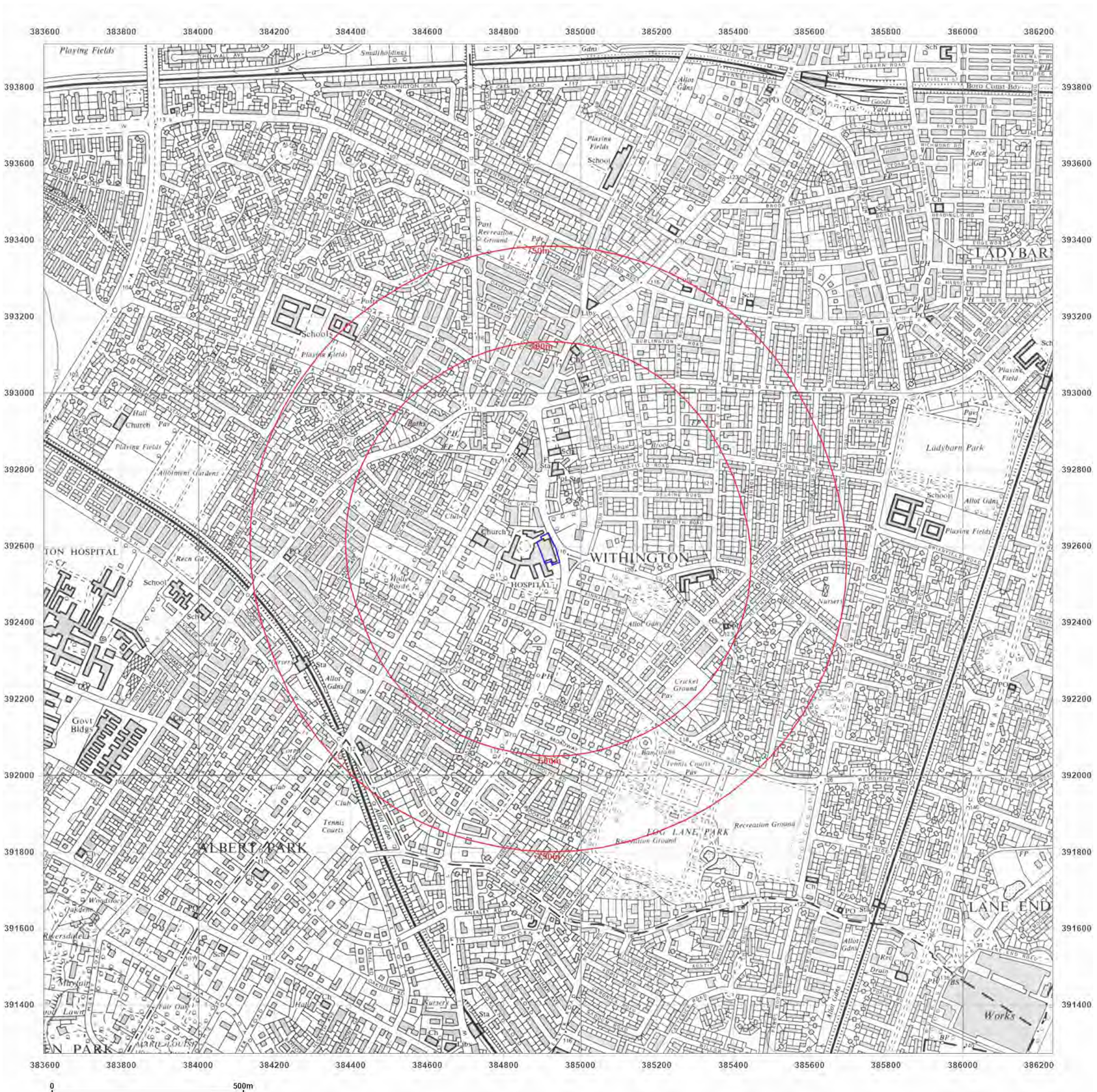
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Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: Provisional
Map date: **1965-1966**
Scale: 1:10,560
Printed at: 1:10,560

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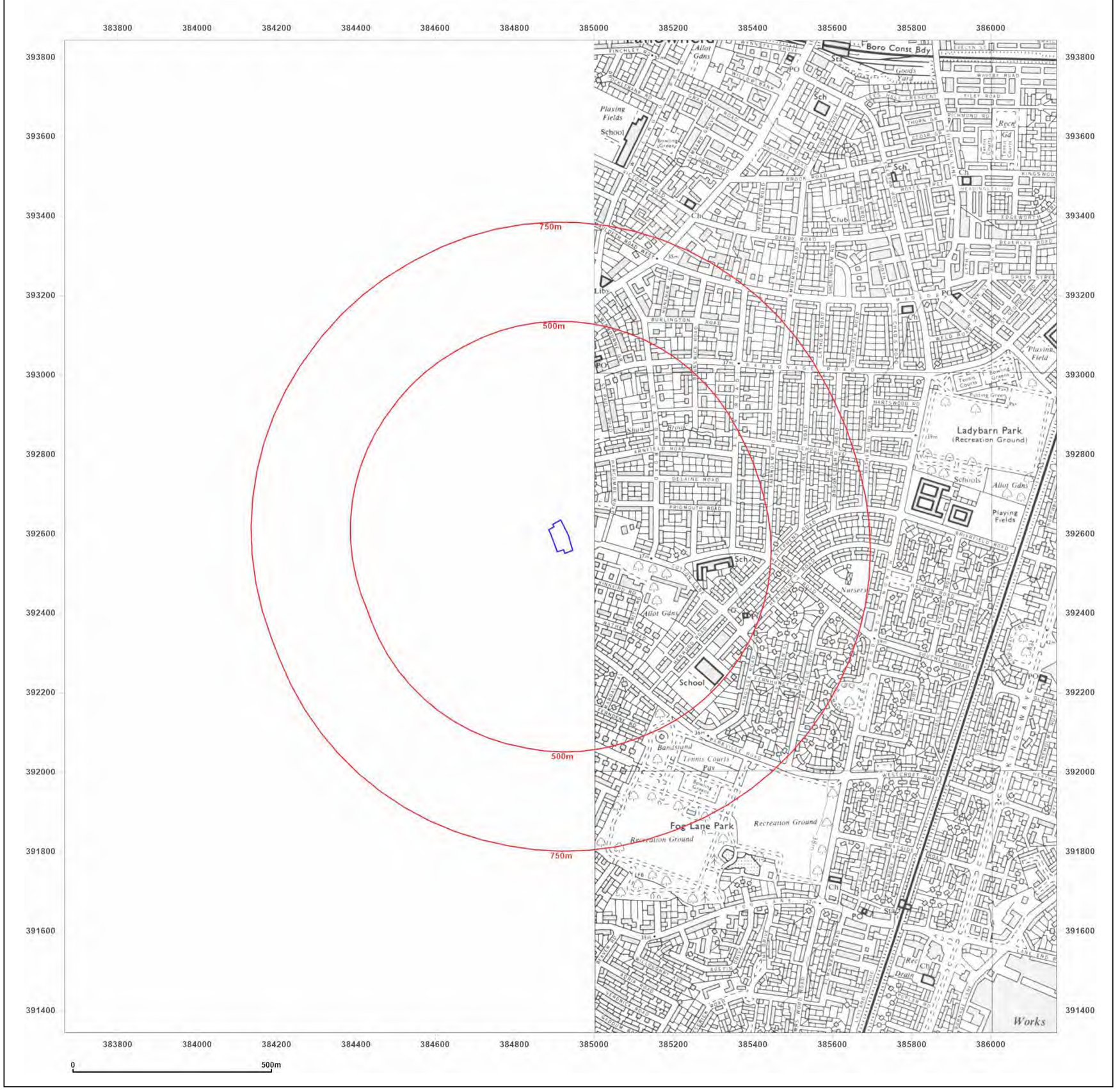
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1976**

Scale: 1:10,000

Printed at: 1:10,000

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Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1981-1983**

Scale: 1:10,000

Printed at: 1:10,000

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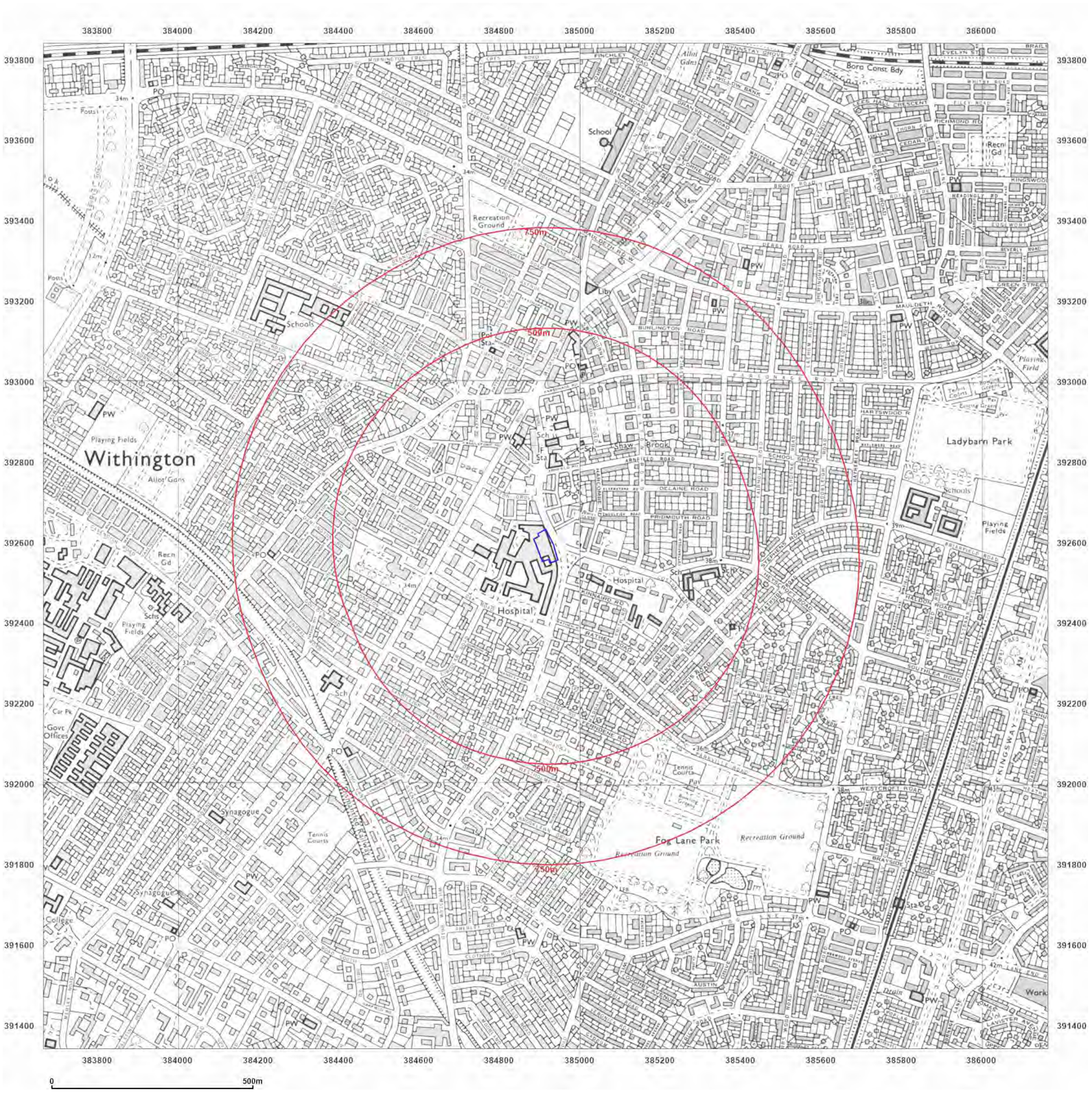
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1988-1989**

Scale: 1:10,000

Printed at: 1:10,000

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
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Map Name: National Grid

Map date: **2001**

Scale: 1:10,000

Printed at: 1:10,000

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2001

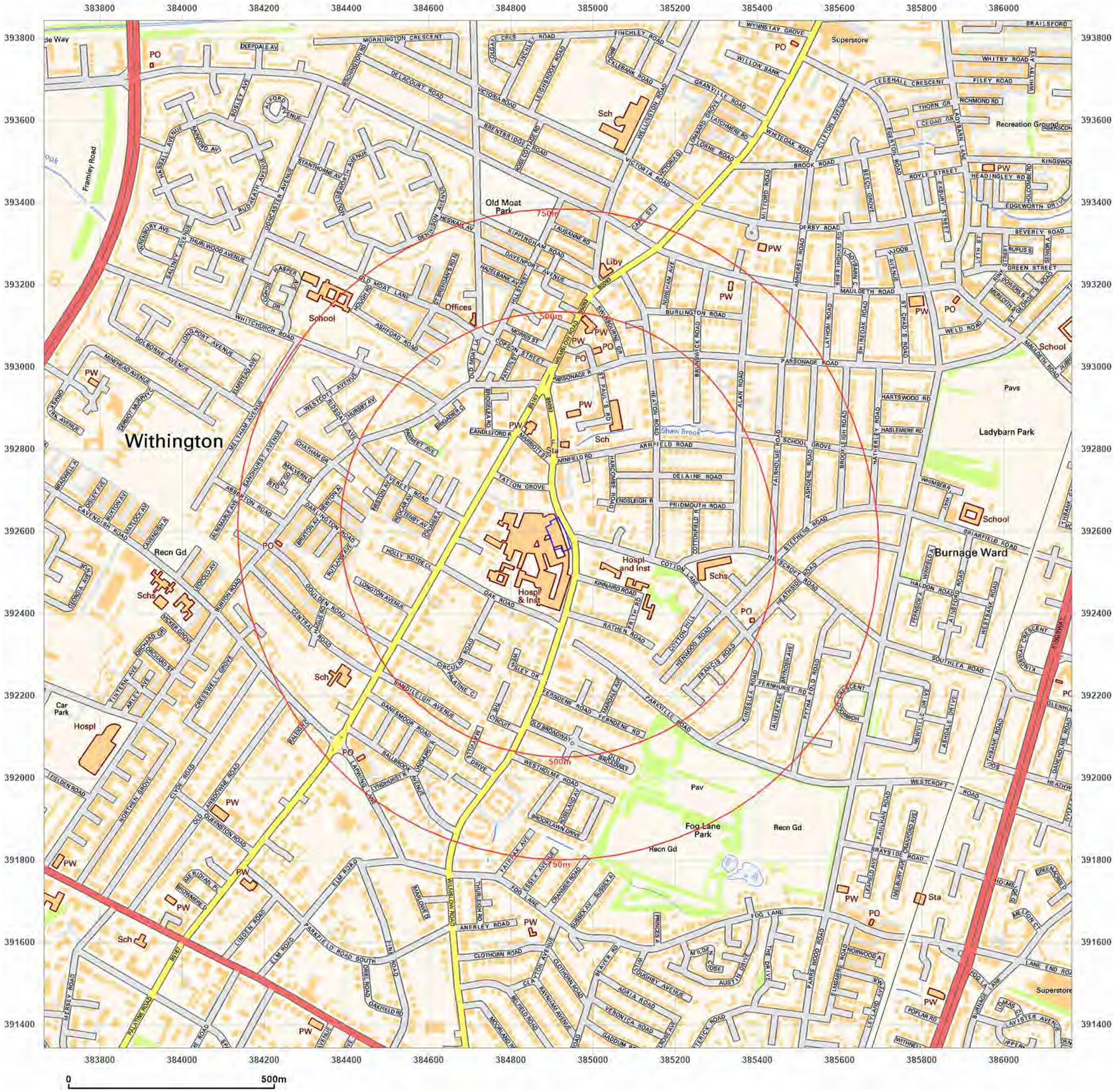
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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2010

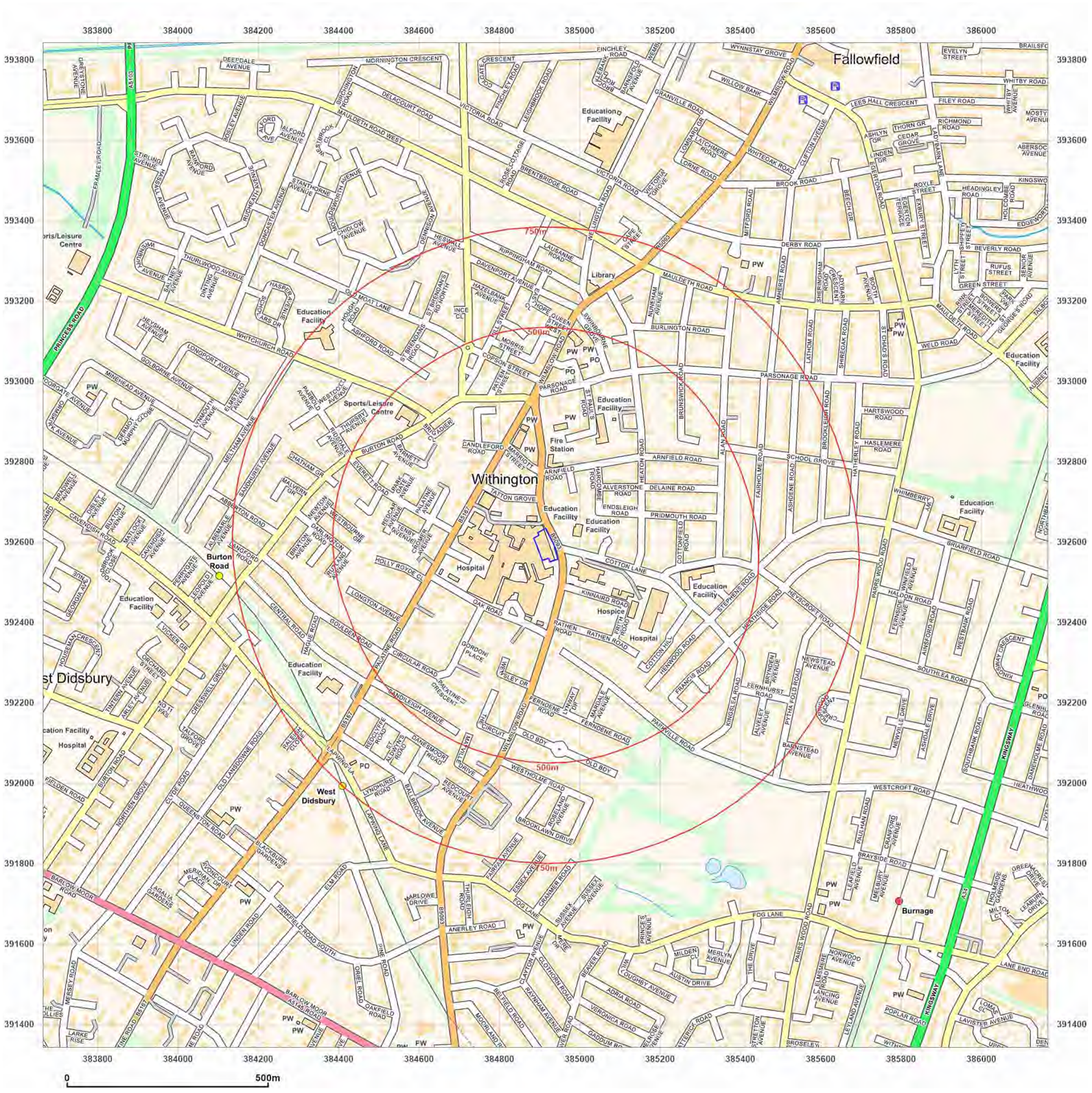
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Site Details:

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **2023**

Scale: 1:10,000

Printed at: 1:10,000

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1881**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1881
Revised N/A
Edition 1881
Copyright N/A
Levelled N/A

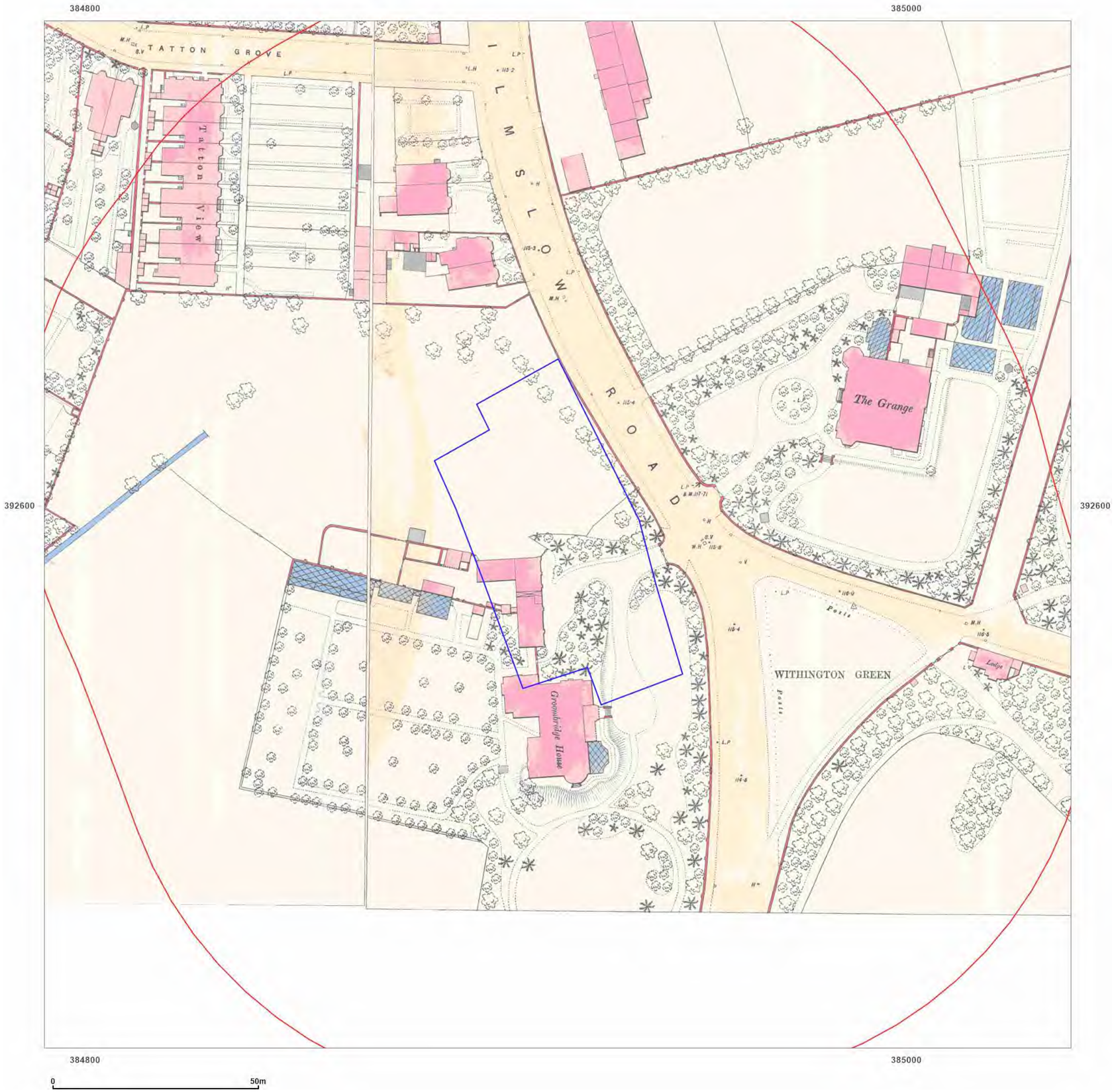
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
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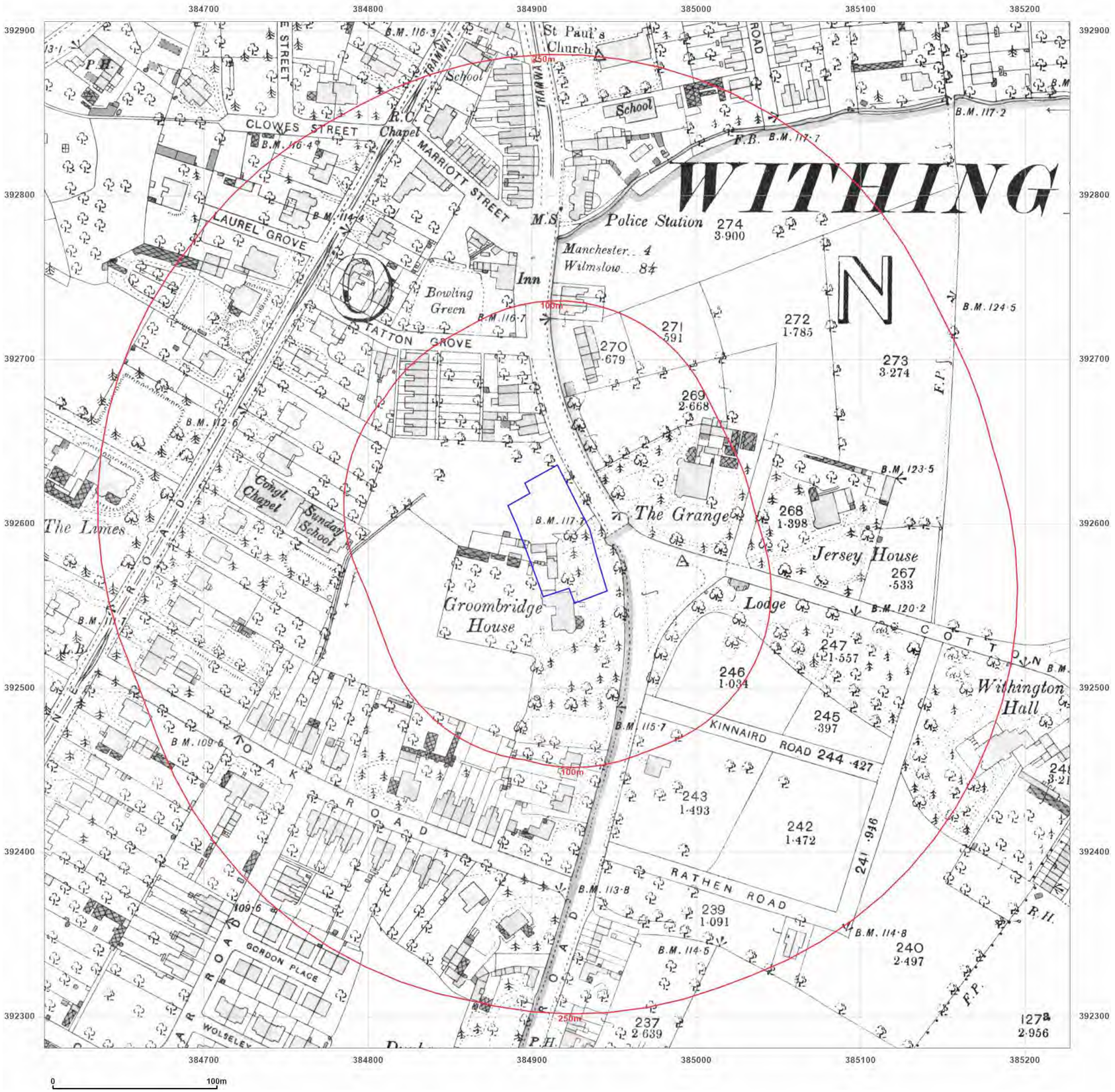
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1894**

Scale: 1:2,500

Printed at: 1:2,500

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

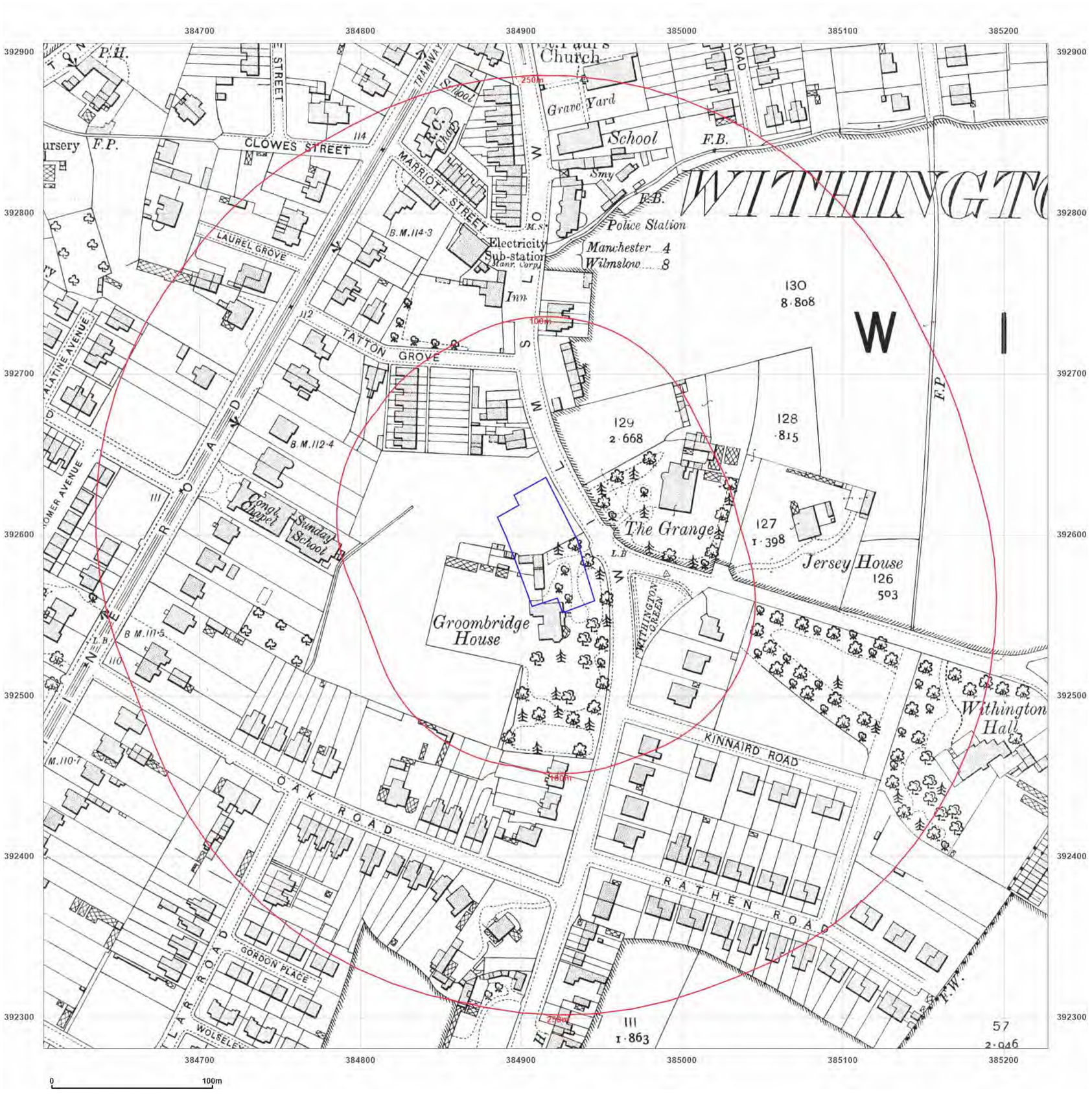
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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1907**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1891
Revised 1905
Edition 1907
Copyright N/A
Levelled N/A

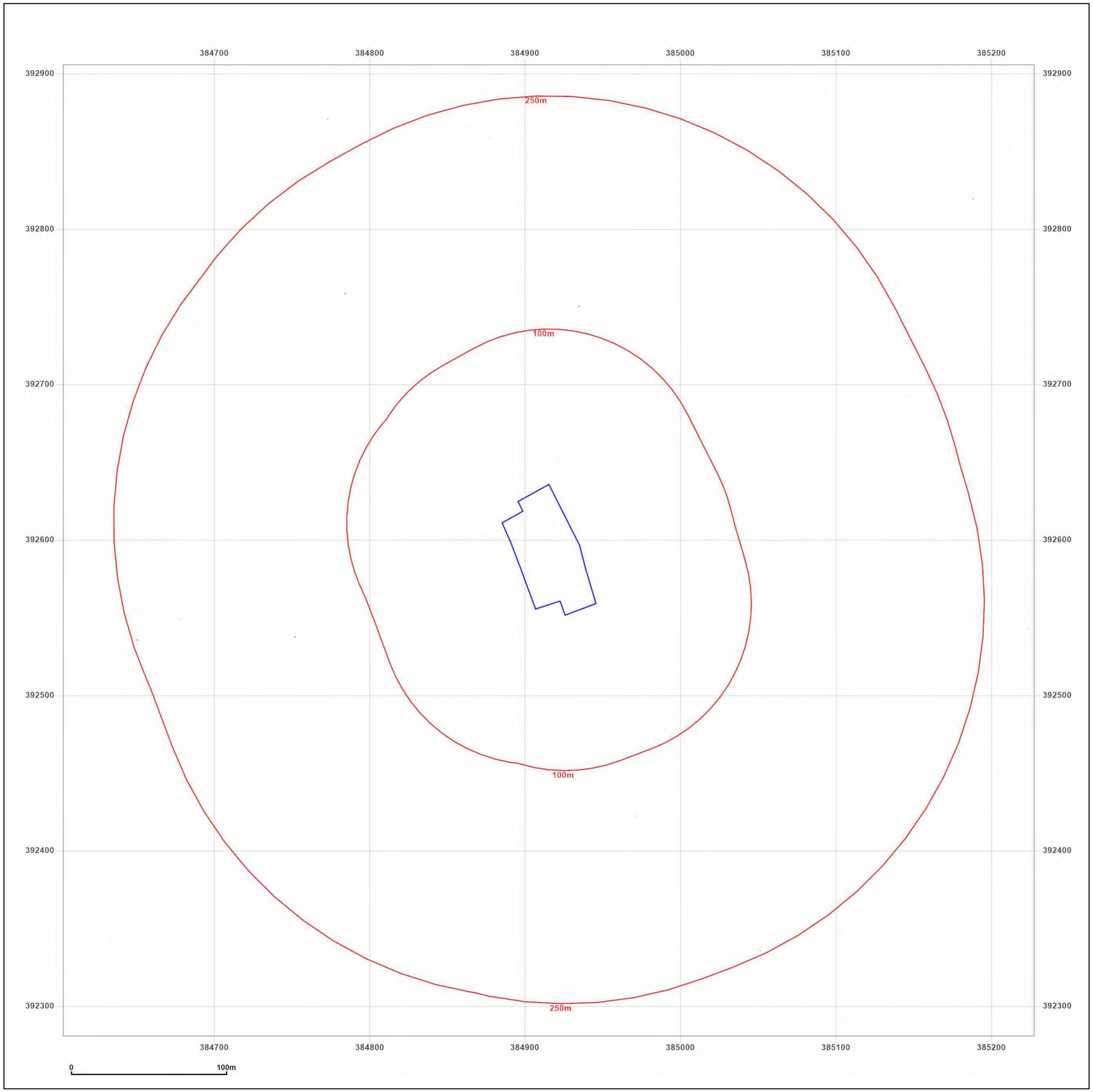
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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1910**

Scale: 1:2,500

Printed at: 1:2,500

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Revised 1908
Edition 1910
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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1922**

Scale: 1:2,500

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Surveyed 1922
Revised 1916
Edition 1922
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Groundsure INSIGHTS

Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: County Series

Map date: **1934**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1873
Revised 1934
Edition N/A
Copyright N/A
Levelled 1927

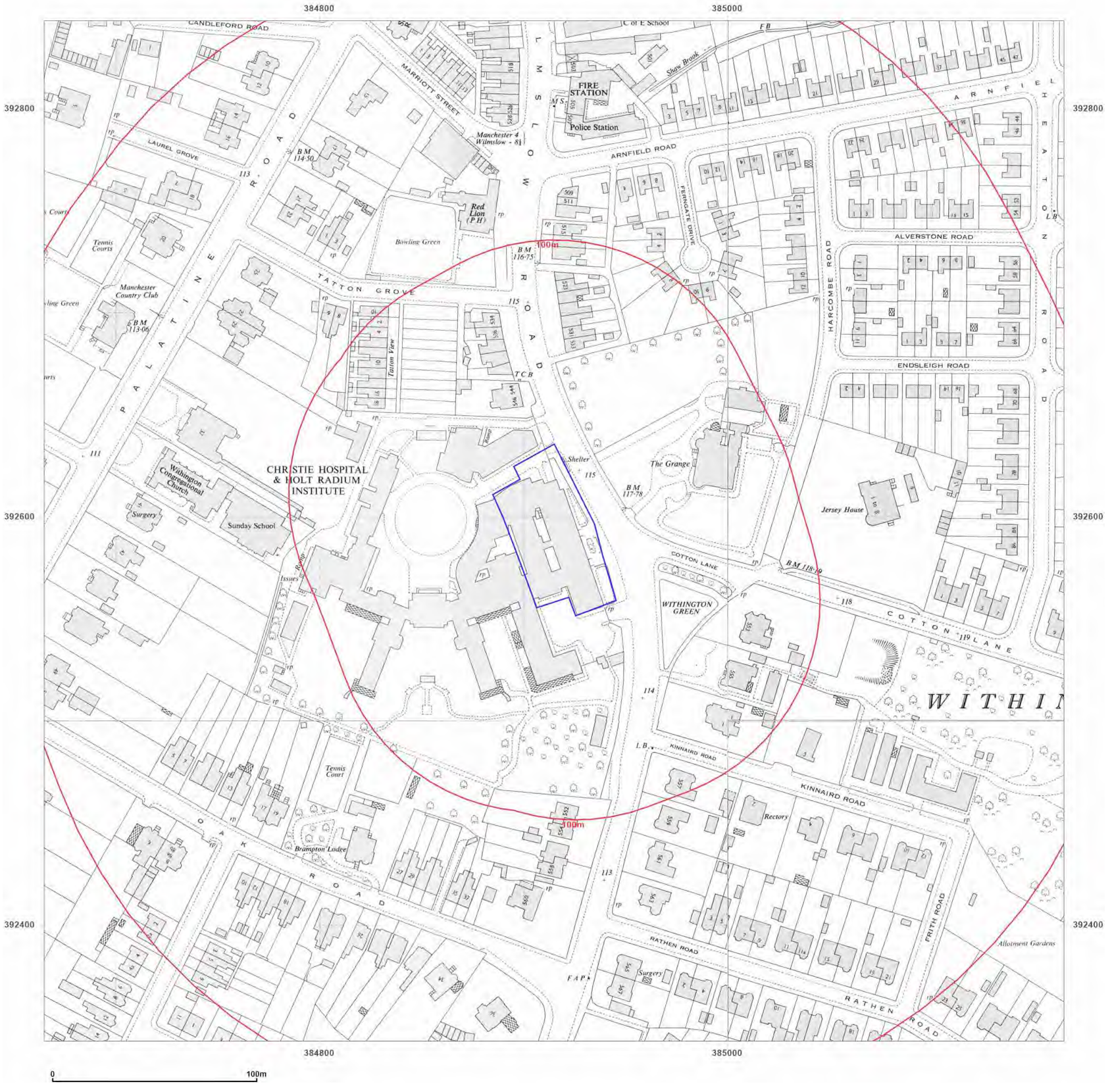
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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1957**

Scale: 1:1,250

Printed at: 1:2,000

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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1958**

Scale: 1:1,250

Printed at: 1:2,000

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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1958-1959**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1957	Surveyed 1957
Revised 1957	Revised 1957
Edition N/A	Edition N/A
Copyright 1958	Copyright 1959
Levelled 1948	Levelled 1949

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Site Details:

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1974-1975**

Scale: 1:1,250

Printed at: 1:2,000

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Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1982-1984**

Scale: 1:1,250

Printed at: 1:2,000

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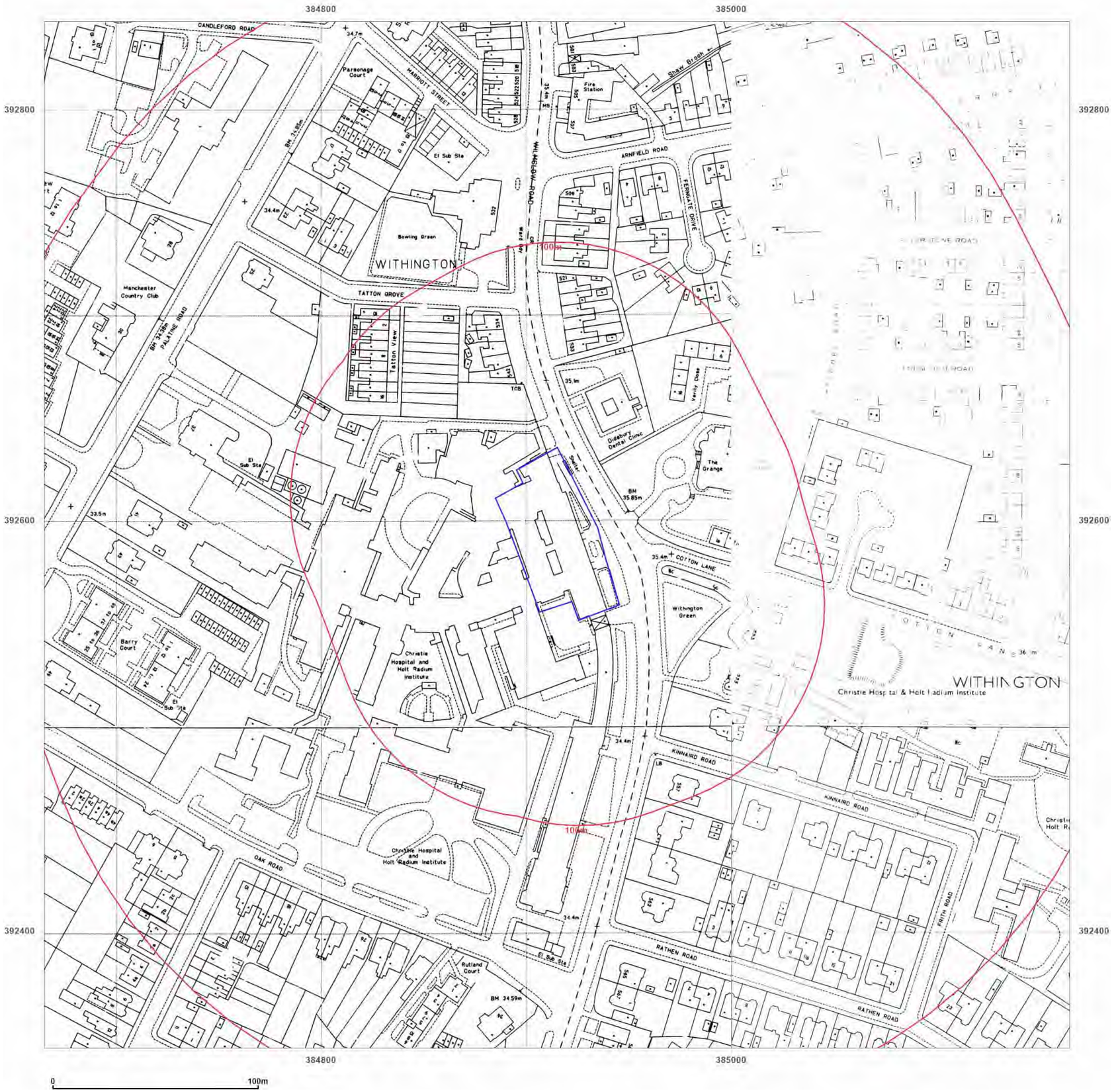
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Site Details:

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Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1988-1992**

Scale: 1:1,250

Printed at: 1:2,000

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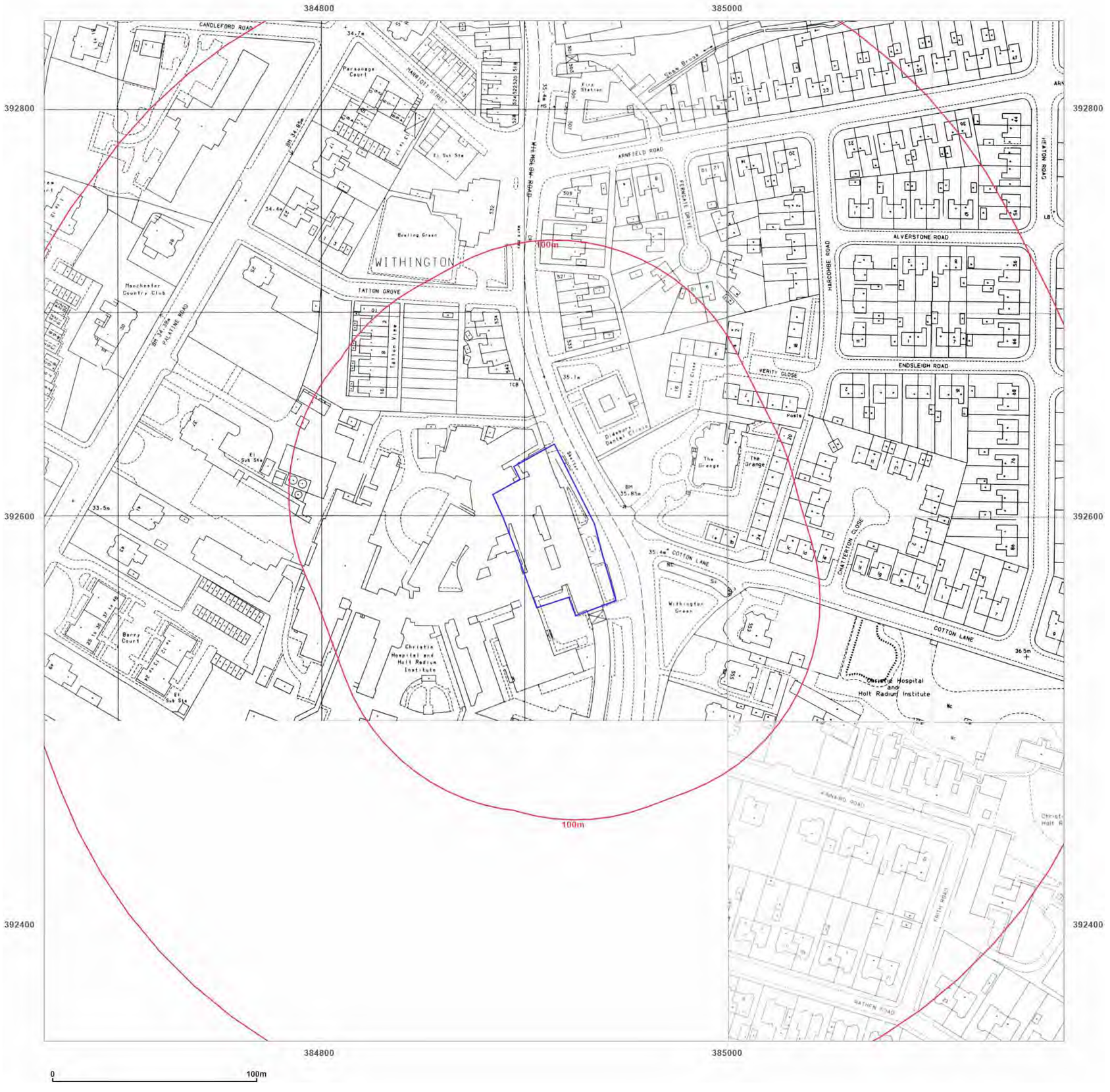
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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1992**

Scale: 1:1,250

Printed at: 1:2,000

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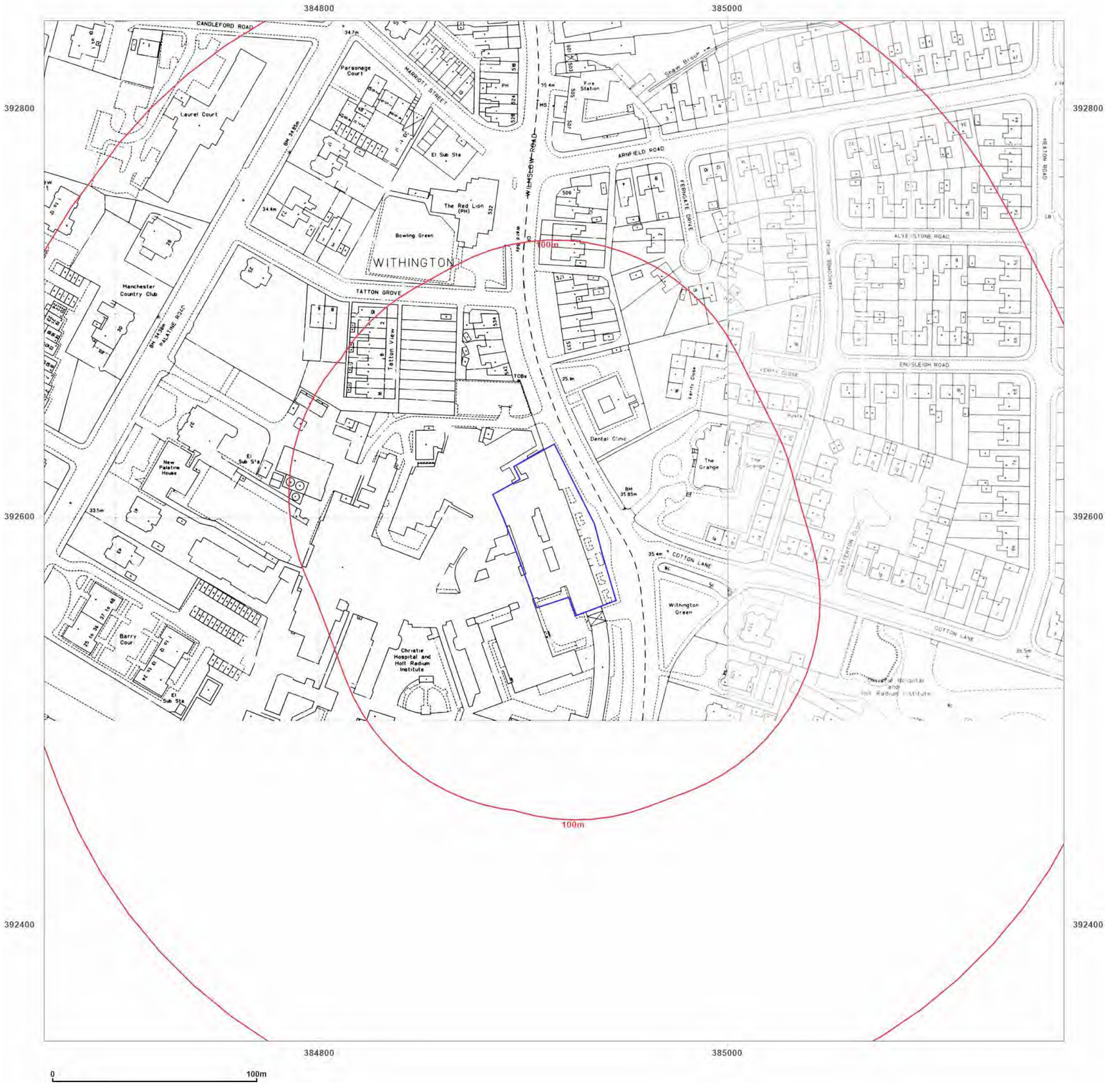
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Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1992-1993**

Scale: 1:1,250

Printed at: 1:2,000

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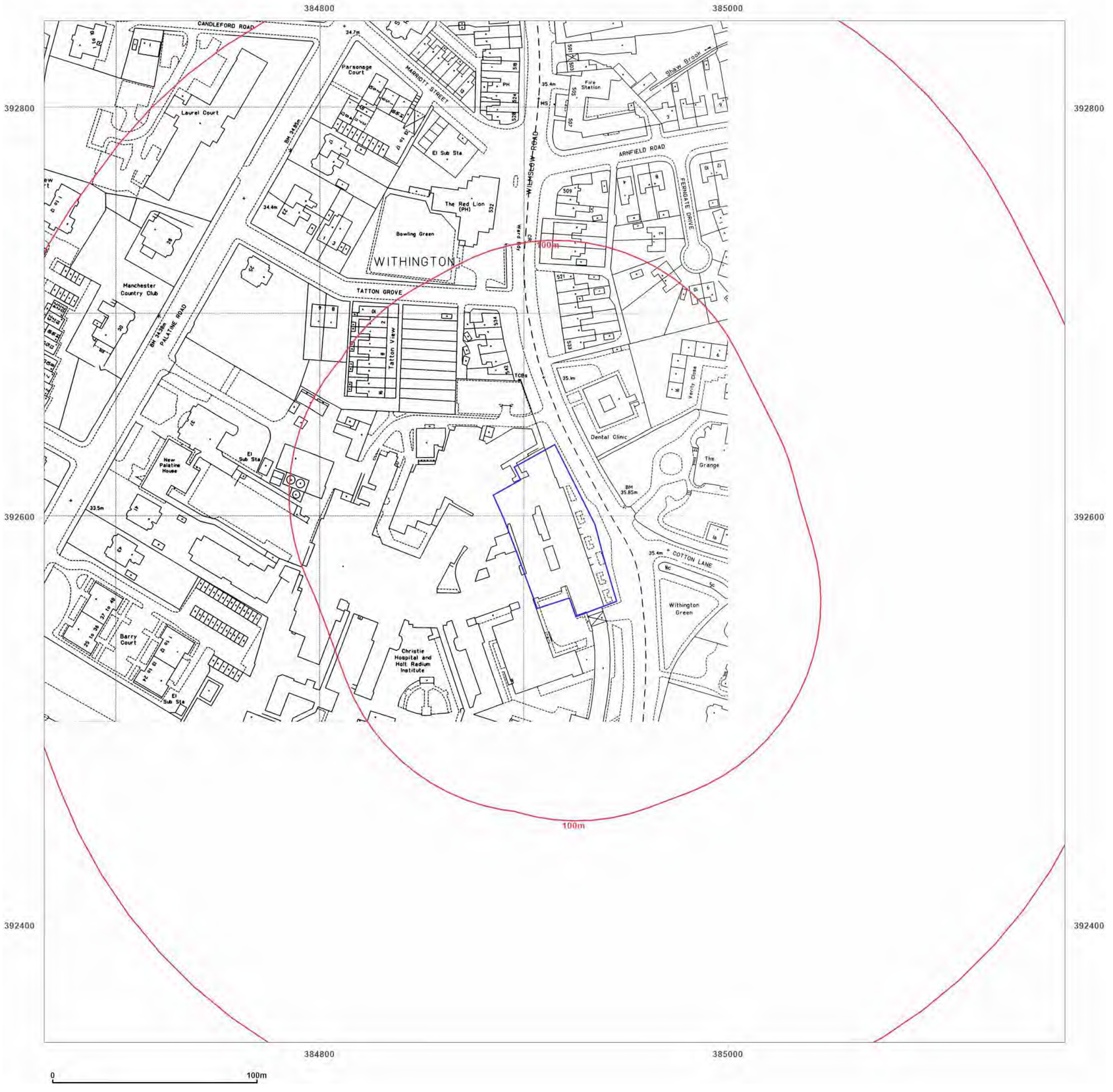
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Groundsure INSIGHTS

Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

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Groundsure INSIGHTS

Site Details:

384918 392598

Client Ref: 10029049
Report Ref: GS-3OZ-Q1Z-94D-LLF
Grid Ref: 384915, 392593

Map Name: LandLine

Map date: **2003**

Scale: 1:1,250

Printed at: 1:1,250

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B. Qualitative Contaminated Land Risk Assessment Methodology

The following classification published by the NHBC, EA and CIEH's *Guidance for the Safe Development of Housing on Land Affected by Contamination* (2008)[1] has been developed from the Department of the Environment's guidance *A Guide to Risk Assessment and Risk Management for Environmental Protection* (1995)[2]. The methodology differs from that presented in *Contaminated land risk assessment A guide to good practice* (CIRIA, 2001)[3], particularly in terms of the definitions of classification of consequence, which include a consideration of immediacy of hazards.

The key to the classification is that the designation of risk is based upon the consideration of both:

- The magnitude of the potential consequence (i.e., severity) which considers both the potential severity of the hazard and the sensitivity of the receptor
- The magnitude of probability (i.e., likelihood) which considers both the presence of the hazard and receptor and the integrity of the pathway.

The potential consequences of contamination risks occurring at this site are classified in accordance with Table B.1.

Table B.1: Classification of Consequence

Classification	Definition
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.
Mild	Exposure to human health unlikely to lead to "significant harm". Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce.

[1] NHBC, EA and CIEH. (2008) *Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D66:2008 Volume 1*.

[2] Department of the Environment. (1995) *A Guide to Risk Assessment and Risk Management for Environmental Protection*. London: Department of the Environment.

[3] CIRIA. (2001) *Contaminated land risk assessment A guide to good practice*. Basingstoke: Basingstoke Press.

Classification	Definition
	Minor or short-lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.

Source: NHBC, EA and CIEH (2008) Table A4.3.

The probability of contamination risks occurring at the site is classified in accordance with Table B.2. Note: A pollution linkage must first be established before probability is classified. If there is no pollution linkage, then there is no potential risk and no need to apply tests for probability and consequence.

Table B.2: Classification of Probability

Classification	Definition
High likelihood	There is a pollutant linkage and an event that either appears very likely in the short term or almost inevitable over the longer term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage and all elements are present and in the right place which means it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long-term.
Low likelihood	There is a pollutant linkage and circumstances are possible under which an event would occur. However, it is by no means certain that even over a longer period such event would take place, and it is less likely in the shorter term.
Unlikely	There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur even in the very long-term.

Source: NHBC, EA and CIEH (2008) Table A4.4.

For each possible pollution linkage (source – pathway – receptor) identified, the potential risk can be evaluated based upon the following probability x consequence matrix shown in Table B.3.

Table B.3: Qualitative Contamination Risk Matrix

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High likelihood**	Very High risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate / Low risk	Low risk
	Low likelihood	Moderate risk	Moderate / Low risk	Low risk	Very Low risk
	Unlikely	Moderate / Low risk	Low risk	Very Low risk	Very Low risk

Source: NHBC, EA and CIEH (2008) Table 1.8.

NHBC, EA and CIEH (2008) presents descriptions of these risk levels which are reproduced in Table B.4. The risks apply to each pollutant linkage, not simply to each hazard or receptor.

Table B.4: Description of Risk Levels

Term	Description
Very High risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action.
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action.

Term	Description
Moderate risk	It is possible that without appropriate remediation action harm could arise to a to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be mild.
Low risk	It is possible that harm could arise to a designated receptor from identified hazard. It is likely that, at worst, if any harm was realised the effects would be mild.
Very Low risk	The presence of an identifies hazard does not give rise to the potential to cause harm to a designated receptor.

Source: NHBC, EA and CIEH (2008) Table1.9.

C. Site Walkover

Figure C.1: Interface with Paterson Building



Figure C.2: Northern extent of site



D. Zetica UXO Pre-Desk Study Assessment

zeticaUXO

Pre-Desk Study Assessment

Site:	The Christie, Withington, Manchester
Client:	Mott MacDonald
Contact:	Lucy Brooks
Date:	31st July 2023
Pre-WWI Military Activity on or Affecting the Site	None identified.
WWI Military Activity on or Affecting the Site	None identified.
WWI Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ Transport infrastructure and public utilities. ■ Industries important to the war effort, including aircraft manufacturing and engineering works. ■ Royal Flying Corps (RFC) Alexandra Park. ■ Anti-Aircraft (AA) guns.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	None identified.
WWII Military Activity on or Affecting the Site	None identified.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ Transport infrastructure and public utilities. ■ Industries important to the war effort, including aircraft manufacturing and engineering works. ■ AA defences.
WWII Bombing Decoys (within 5km of Site)	None.

WWII Bombing	During WWII the Site was located in the County Borough (CB) of Manchester, which officially recorded 737No. High Explosive (HE) bombs with a bombing density of 27 bombs per 405 hectares (ha). The Manchester area was heavily bombed between the 22nd and 24th December 1940 (the 'Manchester Blitz'). Over 400No. HE bombs and more than 30,000 Incendiary Bombs (IBs) fell across the region. Readily available records have been found to indicate that several HE bombs fell in close proximity to the Site.
Post-WWII Military Activity on or Affecting the Site	None identified.
Recommendation	It is recommended that a detailed desk study is commissioned to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the Site.
Further information	For information about Zetica's detailed UXO desk studies and other UXO services, please visit our website: www.zeticauxo.com. Details and downloadable resources covering the most common sources of UXO hazard affecting sites in the UK can be found **here**. If you have any further queries, please don't hesitate to get in contact with us at uxo@zetica.com or 01993 886 682.

This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary.

It should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.

E. Paterson Ground Investigation (CCG, 2019)



CCG-C-18-10614

GROUND INVESTIGATION REPORT FOR SITE AT

THE CHRISTIE, MANCHESTER

PATERSON REDEVELOPMENT PROJECT

APRIL 2019

Prepared by:

CC GEOTECHNICAL LTD

Unit 1 Deltic Way
Knowsley Industrial Estate
Liverpool
Merseyside
L33 7BA

Telephone: 0151 545 2750
Facsimile: 0151 548 7892

Consulting Engineers:

OVE ARUP & PARTNERS LTD

9th Floor, 3 St Paul's Place
Norfolk Street
Sheffield, S1 2JE

Telephone: 0114 283 3686

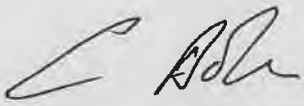
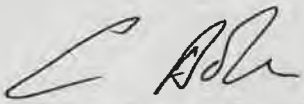
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INTERSERVE CONSTRUCTION LTD

Woodhouse Drive
Wigan
WN6 7NT

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Reference Number:	CCG-C-18-10614
Main Author:	Daniel O'Regan BSc(Hons) PIEMA
Signature:	
Reviewed by:	Chris Bolan CEng MICE CEnv
Signature:	
Approved for Issue by:	Chris Bolan CEng MICE CEnv
Signature	
	For and behalf of CC GEOTECHNICAL LTD
Date:	March 2019
Revision Number:	0
Comments:	
Status:	Final
Distribution:	**INTERSERVE CONSTRUCTION LTD** **ARUP**

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1.0 INTRODUCTION

CC GEOTECHNICAL LTD **(*CCG*)** was commissioned by ***OVE ARUP & PARTNERS LTD (ARUP)*** acting as The Engineer, on behalf of The Client ***INTERSERVE CONSTRUCTION LIMITED***, to carry out ground investigation works for The Christie NHS Foundation Trust (The Christie) in connection with the Paterson Redevelopment project, at The Christie, Manchester, where it is proposed the existing Paterson building be demolished and replaced with the construction of a new medium-rise research building with an associated new basement structure.

The purpose of the Ground Investigation was to obtain geotechnical and geoenvironmental data relevant to the selection and design of foundation and substructure elements of the proposed development.

The investigation works were carried out in accordance with the Ground Investigation Specification – 263083-00 – P02 – September 2018 – issued by ***ARUP***.

This factual report is a compilation of the findings of the investigation and associated testing.

It must be borne in mind that the data and/or opinions contained in this report should be read in conjunction with the Notes on Limitations, given in Appendix J.

2.0 SITE LOCATION AND DESCRIPTION

This site is situated within the grounds of The Christie complex, off Wilmslow Road, Manchester, M20 3DB, centred at Ordnance Survey National Grid Reference SJ 84924 92461. Site location plans are presented on ***ARUP*** Drawings Figure 1 - 3 in Appendix A.

The site is currently occupied by the existing 4-storey Paterson Building, which has suffered fire damage on the upper floors.

The site investigation works were carried out over two distinct areas – adjacent to the eastern and western elevations of the Paterson Building. No works were carried out within the existing building footprint.

3.0 DOCUMENTED GEOLOGY

The natural geology prevailing at the site was researched by reference to BGS records. These indicate that the site is underlain by drift deposits of Glacial Till. The solid geology comprises Chester Formation - Sandstone. Sedimentary Bedrock formed approximately in the Triassic Period. Given the history of development of the site it was known that made ground would be present at the surface of the site.

4.0 SCOPE OF INVESTIGATION

The fieldwork was planned in accordance with BS10175: 2013 and was carried out in accordance with BS10175: 2013 and BS5930: 2015, insofar as they related to the scope of the investigation. Investigation works were carried out in January / February 2019 and comprised:

- The sinking of 4nr boreholes (BH01-BH04) to rockhead by cable percussion methods, and further advanced by rotary coring methods in the bedrock to depths of up to 25.0mbgl.

  Logs of the boreholes annotated with SPT "N" values, disturbed sampling details, TCR, SCR, RQD, and I_f values, and standpipe construction details are given in Appendix B.

  Photographs of rock cores are presented in Appendix F.

- The sinking of a single borehole (WS01) to rockhead by dynamic sampling methods to a depth of 2.4mbgl.

  A log of the borehole annotated with SPT "N" values and sampling details, is given in Appendix B.

- The mechanical excavation of 3nr trial pits (TP01-TP03) to depths of 2.9mbgl.

  Logs of the trial pits are given in Appendix C.

- The manual excavation of 9nr foundation observation pits (OP01-OP09) to determine the existing foundation depths and projections.

  Sketches of the observation pits are presented in Appendix D.

- The determination of permeability values by insitu variable head tests (both falling and rising head test methods) carried out in accordance with both BS EN ISO 5930:1999 and BS EN ISO 22282:2012.

  The test worksheets are presented in Appendix E.

The layout of the investigation is presented on ***CCG*** Drawings 1 - 3 in Appendix A.

5.0 LABORATORY TESTING

5.1 Soil & Rock Engineering Testing

The following programme of soil and rock engineering testing was undertaken:

- Determination of soil moisture content in accordance with BS 1377: Part 2: 1990 – 8nr tests.
- Determination of Atterberg Limits in accordance with BS 1377: Part 2: 1990 - 5nr tests.
- Determination of particle size distribution by wet sieving in accordance with BS 1377: Part 2: 1990 - 4nr tests
- Determination of sedimentation distribution by pipette in accordance with BS 1377: Part 2: 1990 - 3nr tests.
- Determination of unconsolidated undrained triaxial compression with measurement of pore pressure in accordance with BS 1377: Part 7: 1990 - 1nr test.
- Determination of point load strength of rock in accordance with ISRM 1985: Suggested method - 24nr tests
- Determination of Uniaxial Compressive Strength of rock in accordance with ISRM 2007: Suggested Method - 3nr tests
- Determination of Unconfined Compressive Strength with Youngs Modulus & Poissons Ratio of rock in accordance with ISRM 1981: Suggested Method – 3nr tests

The engineering testing was largely carried out in the UKAS accredited laboratory of ***CCG***. The test results are presented in Appendix G.

5.2 Chemical Analyses

The following programme of chemical analyses was undertaken at a UKAS/MCERTs laboratory as detailed within the specification and listed hereunder:

Suite E1 (General) - 7nr soil samples analysed:

- Arsenic
- Cadmium
- Chromium (total)
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Zinc
- Antimony
- Beryllium
- Vanadium
- Cyanide (total)
- pH
- Boron (water soluble)
- Phenols (total)
- Total Organic Carbon

Suite E2a - 8nr soil samples analysed:

- Asbestos I.D (soil only)

Suite H - 1nr soil sample analysed:

- Waste acceptance (total soils)

The soil chemical test results are presented in Appendix H.

6.0 GAS & GROUNDWATER MONITORING

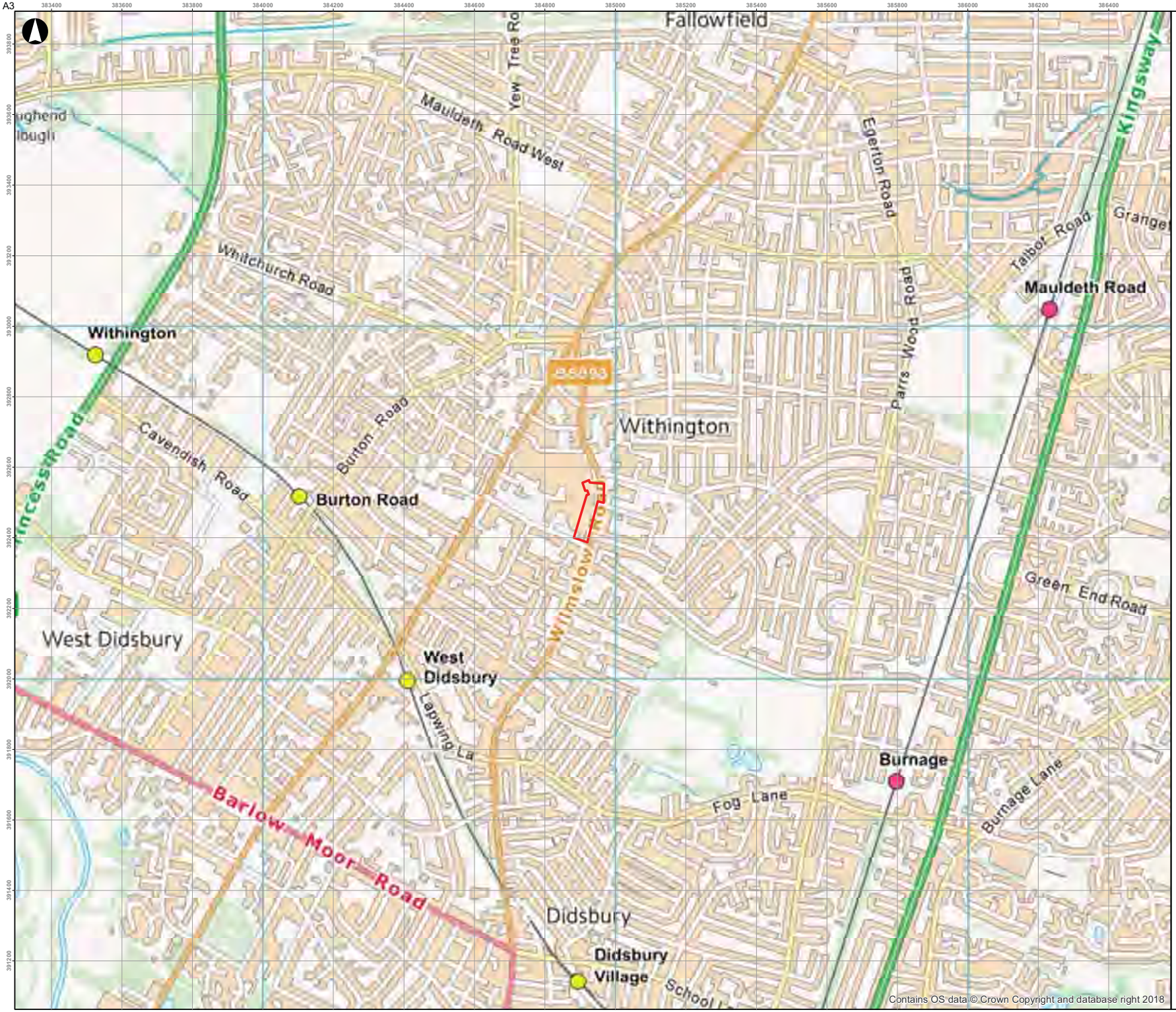
Monitoring standpipe wells were installed in 3nr boreholes (BH01, BH02 & BH04). Each installation was periodically monitored for flow rate and composition of ground gas using a LMsXi infra-red analyser. Immediately following monitoring for gases, the standing water levels were recorded by electronic dipmeter.

The results of the gas and groundwater monitoring, together with calibration certificates of the instruments are given in Appendix I.

APPENDIX A

DRAWINGS

A3



Legend

Site Boundary

Issue	Date	By	Chkd	Appd
P0	2018-08-10	PST	HB	JH

Metres

0 137.5 275 550

ARUP

Arup
6th Floor, 3 Piccadilly Place,
Manchester
M1 3BN
United Kingdom

Client

Interserve Construction Limited

Job Title

Paterson Redevelopment Building

Site location

Scale at A3

1:10,000

Job No	Drawing Status
263083-00	**Preliminary**

Drawing No	Issue
Figure 1	**P0**

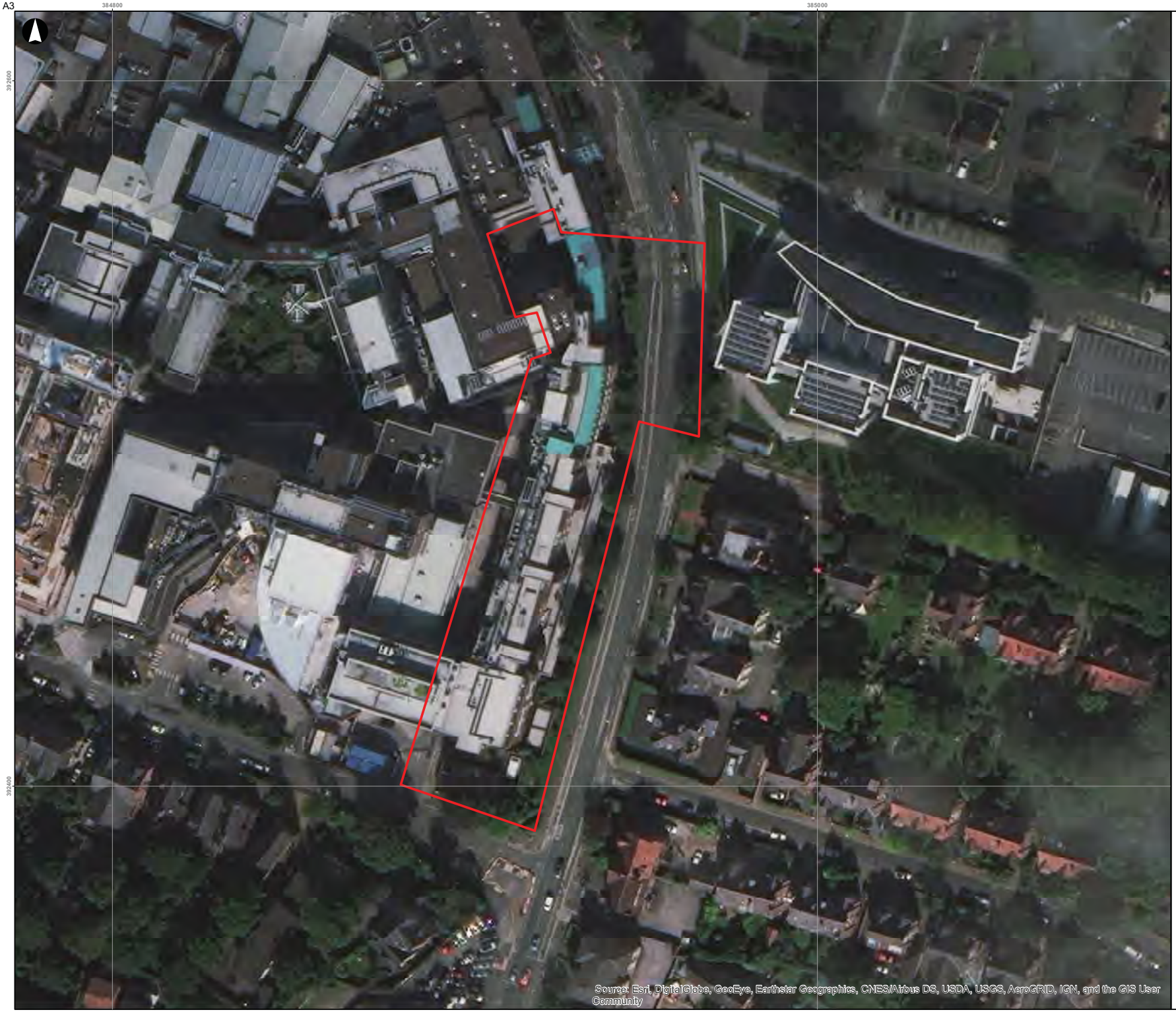
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\\GlobalEurope\Manchester\Jobs\260000\263083-00\4 Internal Project Data\4-03 Drawings\C_Civil\CG_Geotechnics\GIS_Paterson redevelopment_Quick.mxd

Template A3: Version 2

© Arup

A3



Legend

Site Boundary

Issue	Date	By	Chkd	Appd
P0	2018-08-10	PST	HB	JH

Metres

0 12.5 25 50

ARUP

Arup
6th Floor, 3 Piccadilly Place,
Manchester
M1 3BN
United Kingdom

Client

Interserve Construction Limited

Job Title

Paterson Redevelopment Building

Site boundary

Scale at A3

1:1,000

Job No	Drawing Status
263083-00	**Preliminary**

Drawing No	Issue
Figure 2	**P0**

17/08/2018 11:48:33

\\GlobalEurope\Manchester\Jobs\260000\263083-00\4 Internal Project Data\4-03 Drawings\C_Civil\CG_Geotechnics\GIS_Paterson redevelopment_Quick.mxd

Template A3: Version 2

© Arup

A3



Legend

Phase

- 1 & 2
- 3 & 4
- 5 & 6
- 7

The Christie buildings. Data

- No
- Yes

Issue	Date	By	Chkd	Appd
P0	2018-08-20	PST	PST	PST

Metres
0 10 20 40

ARUP

Client
Interserve Construction Limited

Job Title
Paterson Redevelopment Building

Phases of construction

Scale at A3
1:750

Job No	Drawing Status
263083-00	**Preliminary**

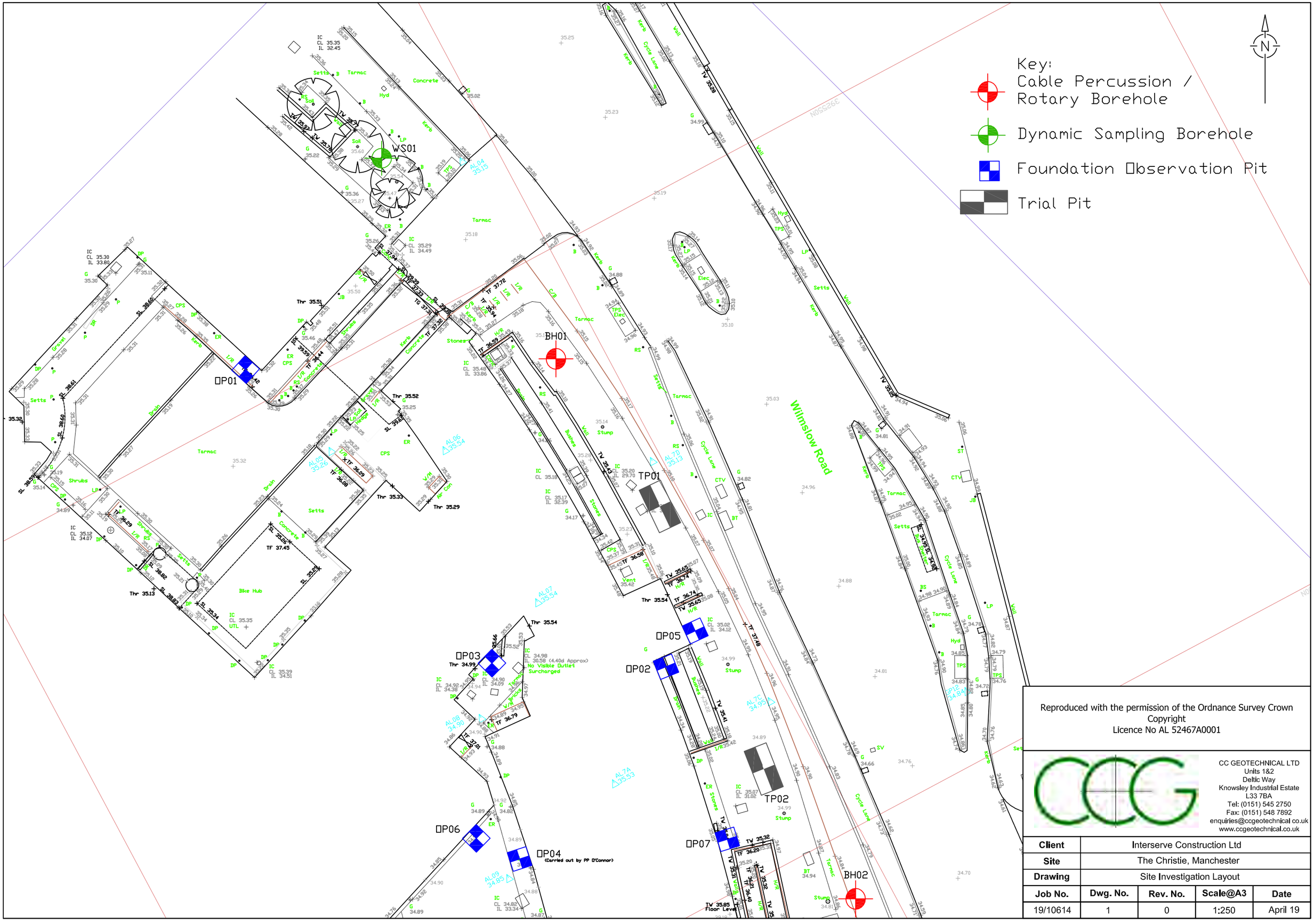
Drawing No	Issue
Figure 3	**P0**

20/08/2018 11:58:43

\\Global\europe\Manchester\Jobs\250000\263083-00\4 Internal Project Data\4-03 Drawings\C_Civil\CG_Geotechnics\GIS_Paterson redevelopment_Quick.mxd

Template A3: Version 2

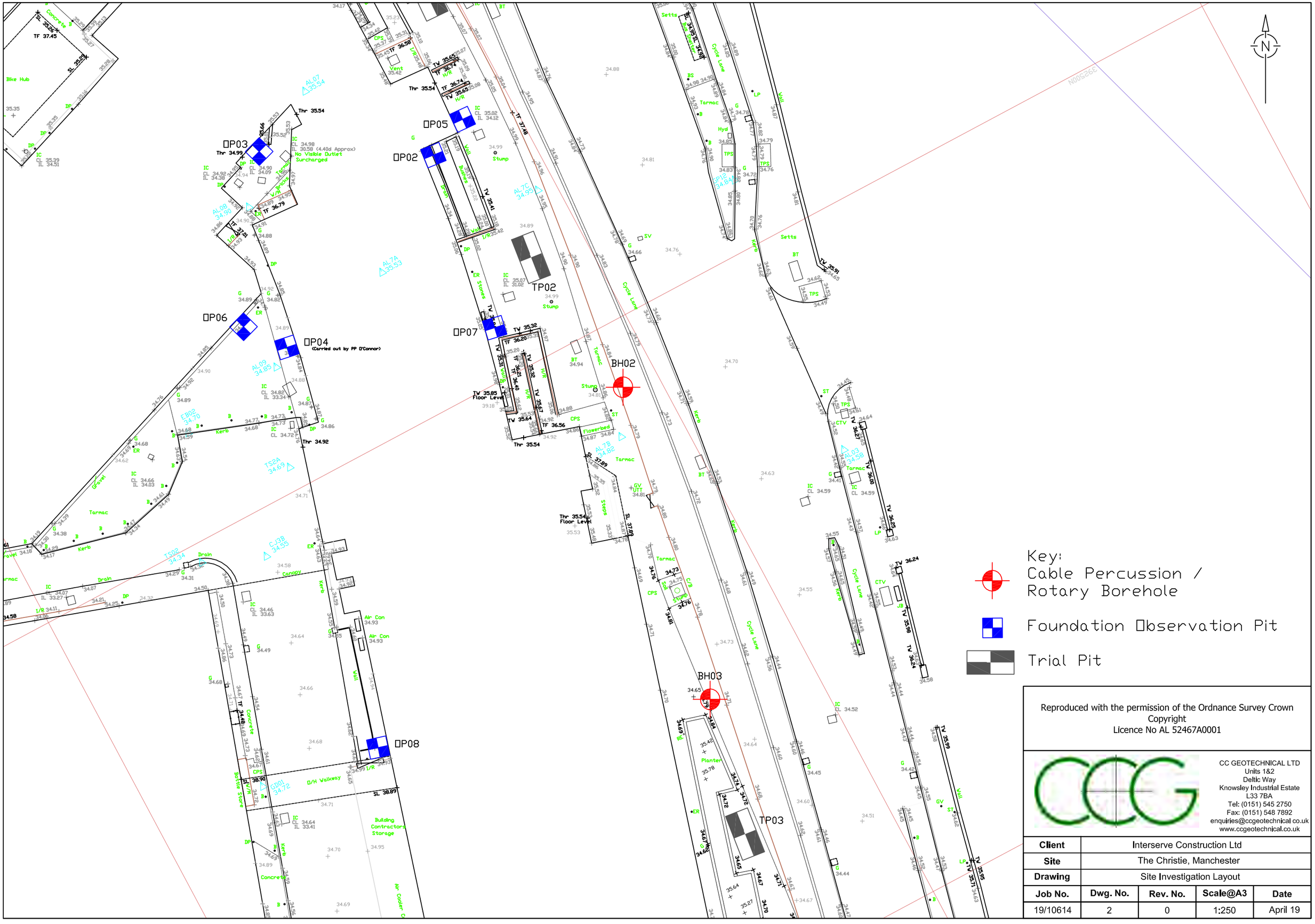
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CC GEOTECHNICAL LTD
Units 1&2
Deltic Way
Knowsley Industrial Estate
L33 7BA
Tel: (0151) 545 2750
Fax: (0151) 548 7892
enquiries@ccgeotechnical co.uk
www.ccgeotechnical.co.uk

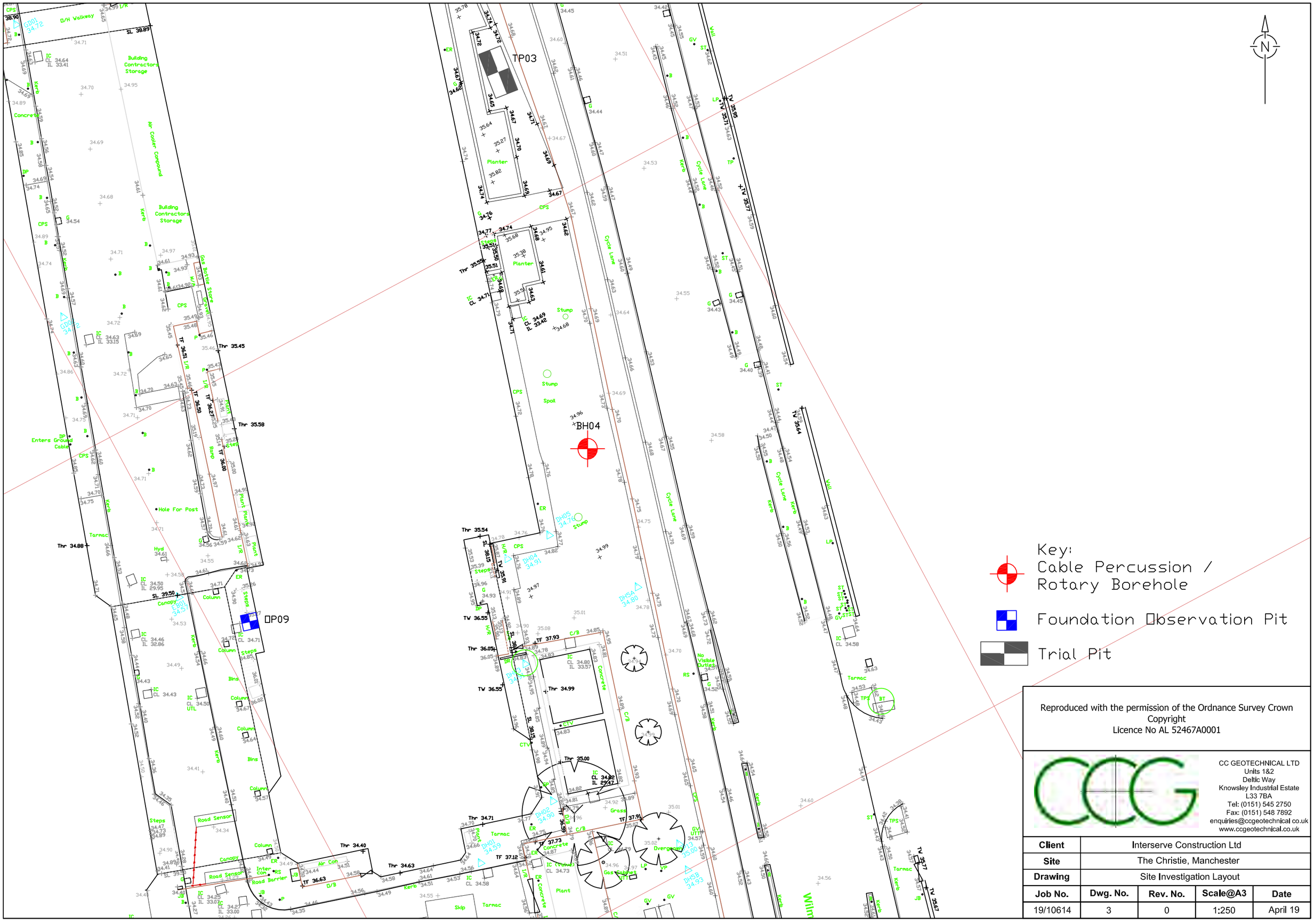
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Site	The Christie, Manchester			
Drawing	Site Investigation Layout			
Job No.	**Dwg. No.**	**Rev. No.**	**Scale@A3**	**Date**
19/10614	1	0	1:250	April 19



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CC GEOTECHNICAL LTD
Units 1&2
Deltic Way
Knowsley Industrial Estate
L33 7BA
Tel: (0151) 545 2750
Fax: (0151) 548 7892
enquiries@ccgeotechnical co.uk
www.ccgeotechnical.co.uk

Client	Interserve Construction Ltd			
Site	The Christie, Manchester			
Drawing	Site Investigation Layout			
Job No.	Dwg. No.	Rev. No.	Scale@A3	Date
19/10614	2	0	1:250	April 19



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Units 1&2
Deltic Way
Knowsley Industrial Estate
L33 7BA
Tel: (0151) 545 2750
Fax: (0151) 548 7892
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Client	Interserve Construction Ltd			
Site	The Christie, Manchester			
Drawing	Site Investigation Layout			
Job No.	Dwg. No.	Rev. No.	Scale@A3	Date
19/10614	3	0	1:250	April 19

APPENDIX B

BOREHOLE LOG SHEETS

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH01**
	Contract Number: CCG-C-18-10614	Date Started: 24-01-2019	Logged By: LT	Checked By: CB	Status: FINAL — Sheet 1 of 3
Cable Percussion Borehole Log	Easting: 384946.8	Northing: 392535.6	Ground Level: 35.26mAOD	Plant Used: DANDO 3000	Rig Crew: AH/DB DB/AH — Scale: 1:50
Weather:		Termination:		SPT Hammer: CCG6 Energy Ratio: 68%	

Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	TCR	SCR	RQD	Fracture	Water
			34.86	(0.40)	SUB-BASE					
0.50	B			0.40	Brown very gravelly very silty slightly sandy CLAY, with rootlets. Gravel is sub-angular to sub-rounded to sub-angular brick and sandstone (MADE GROUND)					
1.00	B			(1.00)						
		SPT(S)N=11 (1,2/2,3,3,3)	33.86	1.40						
1.50	B				Medium dense clayey silty gravelly fine to coarse grained SAND. Gravel is fine to medium sub-angular to sub-rounded sandstone					
2.00	B	SPT(S)N=15 (2,3/3,4,4,4)		(0.80)						
			33.06	2.20	Red/orange weathered SANDSTONE, recovered as fine to coarse sand					
2.50	B			(1.30)						
		SPT(S)100 (17,8/100 for 95mm)								
			31.76	3.50	Very weak to weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are extremely close to medium spaced, horizontal, clean, rough and tight to open				45	
3.50 - 5.00	98	33	7		NO RECOVERY - 3.50-3.53mbgl NON-INTACT. RECOVERED AS VERY GRAVELLY SAND - 3.53-3.82mbgl NON-INTACT. RECOVERED AS GRAVEL - 3.95-4.25mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 4.36-4.62mbgl				110	
					NON-INTACT. RECOVERED AS SANDY GRAVEL - 4.70-4.78mbgl				33 80	
					NON-INTACT. RECOVERED AS GRAVEL - 4.84-4.92mbgl				80	
					NO RECOVERY - 5.00-5.07mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 5.07-5.73mbgl					
5.00 - 6.50	95	65	28						19 70 200	
					NO RECOVERY - 6.50-6.61mbgl				140	
					NON-INTACT. RECOVERED AS SANDY GRAVEL - 6.75-7.27mbgl					
6.50 - 8.00	93	54	25						41 75 131	
					NON-INTACT. RECOVERED AS GRAVEL - 7.72-7.89mbgl					
					NO RECOVERY - 8.00-8.04mbgl				80	
					NON-INTACT. RECOVERED AS GRAVEL - 8.12-8.28mbgl					
					NON-INTACT. RECOVERED AS GRAVEL - 8.37-8.39mbgl				55 70 88 119	
8.00 - 9.50	97	73	27							
					NON-INTACT. RECOVERED AS SANDY GRAVEL - 8.92-9.12mbgl				36	
					NO RECOVERY - 9.50-9.60mbgl				50	
					NON-INTACT. RECOVERED AS SANDY GRAVEL - 9.65-9.70mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 9.77-10.04mbgl				70	

Continued next sheet

Groundwater: Water Strike; Backfill/Installation

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth (m)	Dia (mm)

Chiselling

From (m)	To (m)	Duration	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	0.50	PLAIN	
0.50	2.30	SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour set up of falling head permeability test
1 hour carrying out falling head permeability test
Permeability test carried out at 2.00mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH01**
	Contract Number: CCG-C-18-10614	Date Started: 24-01-2019	Loggged By: LT	Checked By: CB	Status: FINAL
					Sheet 2 of 3
Rotary Core Drilling Log	Easting: 384946.8	Northing: 392535.6	Ground Level: 35.26mAOD	Plant Used: DANDO 3000	Rig Crew: AH/DB DB/AH
					Scale: 1:50
Weather:		Termination:		SPT Hammer: CCG6 Energy Ratio: 68%	

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
9.50 - 11.00	93	36	17	140 80					NON-INTACT. RECOVERED AS SANDY GRAVEL - 10.18-10.69mbgl		
11.00 - 12.50	95	46	17	60 61 130 42					NON-INTACT. RECOVERED AS VERY CLAYEY SAND - 11.13-11.33mbgl INCLUSION OF WEATHERED MUDSTONE - 11.30mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 11.50-11.78mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 11.95-12.15mbgl		
12.50 - 14.00	97	31	7	26					NO RECOVERY - 12.50-12.55mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 12.55-13.61mbgl		
14.00 - 15.50	97	55	25	130 33 84 145			(16.50)		NO RECOVERY - 14.00-14.05mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 14.18-14.30mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 14.97-15.50mbgl		
15.50 - 17.00	94	60	43	86 160 225 270 90					NO RECOVERY - 15.50-15.59mbgl NON-INTACT. RECOVERED AS GRAVEL - 16.07-16.21mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 16.48-16.91mbgl		
17.00 - 18.50	91	39	29	120 180 35					NO RECOVERY - 17.00-17.14mbgl NON-INTACT. RECOVERED AS GRAVEL - 17.26-17.64mbgl NON-INTACT. RECOVERED AS CLAYEY SANDY GRAVEL - 17.82-18.28mbgl INCLUSION OF WEATHERED MUDSTONE - 18.00mbgl		
18.50 - 20.00	98	69	60	165 35 153 315					NON-INTACT. RECOVERED AS SANDY GRAVEL - 18.50-18.79mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 19.17-19.39mbgl		

Continued next sheet

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00 0.50	0.50 2.30	PLAIN SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour set up of falling head permeability test
1 hour carrying out falling head permeability test
Permeability test carried out at 2.00mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH01**
	Contract Number: CCG-C-18-10614	Date Started: 24-01-2019	Loggged By: LT	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting: 384946.8	Northing: 392535.6	Ground Level: 35.26mAOD	Plant Used: DANDO 3000	Rig Crew: AH/DB DB/AH
					Sheet 3 of 3
					Scale: 1:50

Weather: | Termination: | SPT Hammer: CCG6 Energy Ratio: 68%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
						15.26	20.00		Very weak to weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are extremely close to medium spaced, horizontal, clean, rough and tight to open		
									End of Borehole at 20.00m		

20 21 22 23 24 25 26 27 28 29

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	0.50	PLAIN	
					0.50	2.30	SLOTTED	

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit
1 hour set up of falling head permeability test
1 hour carrying out falling head permeability test
Permeability test carried out at 2.00mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH02**
	Contract Number: CCG-C-18-10614	Date Started: 24-01-2019	Logged By: LT	Checked By: CB	Status: FINAL
Cable Percussion Borehole Log	Easting: 384944.8	Northing: 392496.5	Ground Level: 34.92mAOD	Plant Used: DANDO 3000	Rig Crew: AH/DB DB/AH
					Sheet 1 of 3
					Scale: 1:50

Weather: | Termination: | SPT Hammer: CCG6 Energy Ratio: 68%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	Sample ID	Test Result	TCR	SCR	RQD	Fracture	Water	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.50	B								(0.70)		Brown silty sandy gravelly organic CLAY. Gravel is fine to coarse sub-angular to sub-rounded brick and sandstone (MADE GROUND)		
								34.22	0.70				
1.00	B	SPT(S)N=7 (1,0/1,2,2,2)							(0.70)		Loose brown fine to coarse SAND, with frequent clay lenses		
1.50	B							33.52	1.40				
		SPT(S)N=50 (2,3/50 for 235mm)							(0.80)		Stiff brown very sandy silty CLAY		
2.50	B							32.72	2.20				
		SPT(S)100 (25 for 85mm/100 for 90mm)									Red/brown weathered SANDSTONE, recovered as fine to coarse grained sand		
3.50 - 5.00	0		0	0	0				(2.80)		NO RECOVERY - 3.50-5.71mbgl		
5.00 - 6.50	53		0	0				29.92	5.00		Very weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are closely spaced, horizontal, clean, rough and tight to open SPT @ 5.00mbgl = 100 (25 for 25mm / 65, 35 for 20mm) NON-INTACT. RECOVERED AS VERY SANDY GRAVEL - 5.71-6.50mbgl		
6.50 - 8.00	85		22	7		110 55					NO RECOVERY - 6.50-6.73mbgl NON-INTACT. RECOVERED AS VERY SANDY GRAVEL - 6.73-7.38mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 7.49-7.53mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 7.76-8.00mbgl		
8.00 - 9.50	97		50	30		90 47 72 138 162					NO RECOVERY - 8.00-8.05mbgl NON-INTACT. RECOVERED AS SANDY GRASVEL - 8.05-8.40mbgl NON-INTACT. RECOVERED AS GRAVEL - 8.49-8.60mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 8.77-8.95mbgl		
											NON-INTACT. RECOVERED AS GRAVELLY SAND - 9.50-9.97mbgl		
											Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)
0.00	3.50	PLAIN	
3.50	5.00	SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour setting up permeability test
1 hour carrying out falling head permeability test
Falling head permeability test carried out at 3.30mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: The Christie, Manchester			Client: Interserve Construction Ltd		Borehole ID: **BH02**
Contract Number: CCG-C-18-10614	Date Started: 24-01-2019	Loggged By: LT	Checked By: CB	Status: FINAL	Sheet 2 of 3
Rotary Core Drilling Log	Easting: 384944.8	Northing: 392496.5	Ground Level: 34.92mAOD	Plant Used: DANDO 3000	Rig Crew: AH/DB DB/AH	Scale: 1:50
Weather:	Termination:		SPT Hammer: CCG6 Energy Ratio: 68%		

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
9.50 - 11.00	100	43	29	34 85 140 150					NON-INTACT. RECOVERED AS SANDY GRAVEL - 10.19-10.38mbgl		
11.00 - 12.50	93	66	11	37 21 69 159					NON-INTACT. RECOVERED AS GRAVEL - 10.94-11.00mbgl NO RECOVERY - 11.00-11.11mbgl NON-INTACT. RECOVERED AS GRASVEL - 11.11-11.17mbgl NON-INTACT. RECOVERED AS GRAVEL - 11.39-11.60mbgl		
12.50 - 14.00	97	57	21	38 106 110 47					NON-INTACT. RECOVERED AS GRAVEL - 13.52-13.76mbgl		
14.00 - 15.50	97	74	26	70 49 85 140 53			(15.00)		NO RECOVERY - 14.00-14.05mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 14.12-14.16mbgl NON-INTACT. RECOVERED AS SAND - 15.10-15.19mbgl		
15.50 - 17.00	90	71	8	34 79 125					NO RECOVERY - 15.50-15.65mbgl		
17.00 - 18.50	93	67	0	24 557 87 60 88 90					NO RECOVERY - 17.00-17.10mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 17.84-18.06mbgl		
18.50 - 20.00	95	31	8	120 100					NO RECOVERY - 18.50-18.58mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 18.58-18.99mbgl NON-INTACT. RECOVERED AS SLIGHTLY SANDY SLIGHTLY GRAVELLY SILTY CLAY - 19.11-19.41mbgl INCLUSION OF CLAY (MARL) - 19.20mbgl NON-INTACT. RECOVERED AS GRAVELLY SAND - 19.54-19.83mbgl		
									Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00 3.50	3.50 5.00	PLAIN SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour setting up permeability test
1 hour carrying out falling head permeability test
Falling head permeability test carried out at 3.30mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH02**
	Contract Number: CCG-C-18-10614	Date Started: 24-01-2019	Loggged By: LT	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting: 384944.8	Northing: 392496.5	Ground Level: 34.92mAOD	Plant Used: DANDO 3000	Rig Crew: AH/DB DB/AH
					Sheet 3 of 3
					Scale: 1:50

Weather: | Termination: | SPT Hammer: CCG6 Energy Ratio: 68%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
						14.92	20.00		*NON-INTACT. RECOVERED AS GRAVEL - 19.93-20.00mbgl* End of Borehole at 20.00m		

20 21 22 23 24 25 26 27 28 29

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	3.50	PLAIN	
					3.50	5.00	SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour setting up permeability test
1 hour carrying out falling head permeability test
Falling head permeability test carried out at 3.30mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

Contract Name: The Christie, Manchester			Client: Interserve Construction Ltd		Borehole ID: **BH03**
Contract Number: CCG-C-18-10614	Date Started: 22-01-2019	Logged By: LT	Checked By: CB	Status: FINAL	Sheet 1 of 3
Cable Percussion Borehole Log	Easting: 384939.8	Northing: 392468.4	Ground Level: 34.72mAOD	Plant Used: DANDO 3000	Rig Crew: AH/LN DB/AH	Scale: 1:50
Weather:	Termination:		SPT Hammer: CCG6 Energy Ratio: 68%		

Samples & In Situ Testing							Strata Details				Groundwater	
Depth	Sample ID	Test Result					Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
							34.52	0.20		Brown silty sandy gravelly organic CLAY. Gravel is fine to coarse sub-angular to sub-rounded brick and sandstone (MADE GROUND)		
0.50	B						34.32	0.40		Yellow/white sand SUB-BASE		
								(0.40)		Brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular brick (MADE GROUND)		
							33.92	0.80				
1.00	B									Brown slightly sandy GRAVEL. Gravel is fine to coarse angular to sub-rounded concrete, brick and sandstone (MADE GROUND)		
		SPT(S)N=11 (1,2/2,3,3,3)										
1.50	B							(1.40)				
		SPT(S)N=15 (2,2/3,4,4,4)										
							32.52	2.20		Brown silty clayey fine to medium grained SAND		
2.50	B							(0.50)				
							32.02	2.70		Red/brown weathered SANDSTONE, recovered as fine to medium grained sand		
		SPT(S)100 (18,7/100 for 140mm)										
3.50	B							(1.80)				
		SPT(S)100 (50 for 110mm/100 for 50mm)										
							30.22	4.50		Very weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are very close to medium spaced, horizontal with occasional drilling-induced vertical fractures, clean, rough and tight to open		
4.50 - 6.00	70	19	0	44 41						NO RECOVERY - 4.50-4.95mbgl NON-INTACT. RECOVERED AS VERY GRAVELLY SAND - 5.06-5.61mbgl NON-INTACT. RECOVERED AS VERY SANDY GRAVEL - 5.74-5.95mbgl		
6.00 - 7.50	97	75	39	41 90 130 38 9 165						NON-INTACT. RECOVERED AS GRAVEL - 6.25-6.34mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 6.43-6.50mbgl NON-INTACT. RECOVERED AS GRAVEL - 6.79-6.91mbgl		
7.50 - 9.00	97	57	52	55 97 160						NO RECOVERY - 7.46-7.55mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 7.55-7.64mbgl NON-INTACT. RECOVERED AS GRAVEL - 7.94-8.17mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 8.57-8.71mbgl NON-INTACT. RECOVERED AS GRAVEL - 8.87-9.11mbgl		
9.00 - 10.50	99	62	34	50 60						NON-INTACT. RECOVERED AS GRAVEL - 9.40-9.62mbgl		
	TCR	SCR	RQD	Fracture	Water					Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH03**
	Contract Number: CCG-C-18-10614	Date Started: 22-01-2019	Loggged By: LT	Checked By: CB	Status: FINAL — Sheet 2 of 3
Rotary Core Drilling Log	Easting: 384939.8	Northing: 392468.4	Ground Level: 34.72mAOD	Plant Used: DANDO 3000	Rig Crew: AH/LN DB/AH — Scale: 1:50
Weather:		Termination:		SPT Hammer: CCG6 Energy Ratio: 68%	

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				72					NON-INTACT. RECOVERED AS GRAVEL - 9.89-10.09mbgl		
10.50 - 12.00	93	46	19	27 86 165 80					NON-INTACT. RECOVERED AS SANDY GRAVEL - 10.43-10.50mbgl NO RECOVERY - 10.50-10.60mbgl NON-INTACT. RECOVERED AS SLIGHTLY SANDY GRAVEL - 10.60-10.69mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 11.29-11.74mbgl NON-INTACT. RECOVERED AS GRAVEL - 11.82-12.00mbgl		
12.00 - 13.50	83	70	41	50 69 109 132					NO RECOVERY - 12.00-12.25mbgl NON-INTACT. RECOVERED AS GRAVEL - 12.44-12.52mbgl		
13.50 - 15.00	81	63	16	13 59 141			(20.50)		NO RECOVERY - 13.50-13.79mbgl NON-INTACT. RECOVERED AS GRAVEL - 13.79-13.87mbgl NON-INTACT. RECOVERED AS GRAVEL - 14.94-15.00mbgl		
15.00 - 16.50	87	19	0	44					NO RECOVERY - 15.00-15.20mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 15.20-15.79mbgl NON-INTACT. RECOVERED AS VERY SILTY VERY SANDY GRAVEL - 15.97-16.50mbgl		
16.50 - 18.00	0	0	0						NO RECOVERY - 16.50-20.08mbgl Brown clayey MUDSTONE - Drillers Description		
18.00 - 19.00	0	0	0								
19.00 - 20.00	0	0	0								
									Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

Contract Name: The Christie, Manchester			Client: Interserve Construction Ltd		Borehole ID: **BH03**
Contract Number: CCG-C-18-10614	Date Started: 22-01-2019	Loggged By: LT	Checked By: CB	Status: FINAL	Sheet 3 of 3
Rotary Core Drilling Log	Easting: 384939.8	Northing: 392468.4	Ground Level: 34.72mAOD	Plant Used: DANDO 3000	Rig Crew: AH/LN DB/AH	Scale: 1:50
Weather:	Termination:		SPT Hammer: CCG6 Energy Ratio: 68%		

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
20.00 - 21.00	92	33	20	62 170 201					NON-INTACT. RECOVERED AS GRAVEL - 20.08-20.15mbgl NON-INTACT. RECOVERED AS GRAVEL - 20.66-21.00mbgl		
21.00 - 22.50	81	49	35	92 153 305					NO RECOVERY - 21.00-21.29mbgl NON-INTACT. RECOVERED AS VERY SILTY VERY SANDY GRAVEL - 21.90-22.35mbgl		
22.50 - 24.00	97	69	57	110 53 45 134 245					NON-INTACT. RECOVERED AS GRAVEL - 22.46-22.60mbgl NON-INTACT. RECOVERED AS GRAVEL - 22.96-23.06mbgl MUDSTONE CLAST - 23.10mbgl		
24.00 - 25.00	89	44	10	30 79					NON-INTACT. RECOVERED AS VERY SANDY GRAVEL - 24.00-24.27mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 24.51-24.63mbgl NO RECOVERY - 24.89-25.00mbgl		
						9.72	25.00		End of Borehole at 25.00m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

Contract Name: The Christie, Manchester			Client: Interserve Construction Ltd		Borehole ID: **BH04**
Contract Number: CCG-C-18-10614	Date Started: 18-01-2019	Logged By: DO	Checked By: CB	Status: FINAL	Sheet 1 of 3
Cable Percussion Borehole Log	Easting: 384930.1	Northing: 392430.7	Ground Level: 34.93mAOD	Plant Used: Dando 150 S/A Rig	Rig Crew: AH/LN DB/AH	Scale: 1:50
Weather:	Termination:		SPT Hammer: CCG6 Energy Ratio: 68%		

Samples & In Situ Testing								Strata Details				Groundwater	
Depth	Sample ID	Test Result	TCR	SCR	RQD	Fracture	Water	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.50	B										Brown slightly silty sandy GRAVEL with occasional pockets of clay. Gravel is fine to coarse angular to sub-angular brick (MADE GROUND)		
0.50	ES								(1.30)				
1.00	B												
1.00	ES	SPT(S)N=11 (1,2/2,3,3,3)						33.63	1.30				
1.50	B										Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-angular to sub-rounded sandstone		
1.50	ES												
2.00 - 2.45	UT												
2.50	B								(2.20)				
		SPT(S)N=22 (3,4/5,5,6,6)											
3.50	B							31.43	3.50		Red weathered SANDSTONE		
		SPT(C)100 (25 for 75mm/100 for 50mm)											
									(1.50)				
4.50	B												
								29.93	5.00		Very weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are very close to medium spaced, horizontal, clean, rough and tight to wide		
5.00 - 6.50	72	56	19	27 51 92 170							NO RECOVERY - 5.00-5.42mbgl NO-INTACT. RECOVERED AS GRAVEL - 5.42-5.52mbgl NON-INTACT. RECOVERED AS GRAVEL - 5.61-5.67mbgl		
6.50 - 8.00	61	31	15	93 114 60							NO RECOVERY - 6.50-7.09mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 7.09-7.14mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 7.34-7.53mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 7.77-7.94mbgl		
8.00 - 9.50	79	70	20	50 80 181 68							NO RECOVERY - 8.00-8.31mbgl NON-INTACT. RECOVERED AS GRAVEL - 9.11-9.18mbgl NO RECOVERY - 9.50-9.91mbgl		
											Continued next sheet		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)
0.00	1.50	PLAIN	
1.50	3.00	SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour set up of falling head permeability test
1 hour carrying out falling head permeability test
Permeability test carried out at 2.50mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Borehole dry

Contract Name: The Christie, Manchester			Client: Interserve Construction Ltd		Borehole ID: **BH04**
Contract Number: CCG-C-18-10614	Date Started: 18-01-2019	Loggged By: DO	Checked By: CB	Status: FINAL	Sheet 2 of 3
Rotary Core Drilling Log	Easting: 384930.1	Northing: 392430.7	Ground Level: 34.93mAOD	Plant Used: Dando 150 S/A Rig	Rig Crew: AH/LN DB/AH	Scale: 1:50
Weather:	Termination:		SPT Hammer: CCG6 Energy Ratio: 68%		

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
9.50 - 11.00	73	35	0	50 50 54 31					NON-INTACT. RECOVERED AS GRAVEL - 9.91-10.07mbgl NON-INTACT. RECOVERED AS GRAVEL - 10.12-10.21mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 10.35-10.54mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 10.668-10.89mbgl		
11.00 - 12.50	97	31	14	90 20					NON-INTACT. RECOVERED AS SANDY GRAVEL - 11.15-11.30mbgl NON-INTACT. RECOVERED AS SLIGHTLY SANDY SLIGHTLY GRAVELLY SILTY CLAY - 11.39-12.11mbgl INCLUSION OF CLAY (MARL) - 11.80mbgl		
12.50 - 14.00	98	69	33	48 11 183 60					NON-INTACT. RECOVERED AS SANDY GRAVEL - 12.39-12.57 NON-INTACT. RECOVERED AS SANDY GRAVEL - 13.14-13.23mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 13.53-14.00mbgl		
14.00 - 15.50	91	13	0	21 60			(15.00)		NO RECOVERY - 14.00-14.14mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 14.14-14.80mbgl NON-INTACT. RECOVERED AS GRAVEL - 14.89-15.40mbgl NON-INTACT. RECOVERED AS GRAVEL - 15.46-15.85mbgl		
15.50 - 17.00	92	71	45	59 111 290 66 60					NO RECOVERY - 15.50-15.62mbgl NON-INTACT. RECOVERED AS GRAVEL - 15.62-15.66mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 16.55-16.61mbgl NON-INTACT. RECOVERED AS GRAVEL - 16.83-17.00mbgl		
17.00 - 18.50	96	67	41	39 33 77 155 41 108 140					NON-INTACT. RECOVERED AS SANDY GRAVEL - 17.06-17.14mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 17.28-17.34mbgl NON-INTACT. RECOVERED AS SANDY GRAVEL - 17.80-17.85mbgl		
18.50 - 20.00	96	71	56	107 156 216 70					NON-INTACT. RECOVERED AS SANDY GRAVEL - 18.71-19.02mbgl NON-INTACT. RECOVERED AS SLIGHTLY SANDY GRAVEL - 19.65-19.75mbgl NON-INTACT. RECOVERED AS GRAVEL - 19.82-20.00mbgl		
									Continued next sheet		

10 11 12 13 14 15 16 17 18 19

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00 1.50	1.50 3.00	PLAIN SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour set up of falling head permeability test
1 hour carrying out falling head permeability test
Permeability test carried out at 2.50mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Borehole dry

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Borehole ID: **BH04**
	Contract Number: CCG-C-18-10614	Date Started: 18-01-2019	Loggged By: DO	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting: 384930.1	Northing: 392430.7	Ground Level: 34.93mAOD	Plant Used: Dando 150 S/A Rig	Rig Crew: AH/LN DB/AH
					Sheet 3 of 3
					Scale: 1:50

Weather: | Termination: | SPT Hammer: CCG6 Energy Ratio: 68%

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	Fracture Spacing	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
						14.93	20.00		Very weak reddish brown fine to medium grained thickly laminated SANDSTONE. Moderately weathered. Recovered locally as sandy gravel. Discontinuities are very close to medium spaced, horizontal, clean, rough and tight to wide End of Borehole at 20.00m		

20 21 22 23 24 25 26 27 28 29

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information					Installation			
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)
					0.00	1.50	PLAIN	
					1.50	3.00	SLOTTED	

Remarks:

1 hour hand excavating 1.20mbgl service avoidance pit
1 hour set up of falling head permeability test
1 hour carrying out falling head permeability test
Permeability test carried out at 2.50mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Borehole dry

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

Contract Name: The Christie, Manchester			Client: Interserve Construction Ltd		Borehole ID: **WS01**
Contract Number: CCG-C-18-10614	Date Started: 17-01-2019	Logged By: DO	Checked By: CB	Status: FINAL	Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting: 384942.0	Northing: 392561.7	Ground Level: 35.38mAOD	Plant Used: Dando Terrier Rig	Rig Crew: LN/DB	Scale: 1:25
Weather: Dry	Termination:		SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	U			(0.30)		Light brown sandy GRAVEL. Gravel is fine to coarse sub-angular limestone (MADE GROUND)		
0.20	ES		35.08	0.30				
0.50	B					Dark brown slightly silty slightly gravely fine to medium grained SAND. Gravel is fine to coarse sub-angular to sub-rounded sandstone		
0.50	ES			(0.70)				
1.00 - 2.00	U		34.38	1.00		Firm brownish grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to medium sub-rounded sandstone		
		HVP=50						
		SPT(S)N=10 (1,1/2,3,3,2)		(0.40)				
		HVP=50	33.98	1.40				
						Brown slightly silty slightly gravelly fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone		
				(1.00)				
2.00 - 2.40	U	SPT(S)N=50 (8,7/50 for 225mm)						
			32.98	2.40		End of Borehole at 2.40m		

1 2 3 4 5

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

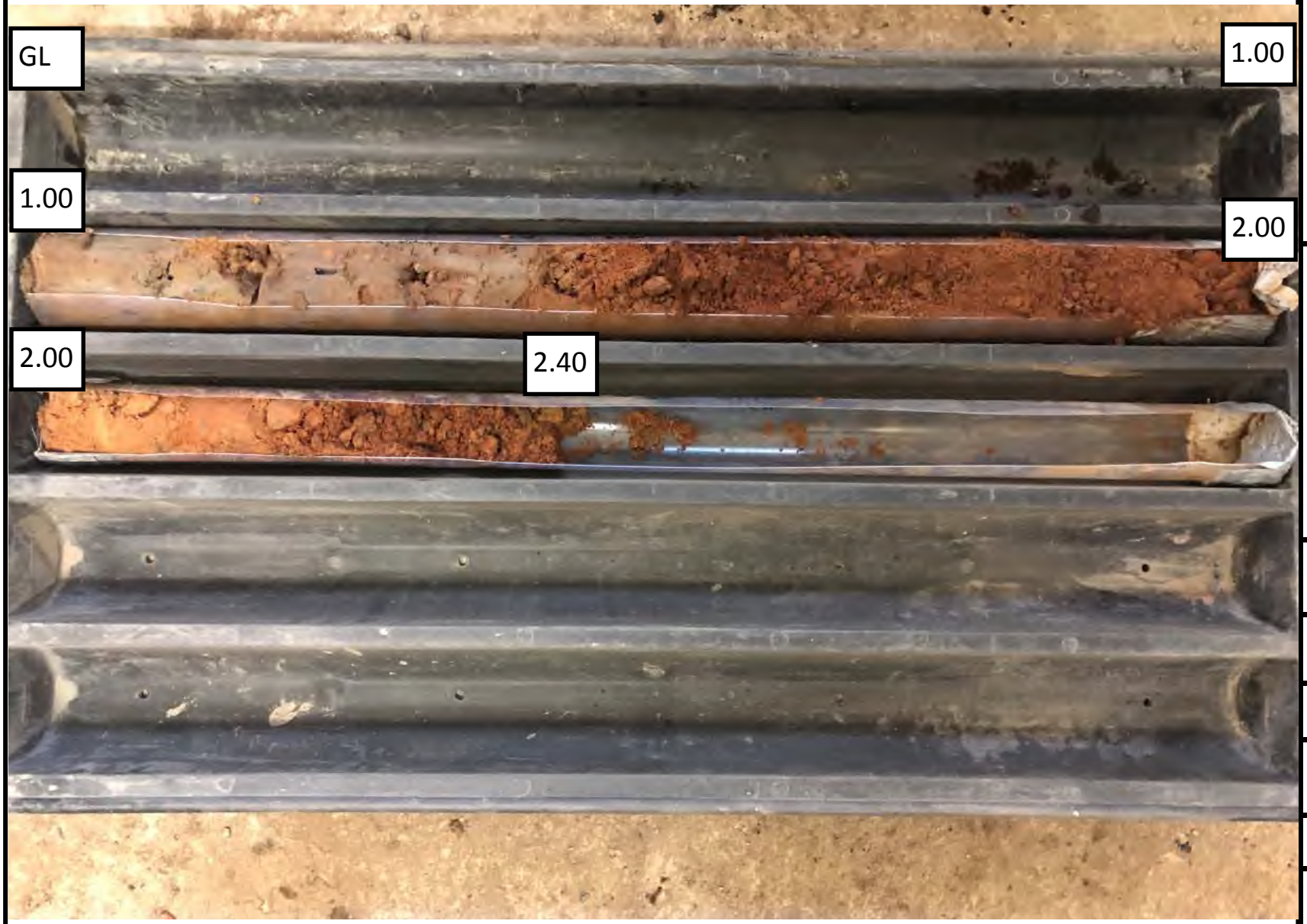
Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks



Notes:

Recovered undisturbed soils from WS01.

Service pit carried out within upper meter.

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Recovered soils from WS01

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	WS01-1

CC GEOTECHNICAL LIMITED

APPENDIX C

TRIAL PIT LOGS

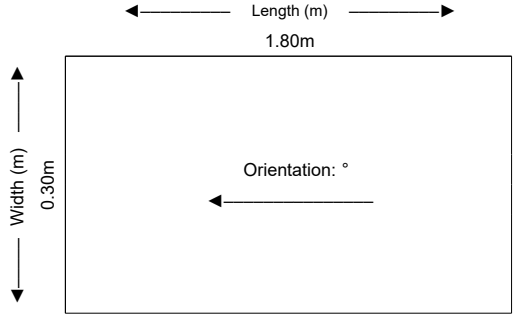
	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Trial Pit ID: TP01
	Contract Number: CCG-C-18-10614	Date Started: 17-01-2019	Logged By: DE	Checked By: CB	Status: FINAL
					Sheet 1 of 1
Trial Pit Log	Easting: 384948.1	Northing: 392529.5	Ground Level: 35.12mAOD	Plant Used: Tracked Excavator	Date Printed: 03-03-2019
					Scale: 1:25
Weather: Dry		Hole Termination: Terminated on Sandstone		Stability:	

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			35.02	0.10		Topsoil		
0.30	ES			(0.50)		Brown very sandy slightly silty GRAVEL with frequent rootlets. Gravels are fine to coarse sub-angular brick, concrete and mortar (MADE GROUND).		
0.50	B							
0.50	ES		34.52	0.60		Brown gravelly slightly clayey slightly silty fine to coarse SAND with occasional rootlets. Gravels are fine to coarse sub-angular brick (MADE GROUND).		
1.00	B			(0.70)				
1.00	ES							
			33.82	1.30		Brown very clayey slightly gravelly slightly silty fine to medium grained SAND. Gravels are fine to coarse sub-rounded quartz and sandstone.		
1.50	B			(0.60)				
			33.22	1.90		Red slightly gravelly slightly silty fine to medium grained SAND. Gravels are fine to coarse sub-angular sandstone.		
2.00	B			(0.70)				
2.50	B							
			32.52	2.60		Red weathered SANDSTONE.		
			32.42	2.70		End of Trial Pit at 2.70m		

1 2 3

Dimensions:

Final Depth: 2.70m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Trial pit dry



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP1

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP1-1

CC GEOTECHNICAL LIMITED



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP1

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP1-2

CC GEOTECHNICAL LIMITED



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP1

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP1-3

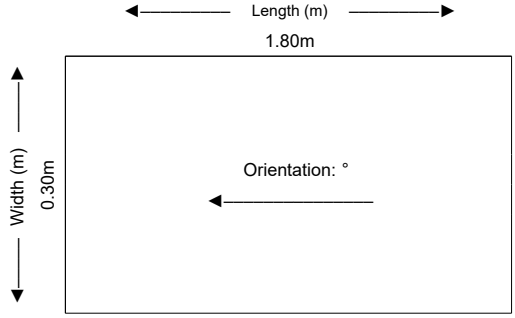
CC GEOTECHNICAL LIMITED

	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Trial Pit ID: TP02
	Contract Number: CCG-C-18-10614	Date Started: 17-01-2019	Logged By: DE	Checked By: CB	Status: FINAL
					Sheet 1 of 1
Trial Pit Log	Easting: 384946.6	Northing: 392505.6	Ground Level: 34.79mAOD	Plant Used: Tracked Excavator	Date Printed: 03-03-2019
					Scale: 1:25
Weather: Dry		Hole Termination:		Stability:	

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			34.69	0.10		Topsoil		
0.30	ES					Brown sandy slightly silty GRAVEL with frequent rootlets. Gravels are fine to coarse sub-angular brick, concrete and mortar (MADE GROUND).		
0.50	B			(0.70)				
0.50	ES							
			33.99	0.80		Brown gravelly slightly silty fine to medium grained SAND with occasional rootlets. Gravels are fine to coarse sub-angular to sub-rounded brick and concrete (MADE GROUND).		
1.00	B							1
1.00	ES			(0.60)				
			33.39	1.40		Firm brown slightly sandy slightly gravelly silty CLAY with frequent laminations of sand. Gravel is fine to medium sub-rounded sandstone		
1.50	B							
		HVP=60kPa						
2.00	B							2
				(1.35)				
		HVP=90kPa						
			32.04	2.75		Red slightly clayey slightly gravely slightly silty fine to medium grained SAND. Gravels are fine to coarse sub-angular sandstone		
2.80	B		31.89	2.90		End of Trial Pit at 2.90m		
								3

Dimensions:

Final Depth: 2.90m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Trial pit dry



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP2

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP2-1

CC GEOTECHNICAL LIMITED



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP2

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP2-2

CC GEOTECHNICAL LIMITED

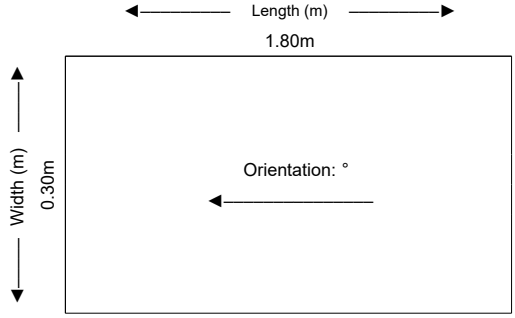
	Contract Name: The Christie, Manchester		Client: Interserve Construction Ltd		Trial Pit ID: TP03
	Contract Number: CCG-C-18-10614	Date Started: 17-01-2019	Logged By: DE	Checked By: CB	Status: FINAL
					Sheet 1 of 1
Trial Pit Log	Easting: 384936.3	Northing: 392444.6	Ground Level: 34.64mAOD	Plant Used: Tracked Excavator	Date Printed: 03-03-2019
					Scale: 1:25
Weather: Dry		Hole Termination:		Stability:	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			34.53	0.10		Topsoil		
0.30	ES					Brown very sandy slightly silty GRAVEL. Gravels are fine to coarse sub-angular brick and concrete (MADE GROUND).		
0.50	B							
0.50	ES							
				(1.30)				
1.00	B							
1.00	ES							
			33.24	1.40				
1.50	B					Firm becoming stiff brown slightly gravelly slightly sandy silty CLAY, with occasional sand laminations. Gravel is fine to medium sub-rounded sandstone.		
		HVP=60kPa						
2.00	B							
				(1.50)				
		HVP=110kPa						
2.80	B							
			31.74	2.90		End of Trial Pit at 2.90m		

1 2 3

Dimensions:

Final Depth: 2.90m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Trial pit dry



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP3

Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP3-1

CC GEOTECHNICAL LIMITED



Notes:

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
INTERSERVE CONSTRUCTION LTD

Project:
The Christie, Manchester

Title:
Trial Pit Excavations - TP3

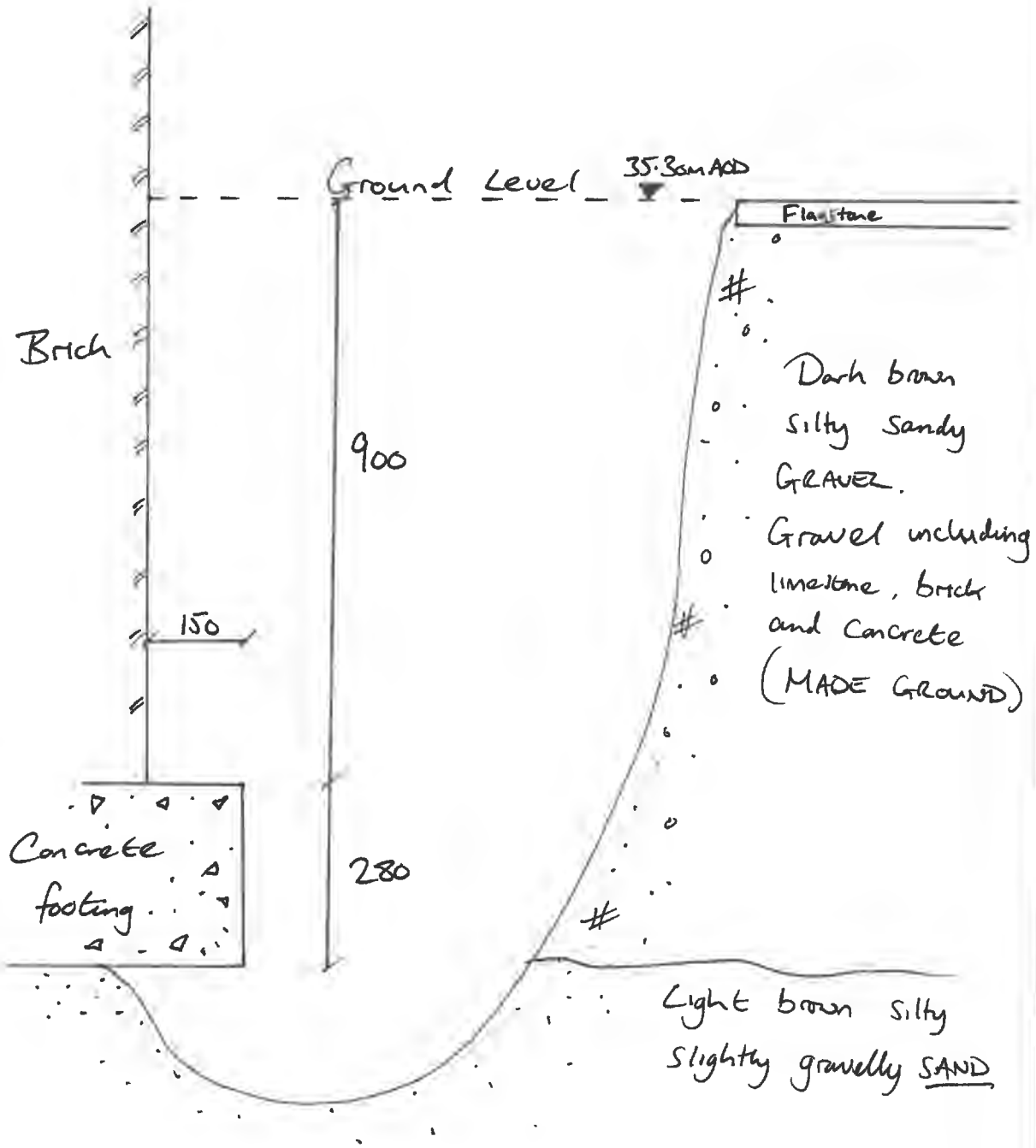
Scale:	Issue:
N/A	1
Drawn by:	Date:
DO	01/04/19
Project No.	Plate No.
CCG-C-18-10614	TP3-2

CC GEOTECHNICAL LIMITED

APPENDIX D

FOUNDATION INSPECTION PIT SKETCHES

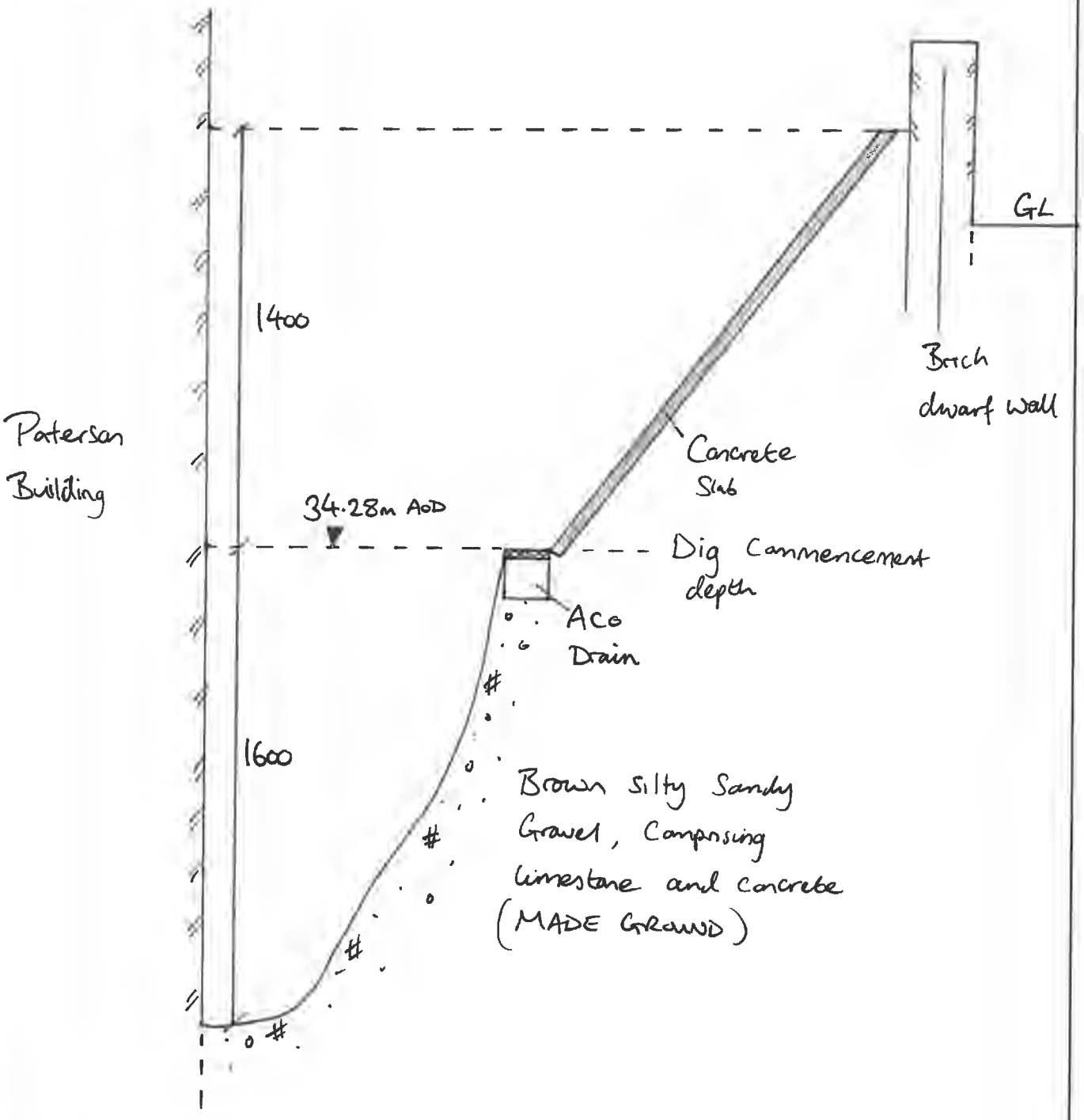
OP01



Notes
- Dimensions = mm
- Pit dry
- Scale 1:100

CC GEOTECHNICAL LTD Consulting Geotechnical and Geoenvironmental Engineers Tel: (0151) 545 2750 Fax: (0151) 548 7892	**Project**	PATERSON REDEVELOPMENT PROJECT	
	Drawing	FOUNDATION OBSERVATION PIT	
	Scale	AS SHOWN	
	Date	Mar-19	**Number** 19/10614

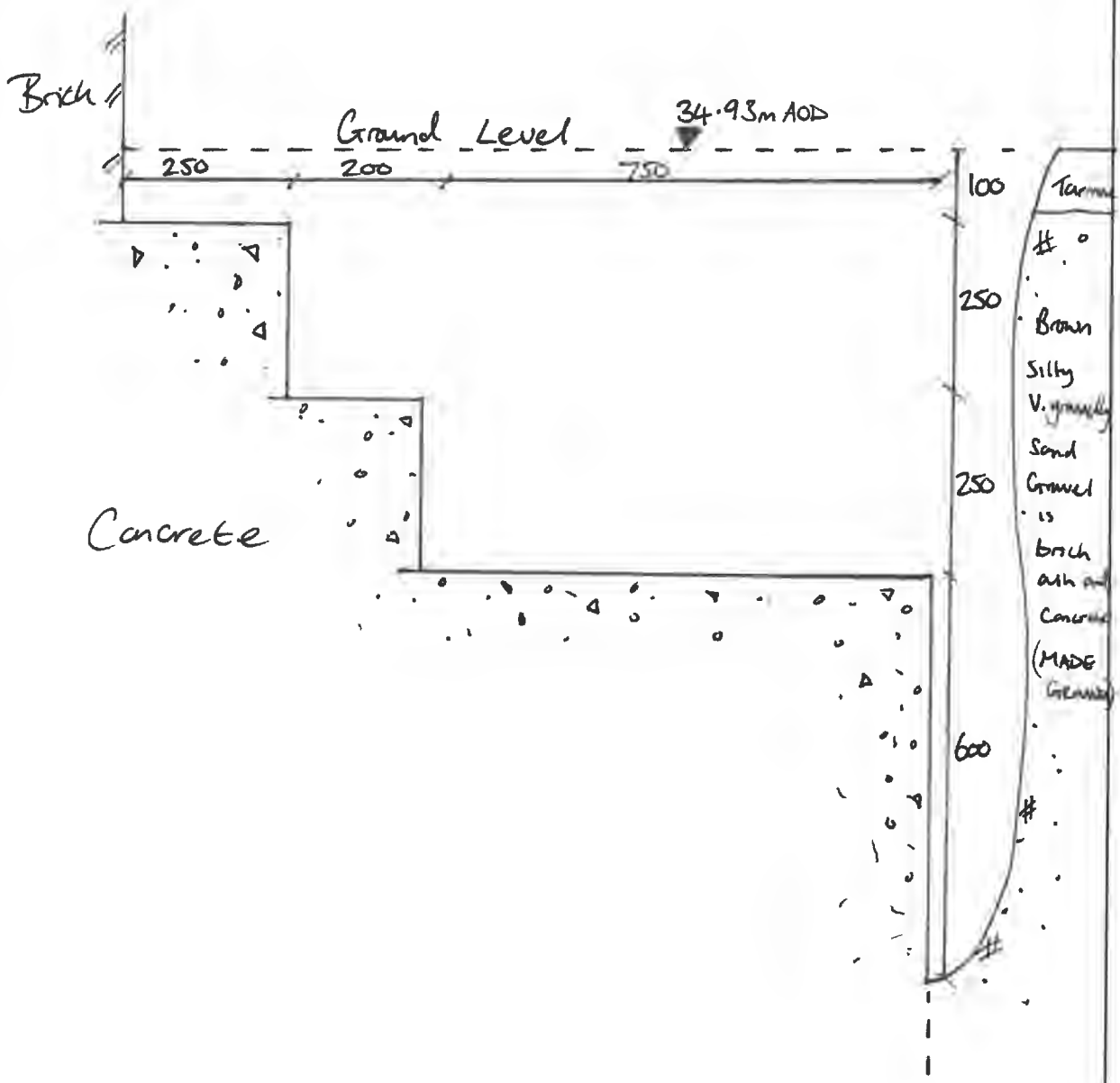
OP02



Notes - Dimensions = MM
- Pit dry
- Scale 1:200

CC GEOTECHNICAL LTD Consulting Geotechnical and Geoenvironmental Engineers Tel: (0151) 545 2750 Fax: (0151) 548 7892	**Project**	PATERSON REDEVELOPMENT PROJECT		
	Drawing	FOUNDATION OBSERVATION PIT		
	Scale	AS SHOWN		
	Date	Mar-19	**Number**	19/10614

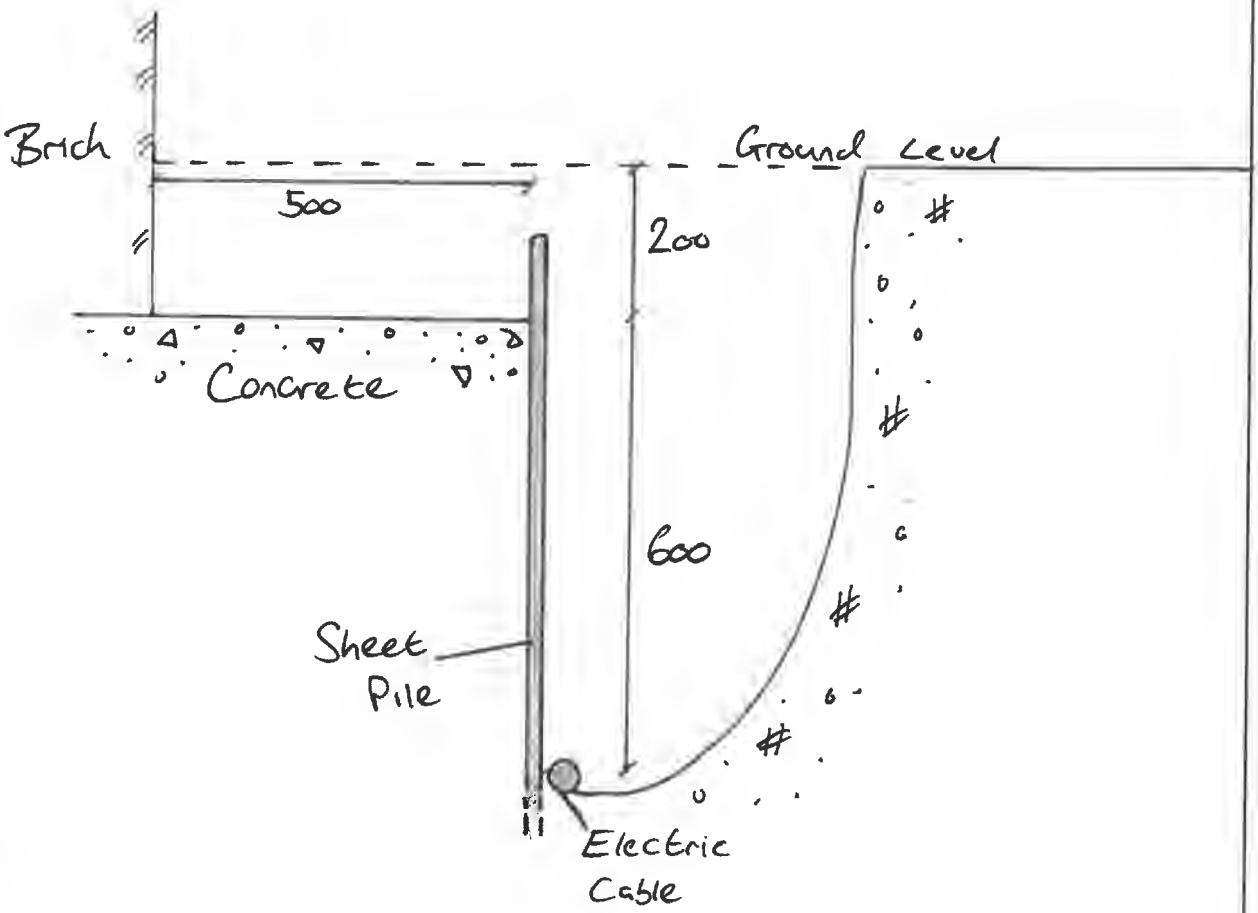
OP03



Notes
- Dimensions = mm
- Pit dry
- Unable to extend pit due to services
- Scale 1:100

CC GEOTECHNICAL LTD Consulting Geotechnical and Geoenvironmental Engineers Tel: (0151) 545 2750 Fax: (0151) 548 7892	**Project**	PATERSON REDEVELOPMENT PROJECT	
	Drawing	FOUNDATION OBSERVATION PIT	
	Scale	AS SHOWN	
	Date	Mar-19	**Number** 19/10614

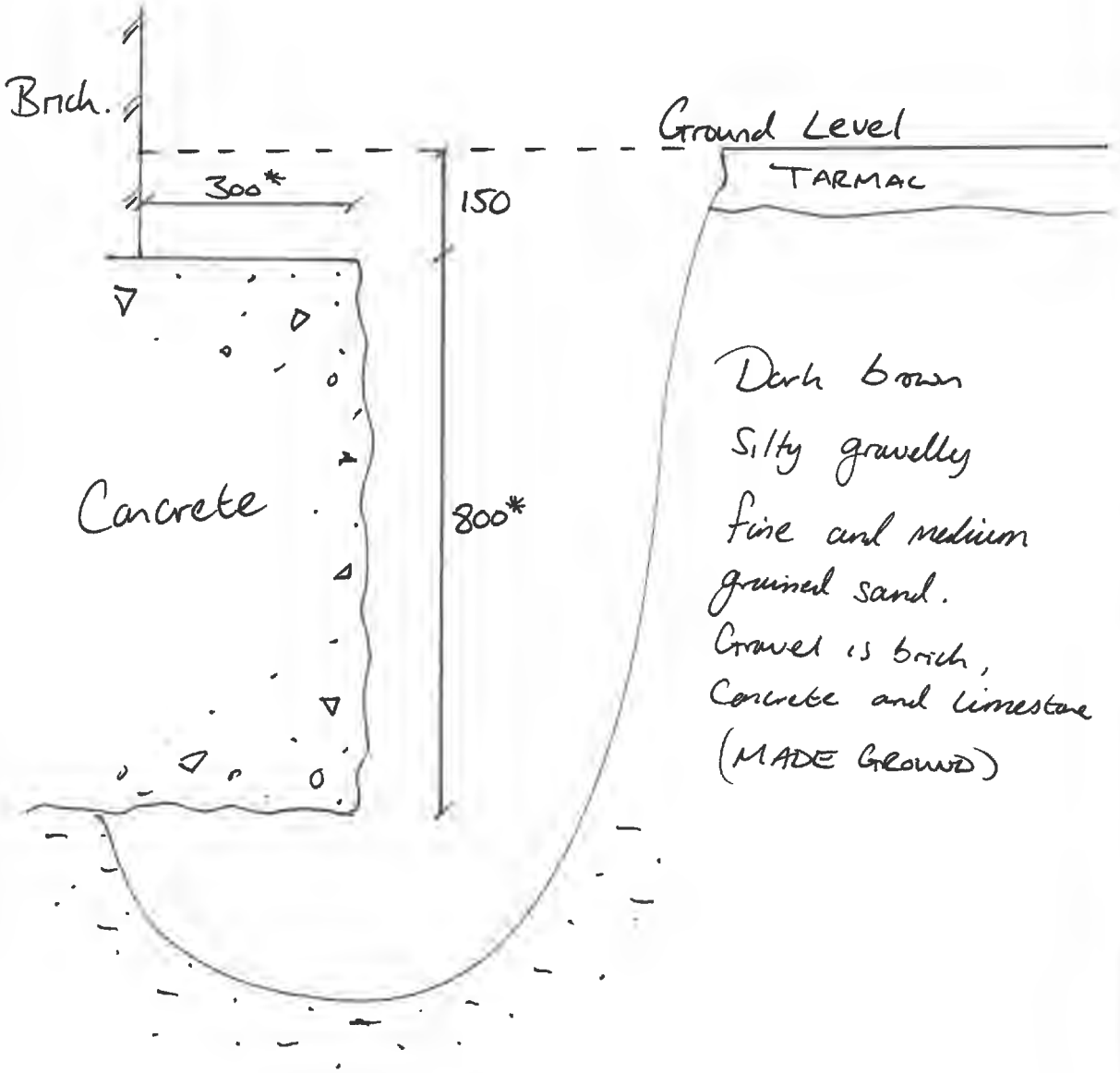
OP05



Notes - Dimensions in mm
- Pit dry
- Unable to advance due to sheet pile & services.
- Scale 1:100

CC GEOTECHNICAL LTD Consulting Geotechnical and Geoenvironmental Engineers Tel: (0151) 545 2750 Fax: (0151) 548 7892	**Project**	PATERSON REDEVELOPMENT PROJECT		
	Drawing	FOUNDATION OBSERVATION PIT		
	Scale	AS SHOWN		
	Date	Mar-19	**Number**	19/10614

OP06

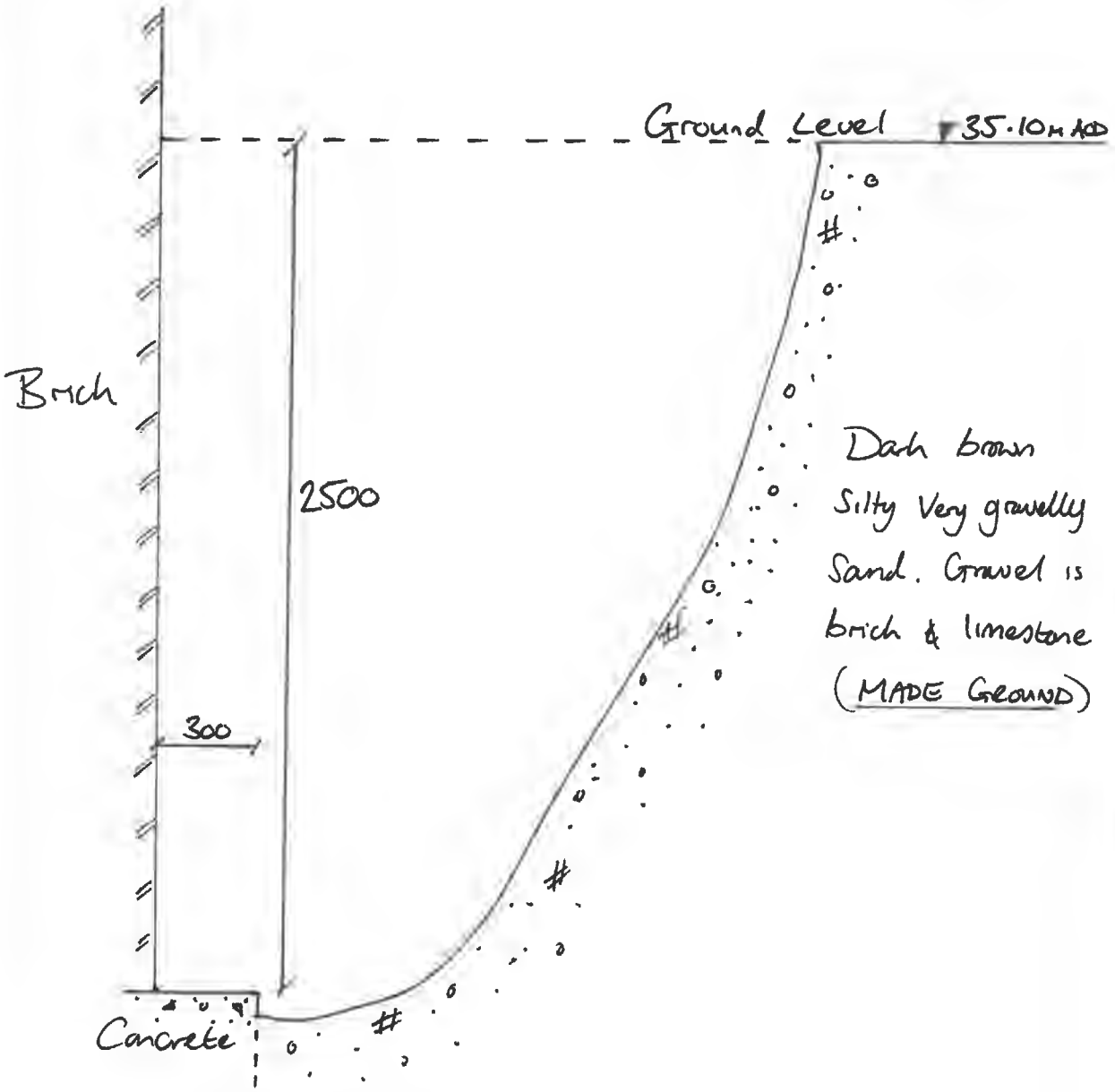


Notes - Dimensions = mm
- Pit dry
- Foundation projection varies from 200mm - 600mm across dig.
- Foundation thickness varies from 700mm - 900mm across dig.
- Scale 1:100

CC GEOTECHNICAL LTD
Consulting Geotechnical and Geoenvironmental Engineers
Tel: (0151) 545 2750 Fax: (0151) 548 7892

Project	PATERSON REDEVELOPMENT PROJECT		
Drawing	FOUNDATION OBSERVATION PIT		
Scale	AS SHOWN		
Date	Mar-19	**Number**	19/10614

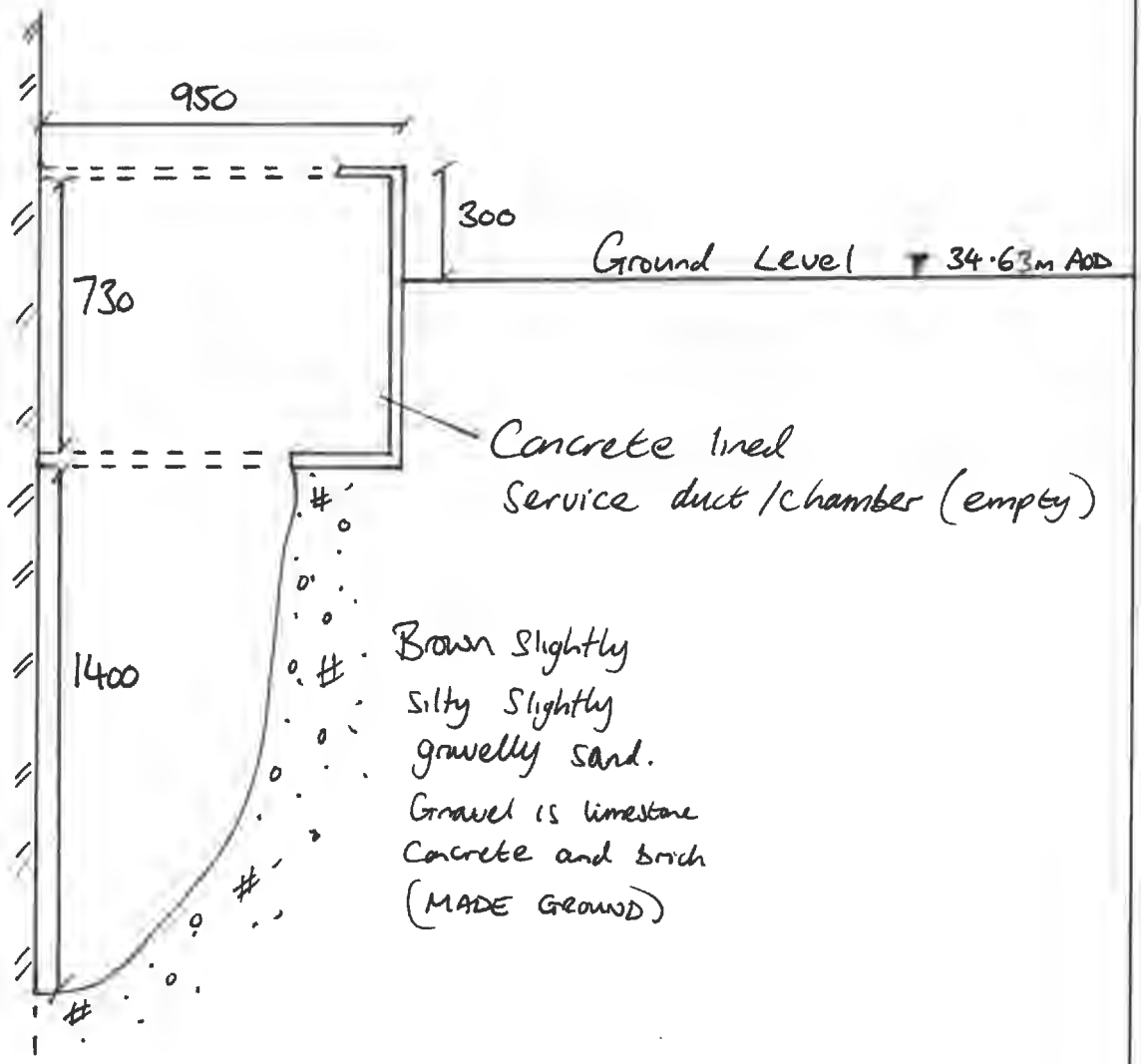
OP07



Notes
- Dimensions = mm
- Pit dry
- Unable to prove foundation thickness
- Scale 1:200

CC GEOTECHNICAL LTD Consulting Geotechnical and Geoenvironmental Engineers Tel: (0151) 545 2750 Fax: (0151) 548 7892	**Project**	PATERSON REDEVELOPMENT PROJECT	
	Drawing	FOUNDATION OBSERVATION PIT	
	Scale	AS SHOWN	
	Date	Mar-19	**Number** 19/10614

OP08

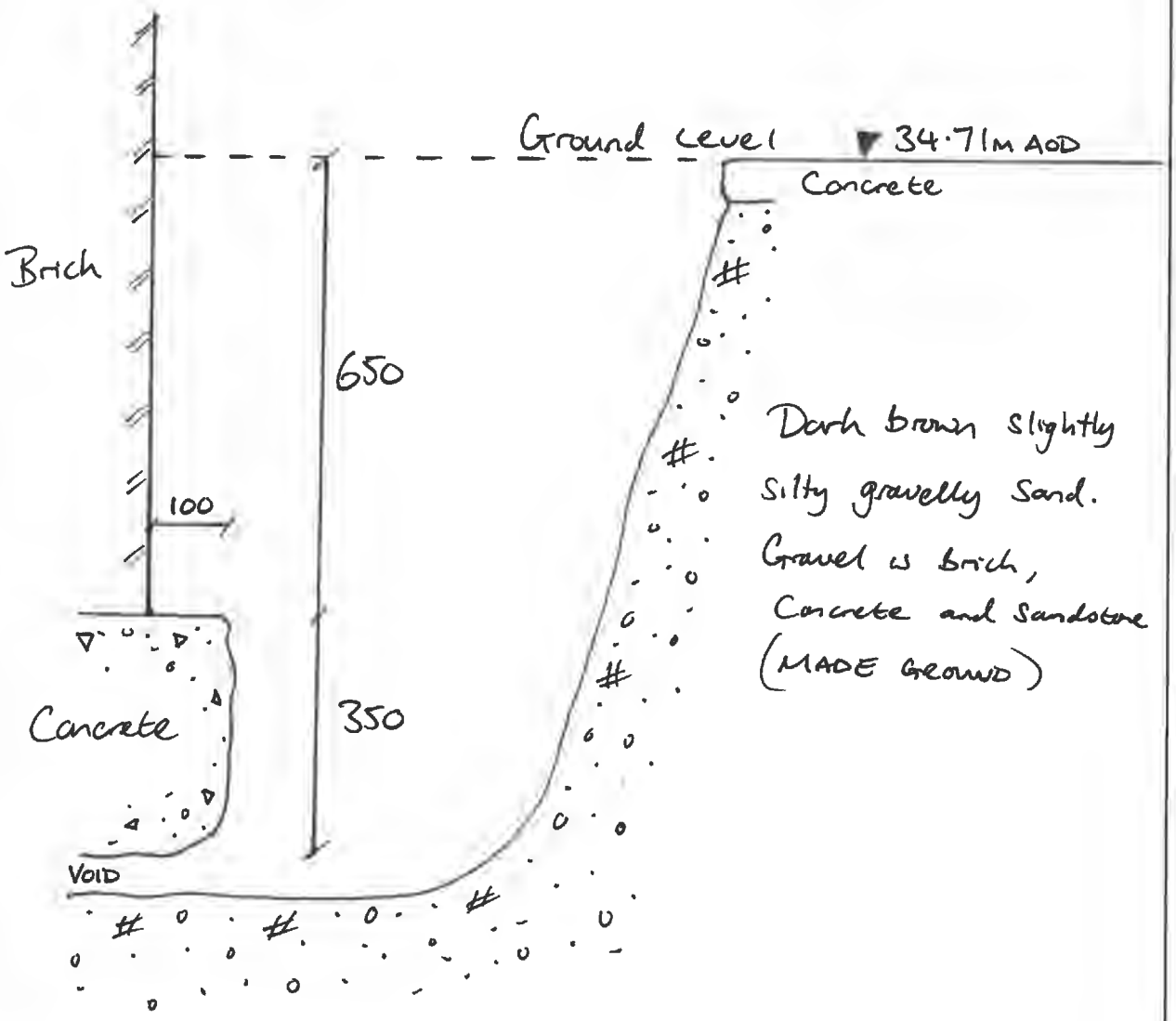


Notes
- Dimensions = mm
- Pit dry
- Foundation not encountered
- Scale 1:200

CC GEOTECHNICAL LTD
Consulting Geotechnical and Geoenvironmental Engineers
Tel: (0151) 545 2750 Fax: (0151) 548 7892

Project	PATERSON REDEVELOPMENT PROJECT		
Drawing	FOUNDATION OBSERVATION PIT		
Scale	AS SHOWN		
Date	Mar-19	**Number**	19/10614

OP09



Notes
- Dimensions = mm
- Pit Dry
- Small Void noted under foundation
- Scale 1:100

CC GEOTECHNICAL LTD Consulting Geotechnical and Geoenvironmental Engineers Tel: (0151) 545 2750 Fax: (0151) 548 7892	**Project**	PATERSON REDEVELOPMENT PROJECT	
	Drawing	FOUNDATION OBSERVATION PIT	
	Scale	AS SHOWN	
	Date	Mar-19	**Number** 19/10614

APPENDIX E

INSITU SOIL PERMEABILITY TESTS

FALLING HEAD TEST

CCG-C-18-10614
Christie Hospital: BH01

CC GEOTECHNICAL LTD

Details of test Section	Situation B - BS5930	Ground Level (mAOD)	
Height of standpipe	N/A	Filter Length	N/A
Depth below top of standpipe to response zone	N/A	Casing Elevation (mAOD)	N/A
		Borehole Diameter (m)	0.150
Initial depth to water (mbgl)	0.200	Standpipe Diameter:	N/A
Depth of Casing (mbgl)	2.000	Casing Diameter	150mm

Ref: BS5930:1999

Strata: 0.40: Grey sandy GRAVEL (SUBBASE)
1.40: Brown very gravelly very silty CLAY. Gravel is brick and sandstone - MADE GROUND
2.20: Firm to stiff brown very silty very sandy CLAY

Time Elapsed t (mins)	Depth at Time t From top of casing (m)	Head at Time t	Head Ratio (H/Ho)
0	0.200	1.800	1.000
1	0.210	1.790	0.994
2	0.220	1.780	0.989
3	0.220	1.780	0.989
4	0.220	1.780	0.989
5	0.220	1.780	0.989
10	0.220	1.780	0.989
15	0.230	1.770	0.983
20	0.230	1.770	0.983
30	0.230	1.770	0.983
40	0.230	1.770	0.983
50	0.240	1.760	0.978
60	0.240	1.760	0.978

Permeability:

K= A/FT

K= **1.97E-07** m/s

Where:

A= Cross sectional area of BH (m2)
0.018
F= Intake Factor (m) see BS5930
0.4125
T= Basic time Lag (s)
222000 (by extrapolation)

Notes:
Test carried out under Test B of Section 4 - BS 5930:1999+A2:2010

Calcs by:	Checked by:	Job Number:
DO	CB	18-10614

FALLING HEAD TEST

CCG-C-18-10614
Christie Hospital: BH02

CC GEOTECHNICAL LTD

Details of test Section	Situation B - BS5930	Ground Level (mAOD)	
Height of standpipe	N/A	Filter Length	N/A
Depth below top of standpipe to response zone	N/A	Casing Elevation (mAOD)	N/A
		Borehole Diameter (m)	0.150
Initial depth to water (mbgl)	0.130	Standpipe Diameter:	N/A
Depth of Casing (mbgl)	3.300	Casing Diameter	150mm

Ref: BS5930:1999

Strata:
0.70: Brown very gravelly very silty CLAY. Gravel is brick and sandstone - MADE GROUND
1.40: Brown fine to coarse SAND, with frequent clay lenses
2.20: Stiff brown very sandy silty CLAY
3.50: Weathered SANDSTONE (continuing)

Time Elapsed t (mins)	Depth at Time t From top of casing (m)	Head at Time t	Head Ratio (H/Ho)
0	0.130	3.170	1.000
1	0.140	3.160	0.997
2	0.140	3.160	0.997
3	0.140	3.160	0.997
4	0.140	3.160	0.997
5	0.150	3.150	0.994
10	0.150	3.150	0.994
15	0.160	3.140	0.991
20	0.160	3.140	0.991
30	0.160	3.140	0.991
40	0.160	3.140	0.991
50	0.160	3.140	0.991
60	0.170	3.130	0.987

Permeability:

K= A/FT

K= **7.38E-08** m/s

Where:

A= Cross sectional area of BH (m2)
0.018
F= Intake Factor (m) see BS5930
0.4125
T= Basic time Lag (s)
591600 (by extrapolation)

Notes:
Test carried out under Test B of Section 4 - BS 5930:1999+A2:2010

Calcs by:	Checked by:	Job Number:
DO	CB	18-10614

FALLING HEAD TEST

CCG-C-18-10614
Christie Hospital: BH04

CC GEOTECHNICAL LTD

Details of test Section	Situation B - BS5930	Ground Level (mAOD)	
Height of standpipe	N/A	Filter Length	N/A
Depth below top of standpipe to response zone	N/A	Casing Elevation (mAOD)	N/A
		Borehole Diameter (m)	0.150
Initial depth to water (mbgl)	0.340	Standpipe Diameter:	N/A
Depth of Casing (mbgl)	2.500	Casing Diameter	150mm

Ref: BS5930:1999

Strata: 1.30: Brown very gravelly very silty CLAY. Gravel is brick and sandstone - MADE GROUND
3.50: Stiff brown very sandy silty CLAY
5.00: Weathered SANDSTONE (continuing)

Time Elapsed t (mins)	Depth at Time t From top of casing (m)	Head at Time t	Head Ratio (H/Ho)
0	0.340	2.160	1.000
1	0.346	2.154	0.997
2	0.347	2.153	0.997
3	0.348	2.152	0.996
4	0.349	2.151	0.996
5	0.350	2.150	0.995
10	0.351	2.149	0.995
15	0.352	2.148	0.994
20	0.355	2.145	0.993
30	0.360	2.140	0.991
40	0.365	2.135	0.988
50	0.370	2.130	0.986
60	0.375	2.125	0.984

Permeability:

K= A/FT

K= **2.68E-07** m/s

Where:

A= Cross sectional area of BH (m2)
0.018
F= Intake Factor (m) see BS5930
0.4125
T= Basic time Lag (s)
162600 (by extrapolation)

Notes:
Test carried out under Test B of Section 4 - BS 5930:1999+A2:2010

Calcs by:	Checked by:	Job Number:
DO	CB	18-10614

CCG-C-18-10614:
The Chrisite, Manchester:
BH02

VARIABLE HEAD TEST

CC GEOTECHNICAL LTD

Test Scenario	Situation D - BS5930	Depth to top of test section	3.50mbgl
Type of Test	Rising Head	Standing water level	3.58mbgl
		Drawdown level	4.72mbgl
Diameter of test section (m)	0.09	Soil / rock description	Weathered Sandstone
Length of test section (m)	1.50		

Ref:
BS 22282:2012
BS 5930:1999

Time Elapsed t (mins)	Depth of groundwater (mbgl)	Head at Time (t)	Head Ratio (H/Ho)
0.0	4.720	1.140	1.000
0.5	4.490	0.910	0.798
1.0	4.320	0.740	0.649
1.5	4.110	0.530	0.465
1.5	3.980	0.400	0.351
2.5	3.880	0.300	0.263
3.0	3.820	0.240	0.211

Permeability:

K= A/FT

K= 7.45E-06 m/s

Where:

A= Cross sectional area of BH (m2)
0.002

F= Intake Factor (m) see BS5930
2.685

T= Basic time Lag (s)
100

Notes:
Test carried out under Test D of Section 4 - BS 5930:1999

Client:	**Interserve Construction Ltd**	**Calcs by:**	**Checked by:**	**Job Number:**
		DO	**CB**	**18/10614**

APPENDIX F

ROCK CORE PHOTOGRAPHS


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH1 3.5-6.5mbgl
3.5
5.0
5.0
6.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH1 6.5-9.5mbgl
KATUN
6.5
8.0
8.0
9.5

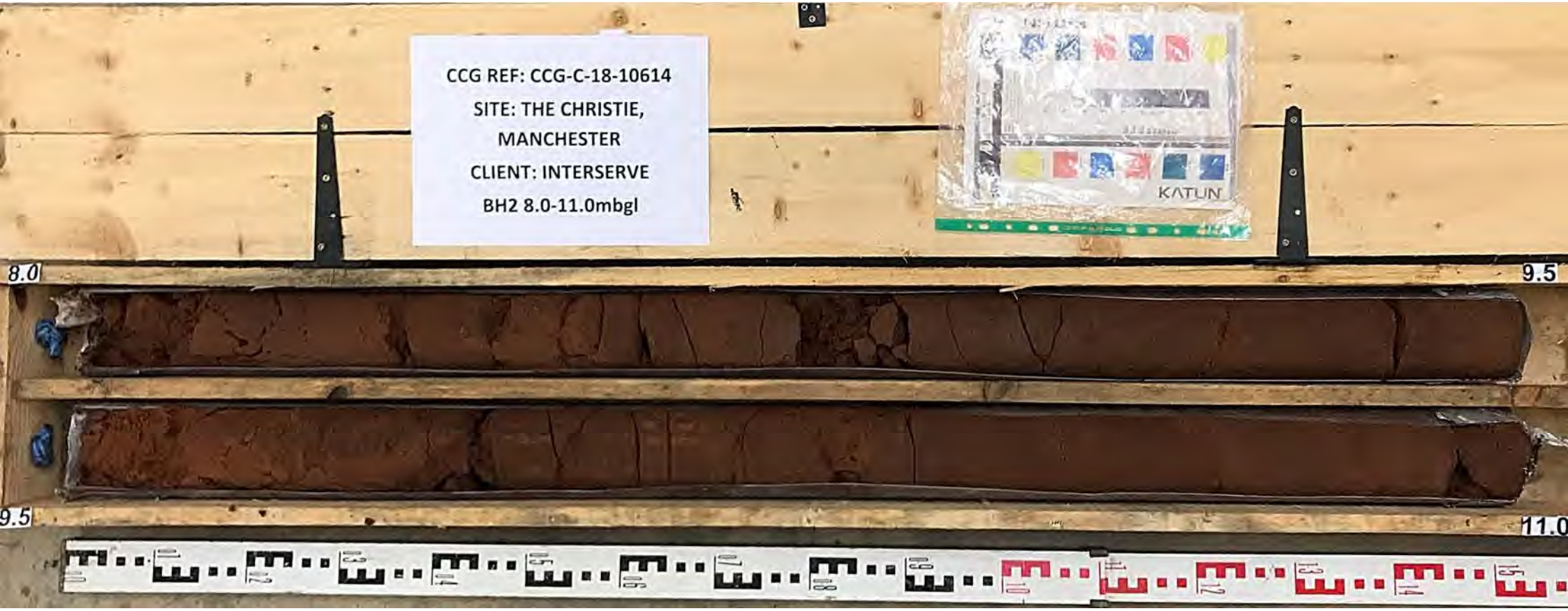

CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH1 9.5-12.5mbgl
KATUN
9.5
11.0
11.0
12.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH1 12.5-15.5mbgl
KATUN
12.5
14.0
14.0
15.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH1 15.5-18.5mbgl
KATUN
15.5
17.0
17.0
18.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH1 18.5-20.0mbgl
KATUN
18.5
20.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH2 5.0-8.0mbgl
5.0
6.5
6.5
8.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH2 8.0-11.0mbgl
KATUN
8.0
9.5
9.5
11.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH2 11.0-14.0mbgl
11.0
12.5
12.5
14.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH2 14.0-17.0mbgl
14.0
15.5
15.5
17.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH2 17.0-20.0mbgl
17.0
18.5
18.5
20.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH3 4.5-7.5mbgl
4.5
6.0
6.0
7.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH3 7.5-10.5mbgl
KATUN
7.5
9.0
9.0
10.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH3 10.5-13.5mbgl
KATUN
10.5
12.0
12.0
13.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH3 13.5-16.5mbgl
KATUN
13.5
15.0
15.0
16.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH3 20.0-22.5mbgl
KATUN
20.0
21.0
21.0
22.5


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH3 22.5-25.0mbgl
KATUN
22.5
24.0
24.0
25.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH4 5.0-8.0mbgl
KATUN
5.0
6.5
6.5
8.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH4 8.0-11.0mbgl
8.0
9.5
9.5
11.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH4 11.0-14.0mbgl
KATUN
11.0
12.5
12.5
14.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH4 14.0-17.0mbgl
KATUN
14.0
15.5
15.5
17.0


CCG REF: CCG-C-18-10614
SITE: THE CHRISTIE,
MANCHESTER
CLIENT: INTERSERVE
BH4 17.0-20.0mbgl
KATUN
17.0
18.5
18.5
20.0

APPENDIX G

SOIL & ROCK ENGINEERING TEST RESULTS

Units 1 & 2
Deltic Place
Deltic Way
Knowsley Industrial Estate
Liverpool
L33 7BU

Telephone: (0151) 545 2750
Fax: (0151) 548 7892
Email: enquiries@ccgeotechnical.com
www.ccgeotechnical.com

CC GEOTECHNICAL LTD
Consulting Geoenvironmental and Geotechnical Engineers

LABORATORY REPORT

CONTRACT NUMBER: CCG-C-18-10614

CONTRACT TITLE: THE CHRISTIE, MANCHESTER

CLIENT: INTERSERVE

DATE RECEIVED: 22/01/19
DATE COMMENCED: 22/01/19
DATE COMPLETED: 12/04/19
REPORT DATE: 12/04/19

Test Description	Qty
Determination of Moisture Content BS 1377-2:1990 (a)	8
Particle Size Distribution BS 1377-2:1990 (a)	4
Sedimentation by Pipette BS 1377-2:1990 (#)	4
Determination of Liquid & Plastic Limits BS 1377-2:1990 (a)	8
Uniaxial Compressive Strength ISRM Vol 16 No 2, pp 135-140 (2007) (s)	3
Point Load test ISRM 1985: Suggested Method	24
Consolidated undrained triaxial compression test BS 1377-8:1990 (s)	1
Deformability in uniaxial compression ISRM 1985: Suggested Method	3

Notes: Observations and interpretations are not accredited by UKAS
# denotes non-accredited test
a denotes UKAS accredited test
s denotes test undertaken by approved subcontractor

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Approved Signatories: Chris Bolan (Managing Director) – Daniel Kerfoot (Laboratory Manager)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH01	BD	1.50	1.50	19	-	-	-	28	13	15	67	CL	Y	Brown clayey silty gravelly fine to coarse grained SAND. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5,9.2,9.4)

SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614) DATE: 11.02.19

CLIENT: INTERSERVE

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH02	BD	2.50	2.50	29	-	-	-	-	-	-	97	NP	Y	Brown silty fine to medium grained SAND. (BS1377Pt2:3.2,4.4,5,9.2,9.4)

SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614) DATE: 11.02.19

CLIENT: INTERSERVE

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH03	BD	2.50	2.50	11	-	-	-	-	-	-	97	NP	Y	Brown silty fine to medium grained SAND. (BS1377Pt2:3.2,4.4,5)
BH03	BD	3.50	3.50	34	-	-	-	-	-	-	99	NP	Y	Brown silty slightly clayey fine to medium grained SAND. (BS1377Pt2:3.2,4.4,5,9.2,9.4)

SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614) DATE: 11.02.19

CLIENT: INTERSERVE

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH04	U100	2.00	2.45	27	-	-	-	51	20	31	91	CH	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5,9.2,9.4)

SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614) DATE: 11.02.19

CLIENT: INTERSERVE

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP02	BD	2.00	2.00	12	-	-	-	28	14	14	93	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
TP03	BD	2.00	2.00	34	-	-	-	29	14	15	95	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614) DATE: 11.02.19

CLIENT: INTERSERVE

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
WS01	U80	1.00	1.40	12	-	-	-	20	13	7	95	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614) DATE: 11.02.19

CLIENT: INTERSERVE

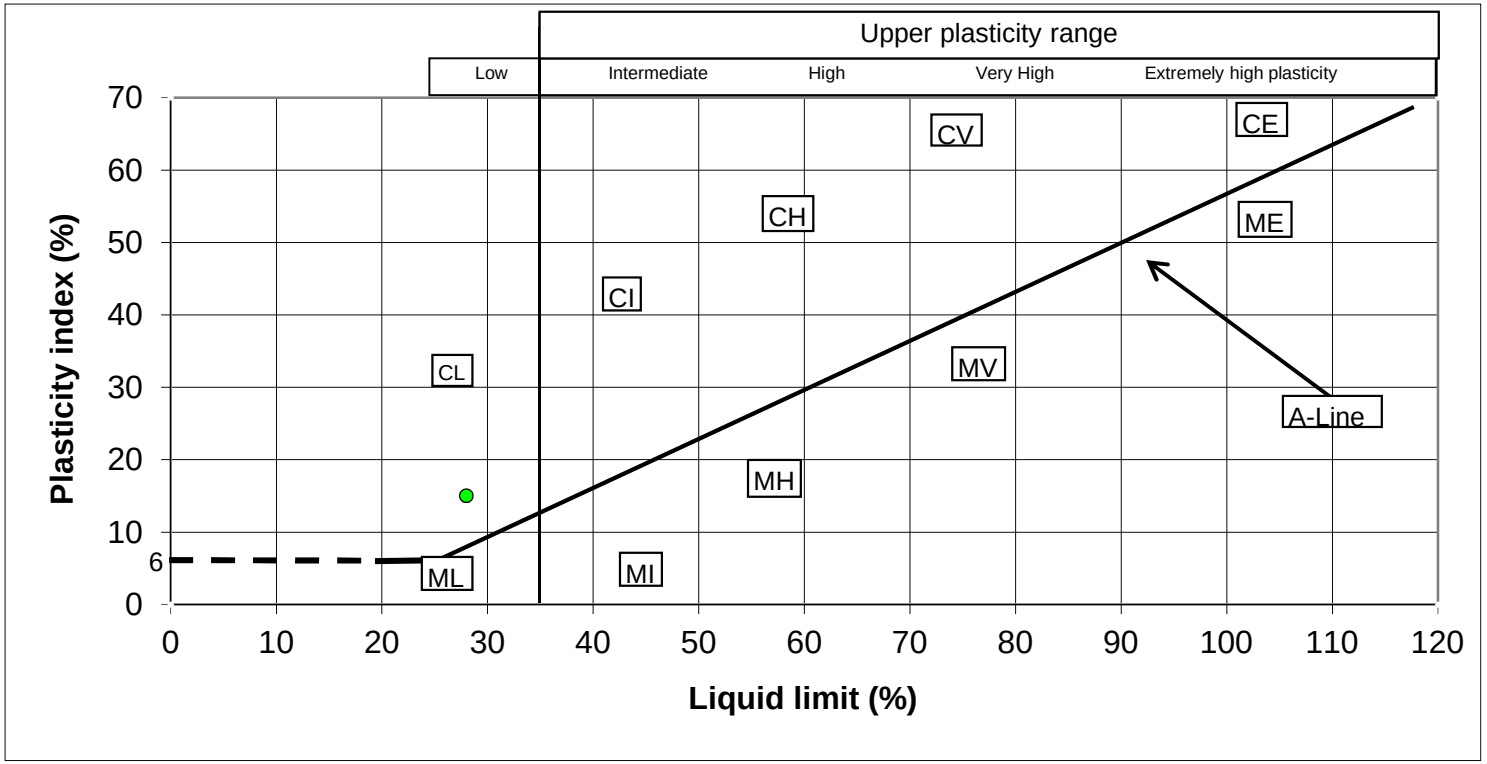
UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET

BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH01	1.50	28.0	15.0

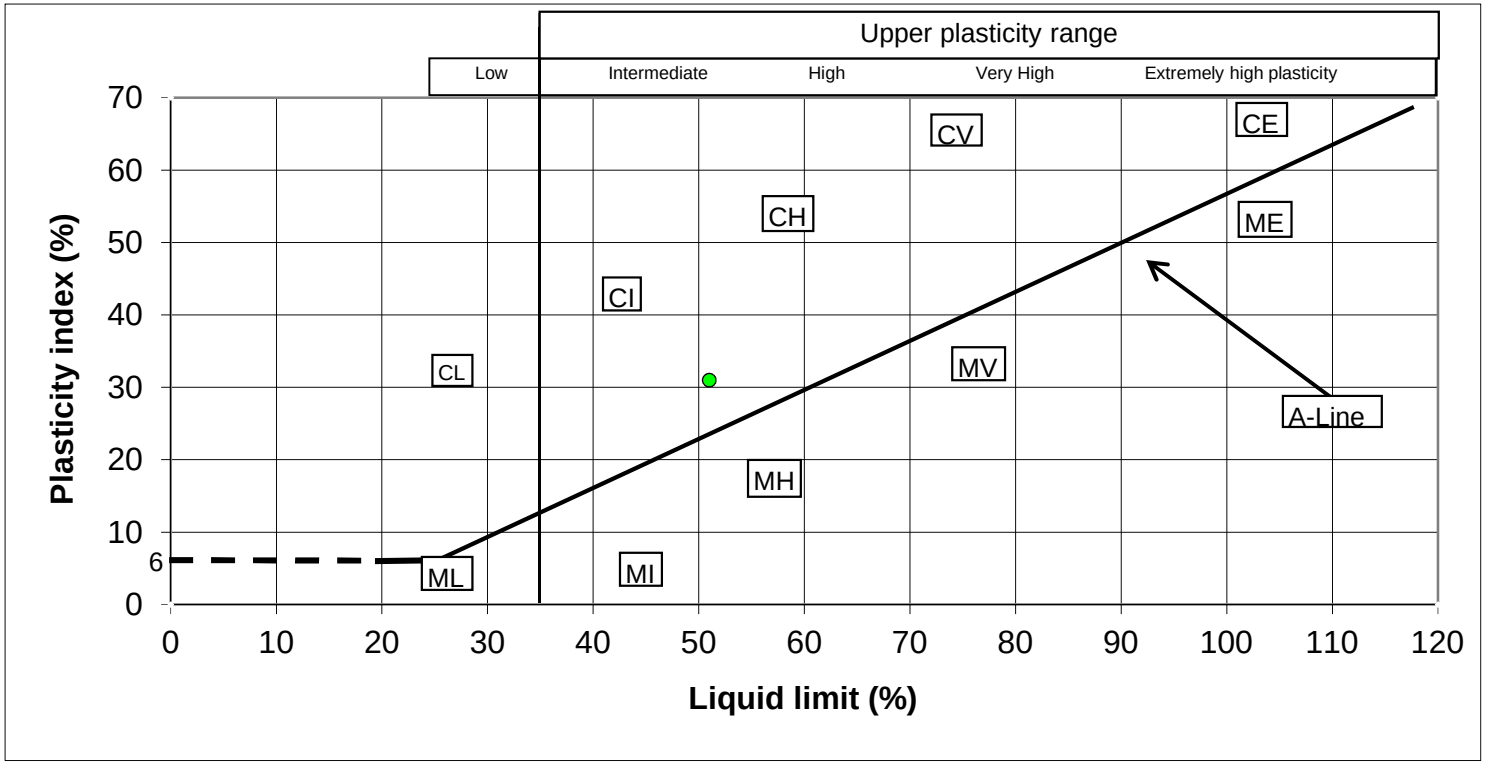
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: INTERSERVE	SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH04	2.0-2.45	51.0	31.0

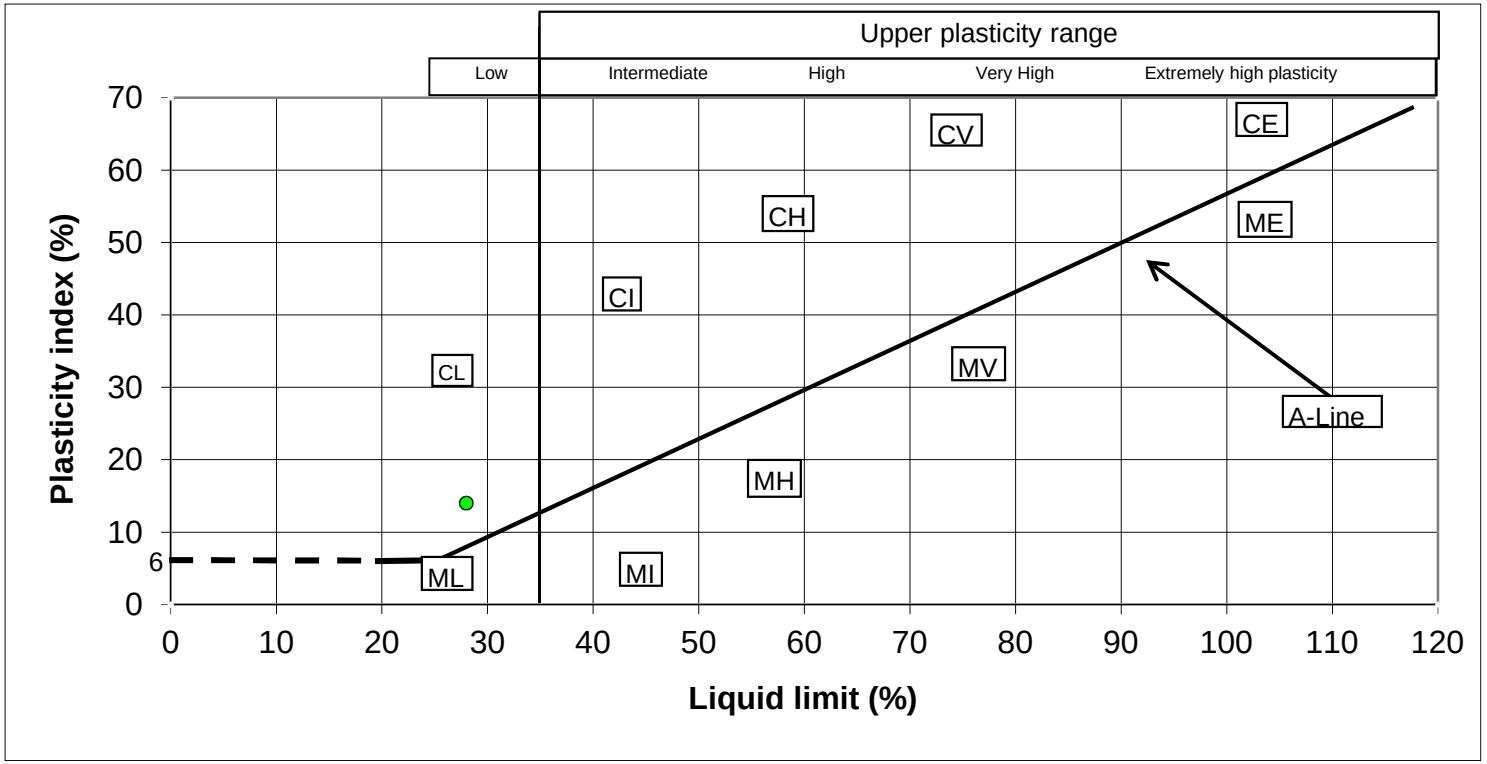
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: INTERSERVE	SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP02	2.00	28.0	14.0

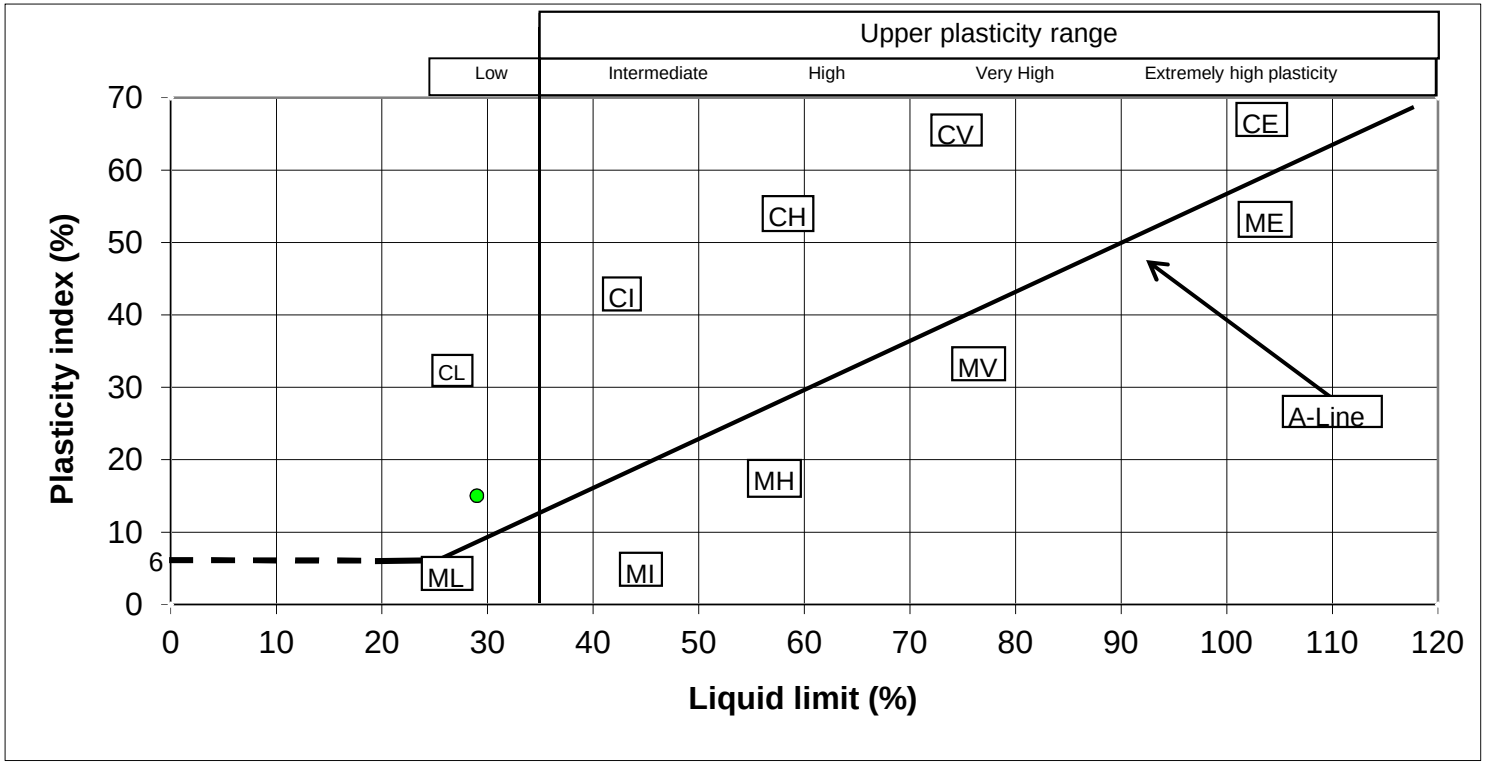
UKAS TESTING
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APPROVED BY	DK

CLIENT: INTERSERVE	SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP03	2.00	29.0	15.0

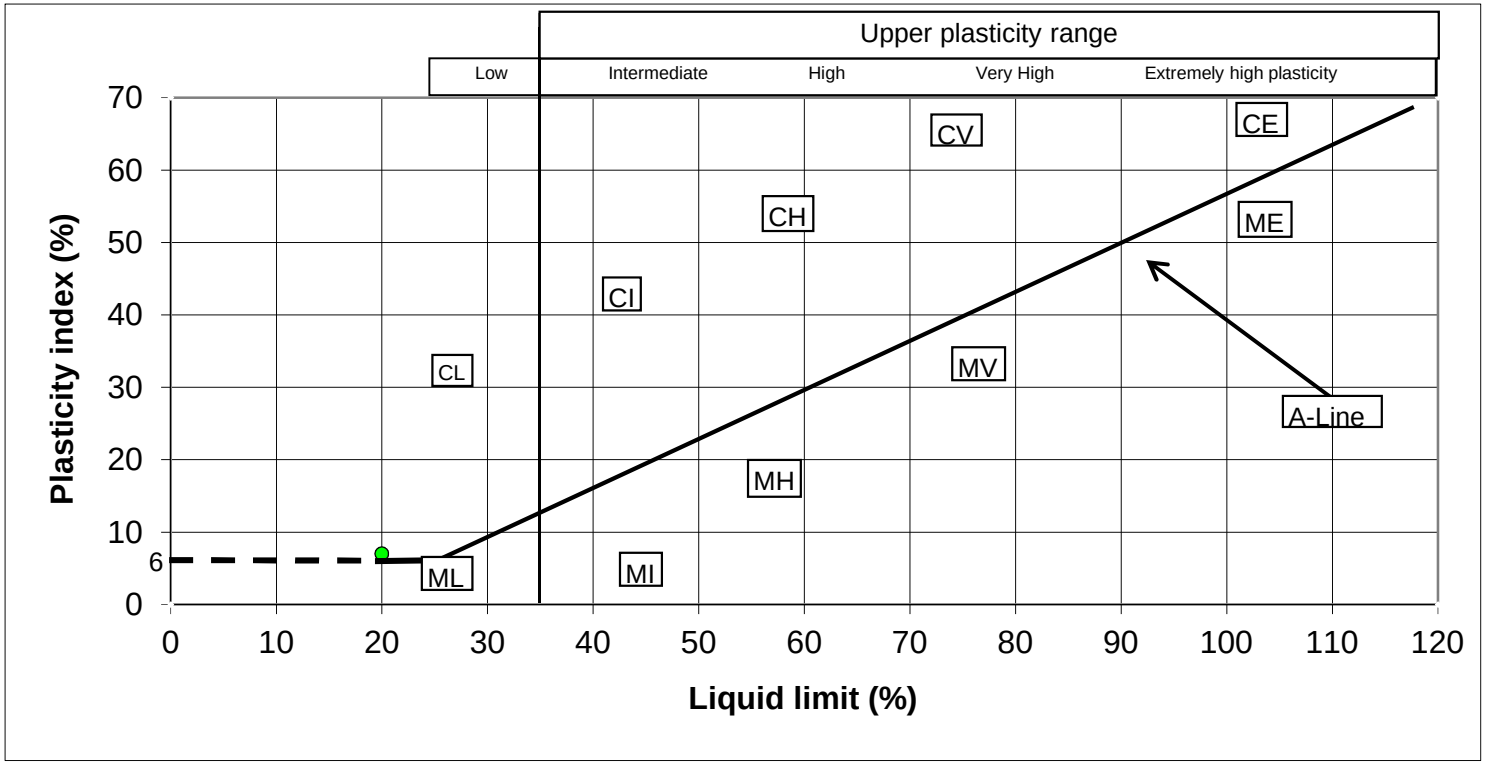
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: INTERSERVE	SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
WS01	1.0-2.0	20.0	7.0

UKAS TESTING
4514

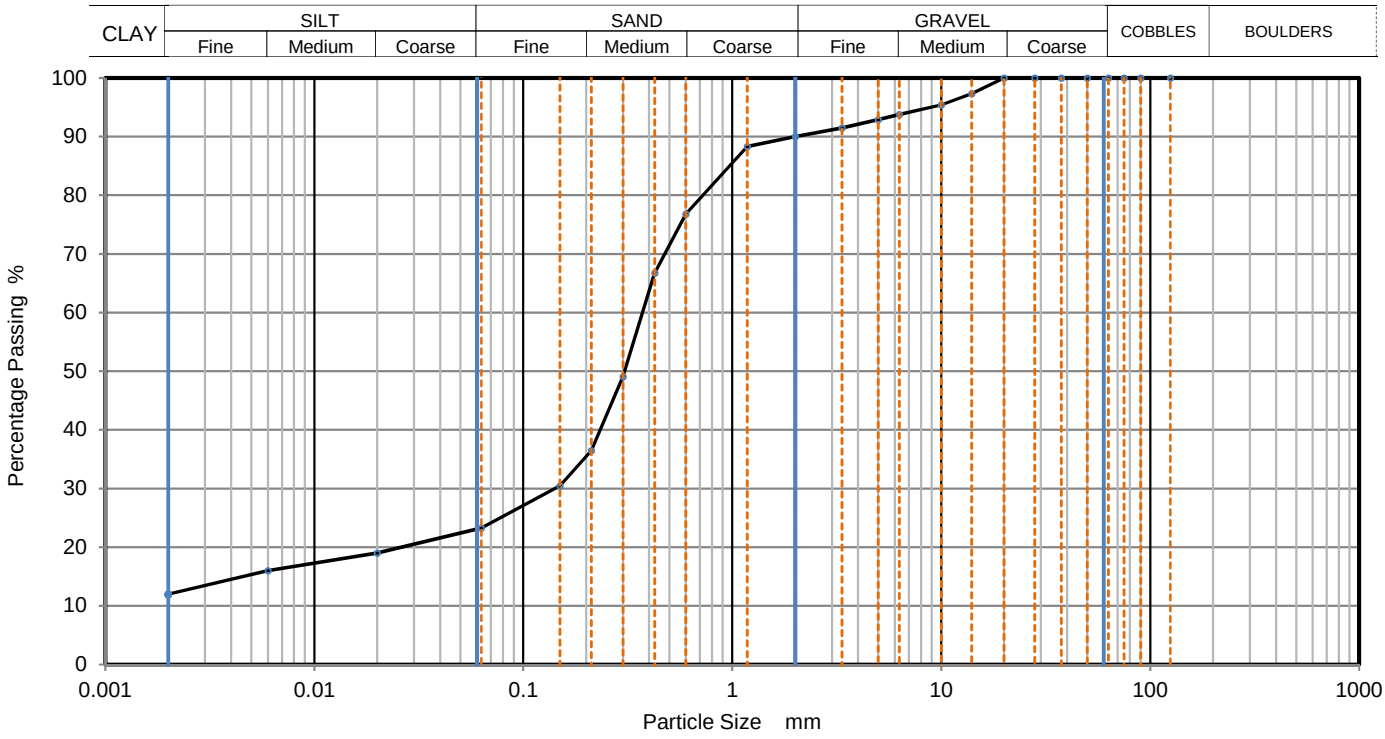
APPROVED BY	DK

CLIENT: INTERSERVE	SITE: THE CHRISTIE, MANCHESTER (CCG-C-18-10614)

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Tel: 0151 545 2750
e: lab@ccgeotechnical.com

PARTICLE SIZE DISTRIBUTION

				Job Ref	CCG-C-18-10614
				Borehole/Pit No.	BH01
Site Name	THE CHRISTIE, MANCHESTER			Sample No.	3
Specimen Description	Brown clayey silty gravelly fine to coarse grained SAND. Gravel is fine to medium subangular to subrounded sandstone			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	WET SIEVE & PIPETTE			KeyLAB ID	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	100	0.0060	16
75	100	0.0020	12
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	95		
6.3	94		
5	93		
3.35	91		
2	90		
1.18	88		
0.6	77		
0.425	67		
0.3	49		
0.212	36		
0.15	30		
0.063	23		

Dry Mass of sample, g: 1611

Sample Proportions	% dry mass
Very coarse	0
Gravel	10
Sand	67
Silt	11
Clay	12

Grading Analysis		
D_{100}	mm	
D_{60}	mm	
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

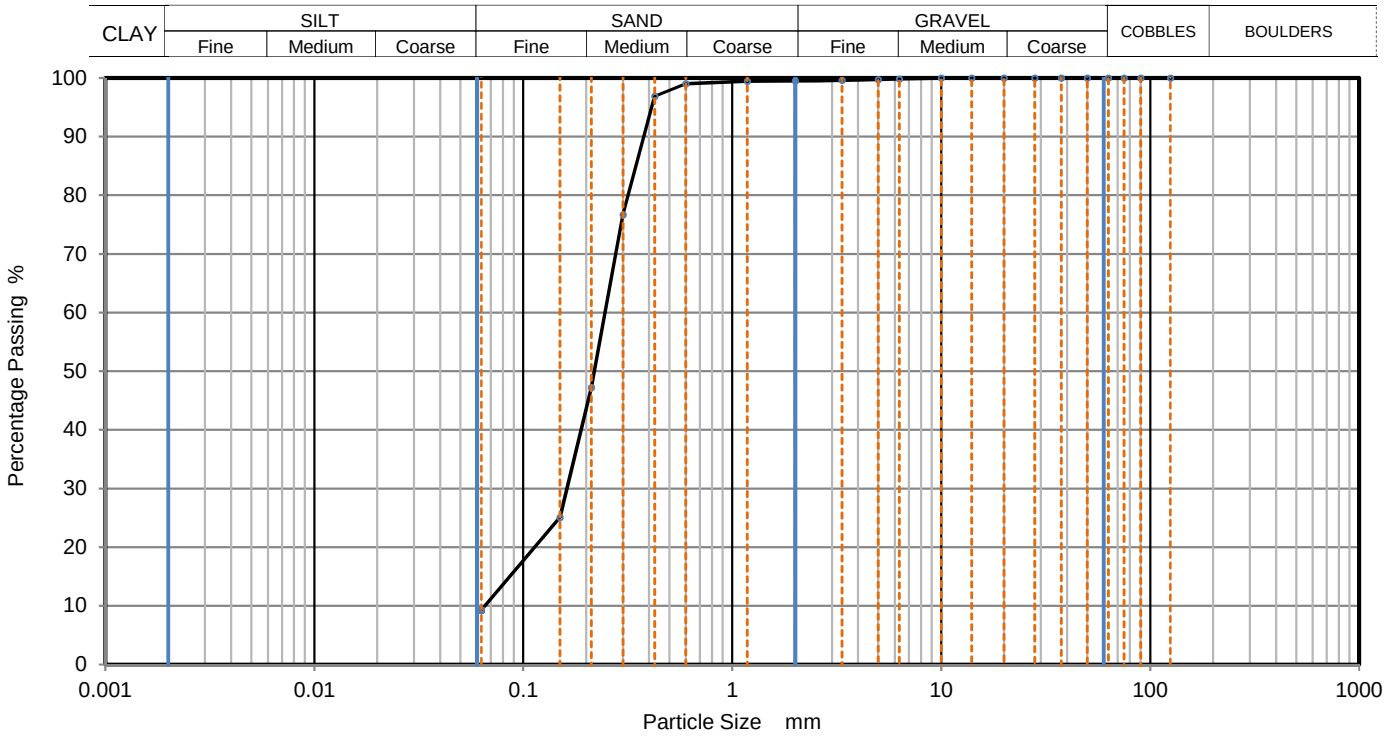
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig
MH	DK	DK	11/02/2019 10:29	Sheet

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PARTICLE SIZE DISTRIBUTION

				Job Ref	CCG-C-18-10614
				Borehole/Pit No.	BH02
Site Name	THE CHRISTIE, MANCHESTER			Sample No.	5
Specimen Description	Brown silty fine to medium grained SAND			Depth, m	2.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	WET SIEVE			KeyLAB ID	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	97		
0.3	77		
0.212	47		
0.15	25		
0.063	9		

Dry Mass of sample, g	728

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	91
Fines <0.063mm	9

Grading Analysis		
D_{100}	mm	
D_{60}	mm	
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

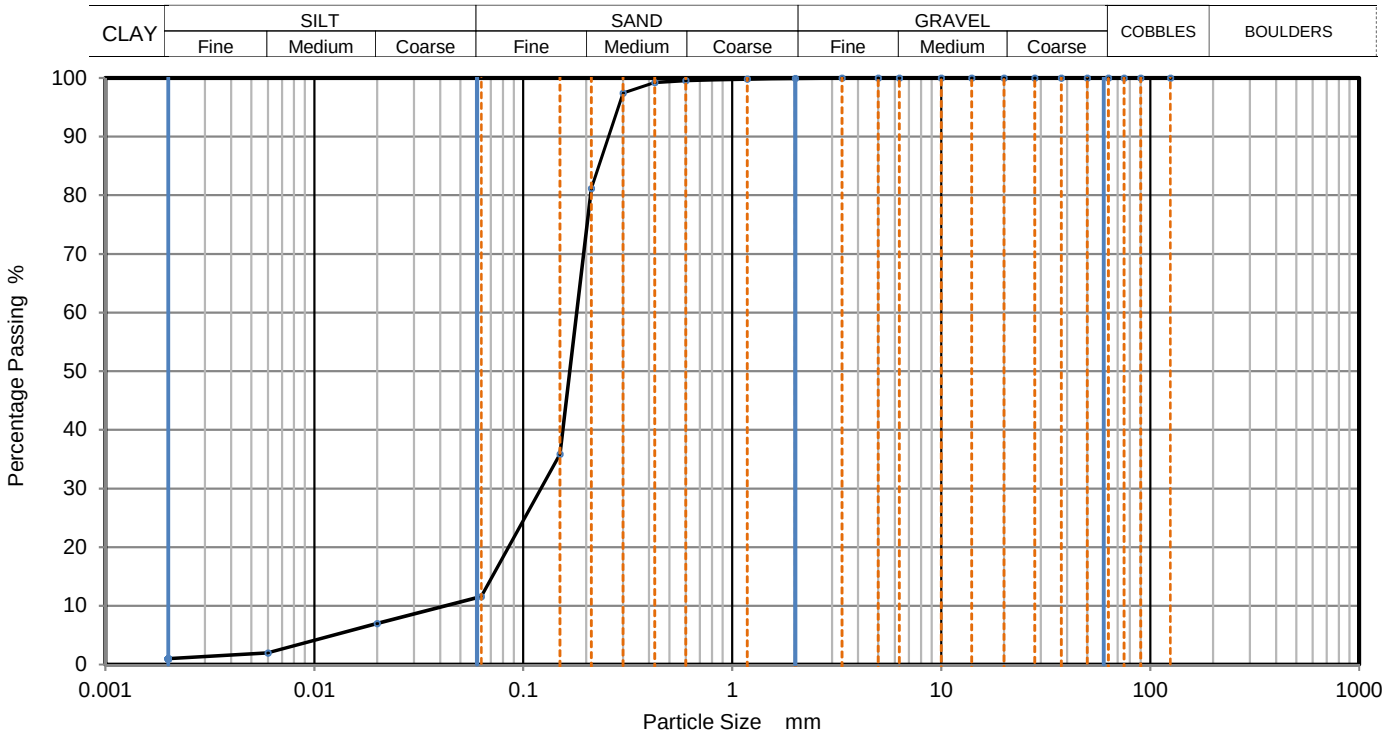
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Operator	Checked	Approved	Sheet printed	Fig
MH	DK	DK	11/02/2019 10:35	Sheet

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PARTICLE SIZE DISTRIBUTION

				Job Ref	**CCG-C-18-10614**
				Borehole/Pit No.	BH03
Site Name	THE CHRISTIE, MANCHESTER			Sample No.	7
Specimen Description	Brown silty slightly clayey fine to medium grained SAND			Depth, m	3.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	WET SIEVE & PIPETTE			KeyLAB ID	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	7
90	100	0.0060	2
75	100	0.0020	1
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	97		
0.212	81		
0.15	36		
0.063	12		

Dry Mass of sample, g: 885

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	88
Silt	11
Clay	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

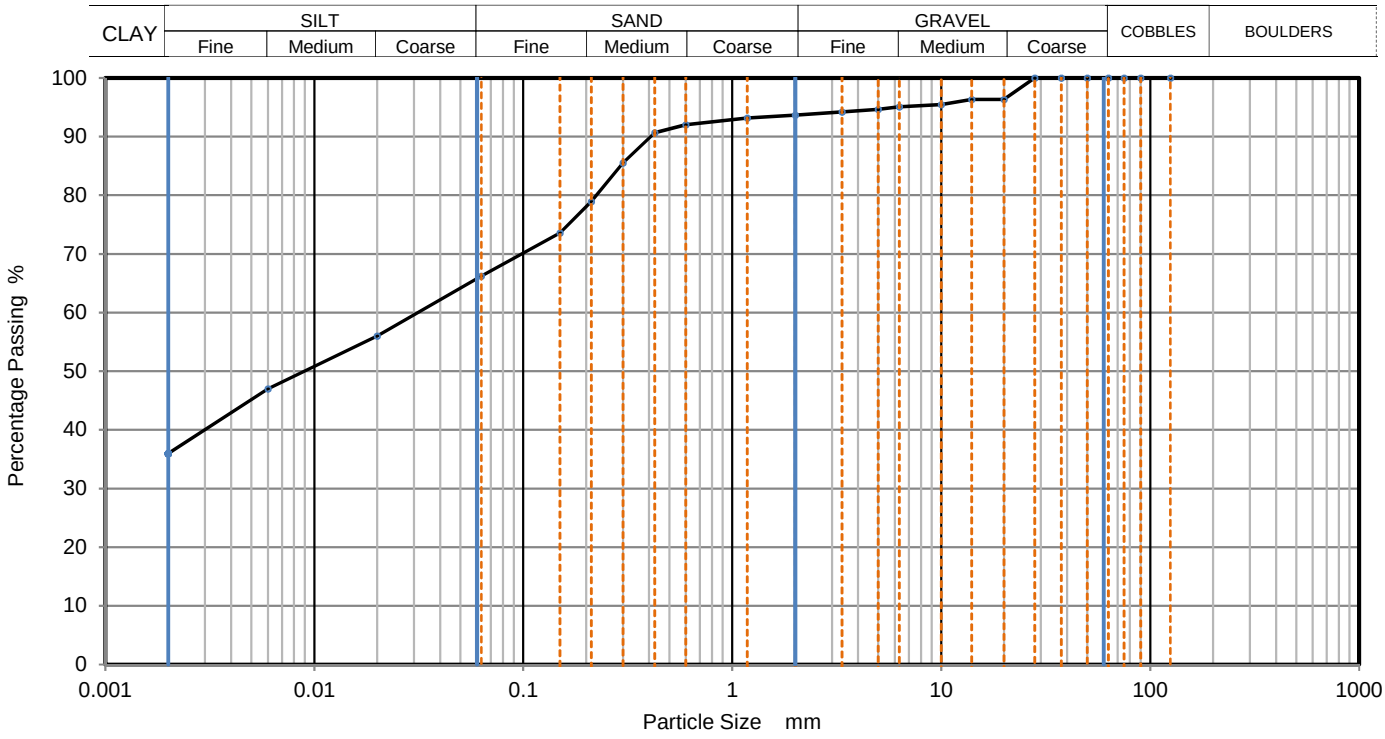
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig
MH	DK	DK	11/02/2019 10:46	Sheet

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PARTICLE SIZE DISTRIBUTION

				Job Ref	CCG-C-18-10614
				Borehole/Pit No.	BH04
Site Name	THE CHRISTIE, MANCHESTER			Sample No.	4
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone			Depth, m	2.00-2.45
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	WET SIEVE & PIPETTE			KeyLAB ID	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	56
90	100	0.0060	47
75	100	0.0020	36
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	96		
10	95		
6.3	95		
5	95		
3.35	94		
2	94		
1.18	93		
0.6	92		
0.425	91		
0.3	86		
0.212	79		
0.15	74		
0.063	66		

Dry Mass of sample, g: 1481

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	28
Silt	30
Clay	36

Grading Analysis		
D_{100}	mm	
D_{60}	mm	
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig
MH	DK	DK	11/02/2019 10:55	Sheet

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

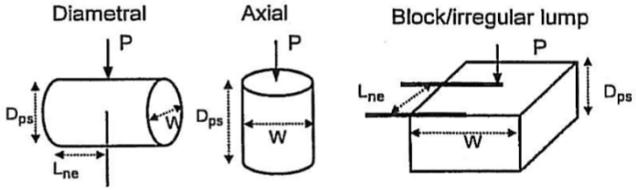
PROJECT No.:- CCG-C-18-10614 SITE:- TH E CHRISTIE, MANCHESTER DATE: 21.02.19

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH01	6.60	a			85	74	1.50	89	0.19	1.30	0.24	4.87	NAT	p
BH01	9.15	a			85	55	1.30	77	0.22	1.22	0.27	5.31	NAT	p
BH01	9.45	a			85	44	1.20	69	0.25	1.16	0.29	5.83	NAT	p
BH01	11.85	a			85	68	1.40	86	0.19	1.27	0.24	4.85	NAT	p
BH01	15.60	a			85	80	1.20	93	0.14	1.32	0.18	3.67	NAT	p
BH01	15.85	a			85	53	1.40	76	0.24	1.21	0.29	5.88	NAT	p
BH01	19.60	a			85	67	1.80	85	0.25	1.27	0.32	6.31	NAT	p
BH01	19.60	a			85	80	2.00	93	0.23	1.32	0.31	6.11	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: JE APPROVED BY: DK

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

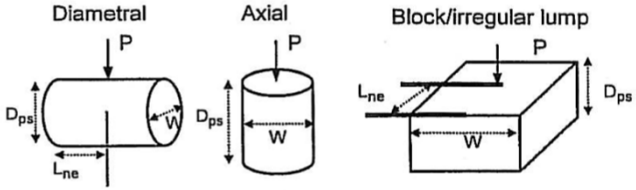
PROJECT No.:- CCG-C-18-10614 SITE:- TH E CHRISTIE, MANCHESTER DATE: 21.02.19

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH02	6.40	a			85	65	0.70	84	0.10	1.26	0.13	2.51	NAT	p
BH02	10.00	a			85	62	0.80	82	0.12	1.25	0.15	2.98	NAT	p
BH02	11.70	a			85	47	0.80	71	0.16	1.17	0.18	3.69	NAT	p
BH02	14.55	a			85	54	0.90	76	0.15	1.21	0.19	3.73	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: JE APPROVED BY: DK

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

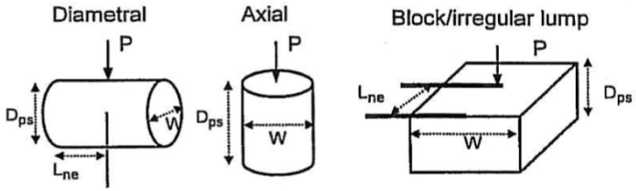
PROJECT No.:- CCG-C-18-10614 SITE:- TH E CHRISTIE, MANCHESTER DATE: 21.02.19

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH03	8.20	a			85	63	0.80	83	0.12	1.25	0.15	2.94	NAT	p
BH03	11.90	a			85	58	0.30	79	0.05	1.23	0.06	1.18	NAT	p
BH03	23.75	a			85	47	0.40	71	0.08	1.17	0.09	1.85	NAT	p
BH03	23.45	a			85	54	0.90	76	0.15	1.21	0.19	3.73	NAT	p
BH03	14.90	a			85	63	0.70	83	0.10	1.25	0.13	2.57	NAT	p
BH03	20.50	a			85	51	0.70	74	0.13	1.20	0.15	3.03	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: JE APPROVED BY: DK

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

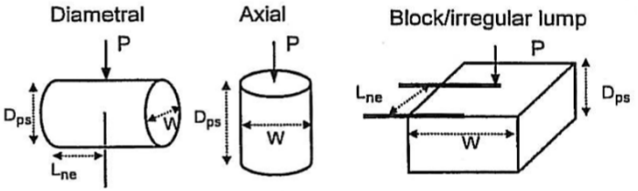
PROJECT No.:- CCG-C-18-10614 SITE:- TH E CHRISTIE, MANCHESTER DATE: 21.02.19

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH04	6.30	a			85	62	1.10	82	0.16	1.25	0.20	4.09	NAT	p
BH04	8.45	a			85	58	0.90	79	0.14	1.23	0.18	3.53	NAT	p
BH04	12.45	a			85	43	0.30	68	0.06	1.15	0.07	1.48	NAT	p
BH04	12.30	a			85	63	0.40	83	0.06	1.25	0.07	1.47	NAT	p
BH04	16.20	a			85	78	1.60	92	0.19	1.31	0.25	4.98	NAT	p
BH04	16.70	a			85	55	1.10	77	0.18	1.22	0.22	4.49	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: JE APPROVED BY: DK

TEST REPORT

UNIAXIAL COMPRESSIVE STRENGTH

In accordance with ISRM Vol 16 No 2, pp 135-140 (1979)

PROJECT:	**THE CHRISTIE, MANCHESTER**
CLIENT:	**INTERSERVE**
CCG REF:	**CCG-C-18-10614**
Sample ref:	BH01 19.80mbgl
Date of coring:	24.01.19
Sampled by:	DB/AH
Sample description:	SANDSTONE

TEST DATA

Specimen Height (mm):	170
Specimen Diameter (mm):	85
L/D ratio:	2:1
Mode of failure:	AXIAL CLEAVAGE
Test duration:	4m 31s
Maximum load at failure (kN):	21.5
Compressive strength (N/mm2):	**3.8**

Test date:	25.02.19
Tested by:	**JE**
Report prepared by:	**DK**
Report approved by:	**DK**

SOIL ENGINEERING

TEST REPORT

UKAS TESTING 1265

Serial number: LT1792 Date of issue: 09/04/2019

Issued by Soil Engineering Geoservices Limited,
Parkside Lane,
Dewsbury Road,
Leeds
LS11 5SX.
Tel: 0113 2711111
Fax: 0113 2760472
Email: enquiries@soil-engineering.co.uk

Authorised signatory

P. Rodgers		(Technical Manager)
K. A. Walker		(Laboratory Manager)
S. Harper	√	(Laboratory Production Manager)

Customer name	CC Geotechnical Limited
Address	Units 1 & 2 Deltic Place Knowsley Industrial Estate Liverpool Merseyside L33 7BU
Contract name	The Christie, Manchester
Your reference	18/10614
Dates of receipt of samples	30/01/2019
Dates of testing	26/02/2019 to 20/03/2019

Sampling was not performed by the Laboratory of Soil Engineering.

Testing was performed on 6 number of samples received in good condition.

Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

Results reported relate only to the samples tested.

Tests marked 'Not UKAS' in this report are not included in the UKAS accreditation schedule for our laboratory. These results will appear in italics on any summary of tests.

Samples will be retained for 28 days from date of issue of this report and then be disposed of, unless we receive written instruction to the contrary

This test report shall not be reproduced except in full without the written permission of Soil Engineering Geoservices Limited.

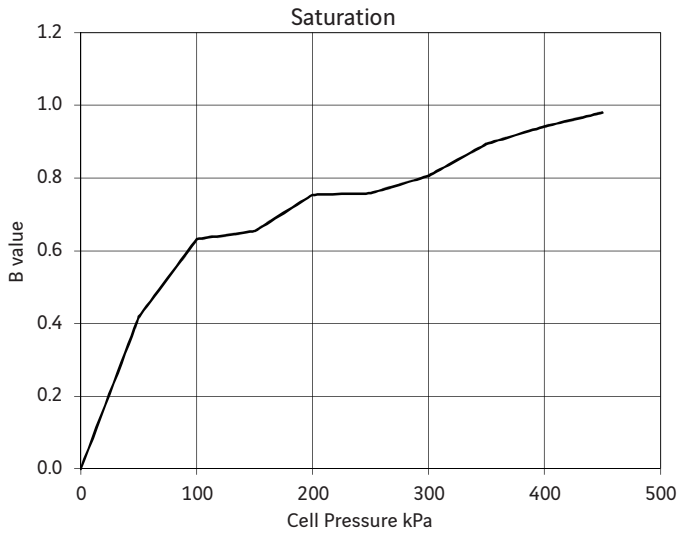
Key to Laboratory Summary Sheets

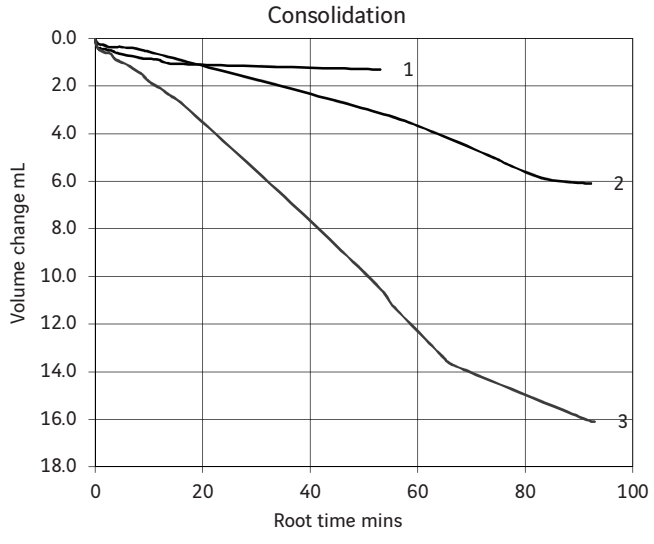
Common to all summaries				
Sample Type	U	Undisturbed sample	D	Small disturbed sample
	P	Piston sample	B	Bulk disturbed sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Rock core
	AMAL	Amalgamated sample		
Test status	Any result in *italics* indicates a test that is not within the scope of the UKAS accreditation for this laboratory.			
Summary of Laboratory Soil Tests: Index / Classification Tests				
Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	1	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		
Summary of Laboratory Soil Tests: Strength and Permeability Tests				
Triaxial	UU	Single stage unconsolidated quick undrained	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained		
	Note that single stage tests are reported assuming f = 0 for total stress and c' = 0 for effective stress			
Consol	Oed	One-dimensional oedometer	Hyd	Hydraulic cell consolidation
	m_v	coefficient of compressibility quoted for p0 to p0 + 100kPa, where determined		
Permeability	C	Constant head permeability	T	Triaxial permeability
Shearbox	SSB	Small shear box	LSB	Large shear box
	p	Peak value	r	Residual value
	RS	Ring shear		
Summary of Laboratory Soil Re-Use Test				
MCV	s	MCV value at natural or specified moisture content	int	Intercept of calibration line in MCV calibration
Summary of Laboratory Rock Strength Tests				
Point Load Type	D	Diametral	A	Axial
(Combination of)	I	Irregular lump	B	Block
	L	Test performed parallel to planes of weakness		
	P	Test performed perpendicular to planes of weakness		
	X	Invalid failure of point load (not broken between points of load application)		
Summary of Laboratory Rock Materials Tests				
Ten% fines	w	Soaked test	d	Dry test
Point Load Index Result				
Point Load Type	D	Diametral	A	Axial
(Combination of)	I	Irregular lump	B	Block
	L	Parallel to planes of weakness	P	Perpendicular to planes of weakness
	X	Invalid failure of point load (not broken between points of load application)		
Dimensions	W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
	D	Distance between platens when just in contact with specimen		
	D'	Distance between platens at point of failure		
	De	Equivalent core diameter	Is	P/De^2
	Is(50)	F x Is	F	$(De/50)^{0.45}$
	Is(50) point load strength index corrected for a diametral test of core diameter 50mm			
	For Axial/Lump tests $De^2 = (4/Pi) \times (W \times D')$		For Diametral tests $De^2 = D \times D'$	

Important note: summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

Project Name	The Christie, Manchester	**Consolidated Undrained Triaxial Compression With Pore Water Pressure Measurement**	Hole ID BH04
Project No.	LT1792		Sample Depth 2.00m
Engineer	CCG		Sample Number
Employer	CC Geotechnical Ltd	In-House Method based on K H Head: Manual of Soils Testing, Vol 3	Sample Type U
Description	Reddish brown slighlty gravelly CLAY.		Specimen Depth 2.00m
			Specimen Number 1

SPECIMEN INITIAL DIMENSIONS				
Test number		1	2	3
Specimen diameter	mm	103.97	106.01	108.12
Specimen length	mm	171.63	164.94	158.15
Density	Mg/m^3	2.11	2.15	2.16
Moisture content	%	19	21	21
Dry density	Mg/m^3	1.78	1.78	1.79
SATURATION STAGE				
Initial pore water pressure	kPa	0.6		
Saturated pore water pressure	kPa	435.6		
Final cell pressure	kPa	450		
B value		0.98		
CONSOLIDATION STAGE				
Cell pressure	kPa	450	470	510
Back pressure	kPa	430	430	430
Effective cell pressure	kPa	20	40	80
Initial pore water pressure	kPa	0	438.4	463.8
Final pore water pressure	kPa	428.4	428.2	428.6
Pore pressure dissipation	%	99.6	121.4	104.1
c_{vi}	m^2/year	18.12	0.94	1.15
m_{vi}	m^2/MN	0.00	0.41	0.32
SPECIMEN AFTER CONSOLIDATION				
Density	Mg/m^3	2.15	2.16	2.17
Moisture content	%	21	21	20
Dry density	Mg/m^3	1.78	1.79	1.81





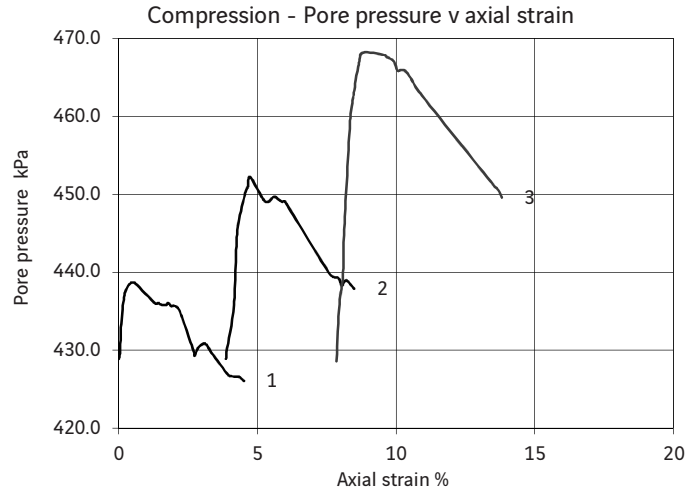
Remarks: Specimen orientation Vertical
Specimen condition for test Undisturbed
Saturation with 50kPa increments with a differential pressure of 10kPa
Drainage from both ends

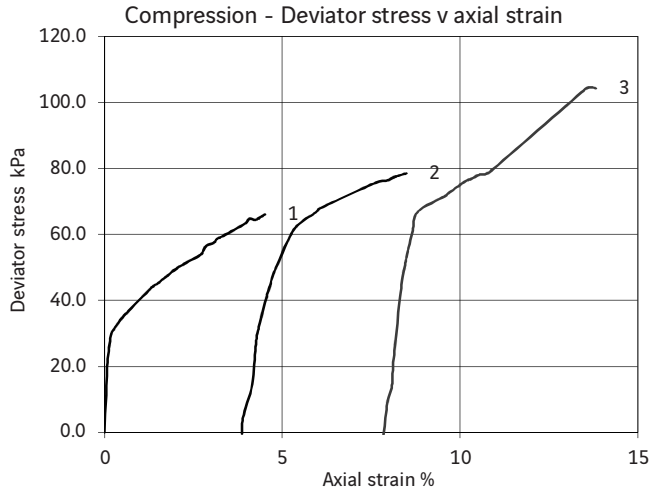
Approved by:	Leeds Laboratory		SOIL ENGINEERING
Steve Harper		Print date 22/03/2019	
	Revision No. 2.03	Issue Date 21/11/2012	Part of the Bachy Soletanche Group

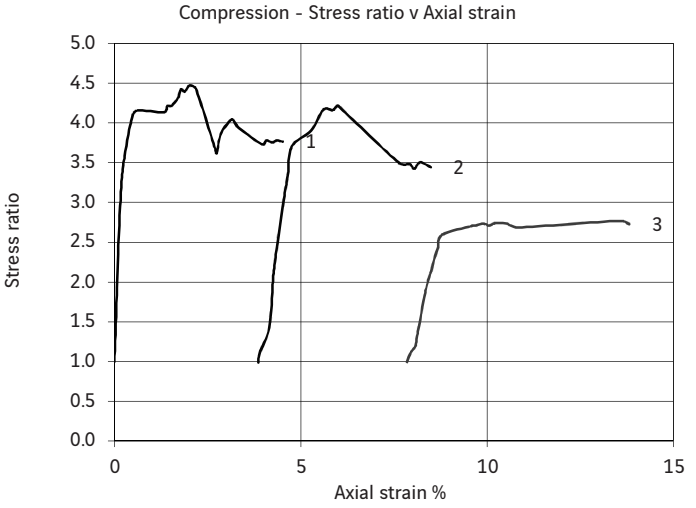
Project Name	The Christie, Manchester	**Consolidated Undrained Triaxial Compression With Pore Water Pressure Measurement**	Hole ID: BH04
Project No.	LT1792		Sample Depth: 2.00m
Engineer	CCG		Sample Number:
Employer	CC Geotechnical Ltd	In-House Method based on K H Head: Manual of Soils Testing, Vol 3	Sample Type: U
Description	Reddish brown slighlty gravelly CLAY.		Specimen Depth: 2.00m
			Specimen Number: 1

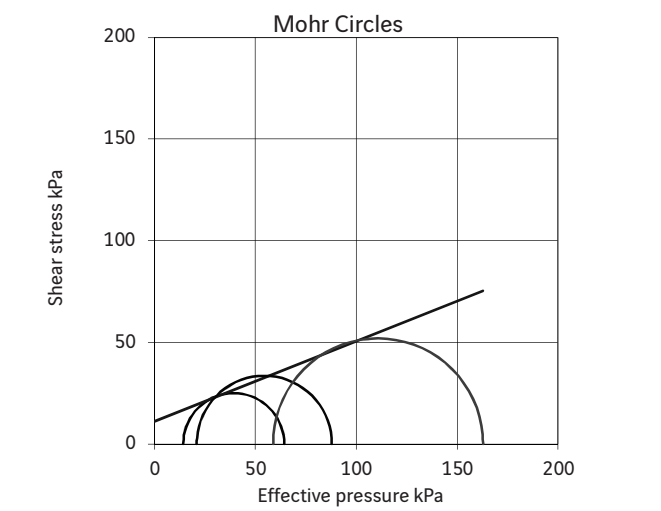
COMPRESSION STAGE					
Test number			1	2	3
Cell pressure		kPa	450	470	510
Initial pore water pressure		kPa	429	429	429
Initial effective pressure		kPa	20	40	80
Failure conditions at			Maximum stress ratio		
Axial strain at failure		%	2.0	6.0	13.5
Maximum deviator stress	$\sigma_1-\sigma_3$	kPa	50	67	104
Pore water pressure at failure	σ	kPa	436	449	451
Effective major principal stress	σ_1'	kPa	63.96	88.21	162.87
Effective minor principal stress	σ_3'	kPa	14.30	20.90	58.80
Effective principal stress ratio			4.47	4.22	2.77
Membrane correction		kPa	0.20	0.52	0.99
Filter drain correction not applicable		kPa	0.0	0.0	0.0
Pore pressure coefficient			0.15	0.31	0.22

SHEAR STRENGTH PARAMETERS	c'	11	kPa	φ'	21.5	°





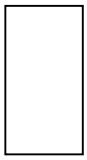




Approved by:	Leeds Laboratory		SOIL ENGINEERING
Steve Harper		Print date 22/03/2019	
	Revision No. 2.03	Issue Date 21/11/2012	Part of the Bachy Soletanche Group

Project Name	The Christie, Manchester	**Consolidated Undrained Triaxial Compression With Pore Water Pressure Measurement**	Hole ID: BH04
Project No.	LT1792		Sample Depth: 2.00m
Engineer	CCG		Sample Number:
Employer	CC Geotechnical Ltd	In-House Method based on K H Head: Manual of Soils Testing, Vol 3	Sample Type: U
Description	Reddish brown slighlty gravelly CLAY.		Specimen Depth: 2.00m
			Specimen Number: 1

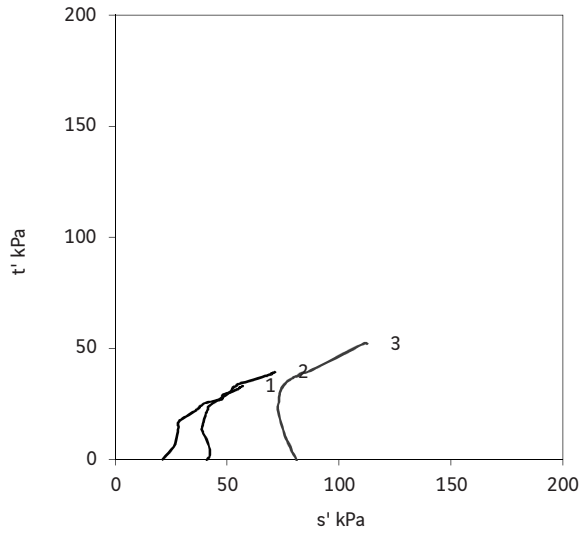
SPECIMEN AFTER TEST

Test number		1		
Mode of failure		Compound 		
Final moisture content	%	21	21	20
Final bulk density	Mg/m^3	2.15	2.16	2.17
Final dry density	Mg/m^3	1.78	1.79	1.81

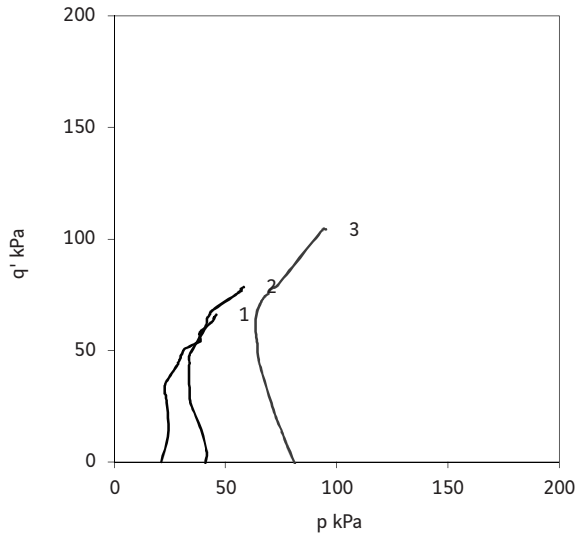
ADDITIONAL SPECIMEN DETAILS

Rate of strain	%/hour	0.16	0.25	0.25
Failure criterion		Maximum stress ratio		

MIT Stress field



Cambridge Stress field



REMARKS

Approved by:	Leeds Laboratory		SOIL ENGINEERING
Steve Harper		Print date 22/03/2019	
	Revision No. 2.03	Issue Date 21/11/2012	Part of the Bachy Soletanche Group

Project Name	The Christie, Manchester
Project No.	LT1792
Engineer	CC Geotechnical
Employer	CC Geotechnical

Summary Of Laboratory Rock Strength Tests

Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	Water Content	Bulk Density	Dry Density	Particle density	Point load			UCS	Brazil	Porosity	Elastic Modulus	Posissons Ratio
										Type	Is	Is50					
						%	kg/m³	kg/m³	Mg/m³		MN/m²	MN/m²	MN/m²	MN/m²	%	GPa	
BH1	9.25		C	9.25	02	13.2	2130	1880					9.39				
BH1	15.80		C	15.80	01	16.1	2130	1830					9.89			3.74 Ave	0.25
BH3	23.55		C	23.55	01	14	2170	1910					1.25			1.09 Ave	0.26
BH4	12.40		C	12.40	01	11.8	2250	2010					5.65			0.52 Ave	0.32
BH4	16.40		C	16.40	02	11.7	2200	1970					13				

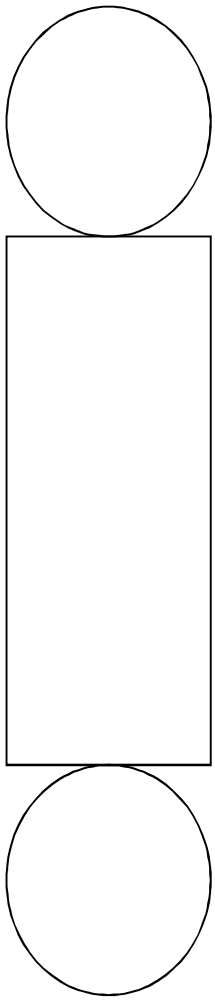
Approved by:	Leeds Laboratory		
Kevin Walker		Print date 09/04/2019	SOIL ENGINEERING
Revision No. 2.03	Issue Date 20/11/2012		Part of the Bachy Soletanche Group

Project Name	The Christie, Manchester	**Uniaxial Compressive Strength**	Hole ID BH1
Project No.	LT1792		Sample Depth 9.25m
Engineer	CC Geotechnical		Sample Number
Employer	CC Geotechnical	I.S.R.M. Suggested Methods 2007 for Determination of Uniaxial Compressive Strength Part 1	Sample Type C
Description	Thinly laminated brown SANDSTONE.		Specimen Depth 9.25m
			Specimen Number 2

Date and method of sampling	Not supplied
Storage history and environment	Not recorded

Sample details				Mean
Length	mm	179.94	179.55	179.7
Diameter (top)	mm	86.15	86.25	86.3
Diameter (middle)	mm	86.57	86.34	Length/diameter ratio
Diameter (base)	mm	86.40	86.20	2.1
Area	mm2	5849.4		
Mass	g	2233.76		
Test details				
Test duration	min	03:49		
Failure load	kN	54.9		
Stress rate	kN/min	14.4		
U.C.S.	MPa	9.39		
Mode of failure		Shear		
Loading axis relative to anisotropy		72 DEG TO BEDDING		
Machine type used in test		Controls 1300 / Automax 5		
Date of test		26/02/2019		
Additional specimen details				
Moisture content	%	13.2		
Bulk density	kg/m3	2130		
Dry density	kg/m3	1880		

Failure sketch



Test Remarks

Tested on specimen with length to diameter ratio outside 2.5-3.0 recommendation.

Specimen Remarks

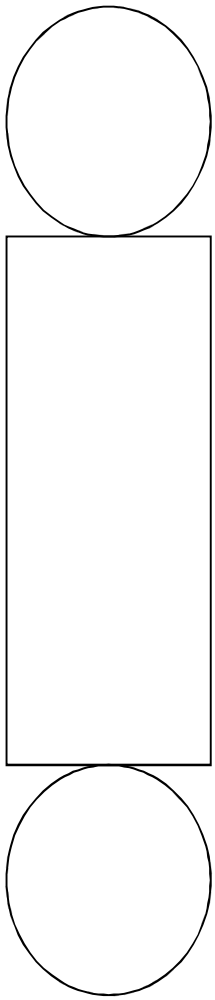
Approved by:	Leeds Laboratory		
Kevin Walker		Print date 09/04/2019	SOIL ENGINEERING
	Revision No. 2.06	Issue Date 20/11/2012	Part of the Bachy Soletanche Group

Project Name	The Christie, Manchester	**Uniaxial Compressive Strength**	Hole ID BH4
Project No.	LT1792		Sample Depth 16.40m
Engineer	CC Geotechnical		Sample Number
Employer	CC Geotechnical	I.S.R.M. Suggested Methods 2007 for Determination of Uniaxial Compressive Strength Part 1	Sample Type C
Description	Thinly laminated brown SANDSTONE.		Specimen Depth 16.40m
			Specimen Number 2

Date and method of sampling	Not supplied
Storage history and environment	Not recorded

Sample details				Mean
Length	mm	240.36	240.06	240.2
Diameter (top)	mm	86.42	86.52	86.3
Diameter (middle)	mm	86.05	85.91	Length/diameter ratio
Diameter (base)	mm	86.54	86.11	2.8
Area	mm2	5849.4		
Mass	g	3092.3		
Test details				
Test duration	min	10:17		
Failure load	kN	76.0		
Stress rate	kN/min	7.4		
U.C.S.	MPa	13		
Mode of failure		Irregular		
Loading axis relative to anisotropy				
Machine type used in test		Controls 1300 / Automax 5		
Date of test		26/02/2019		
Additional specimen details				
Moisture content	%	11.7		
Bulk density	kg/m3	2200		
Dry density	kg/m3	1970		

Failure sketch



Test Remarks

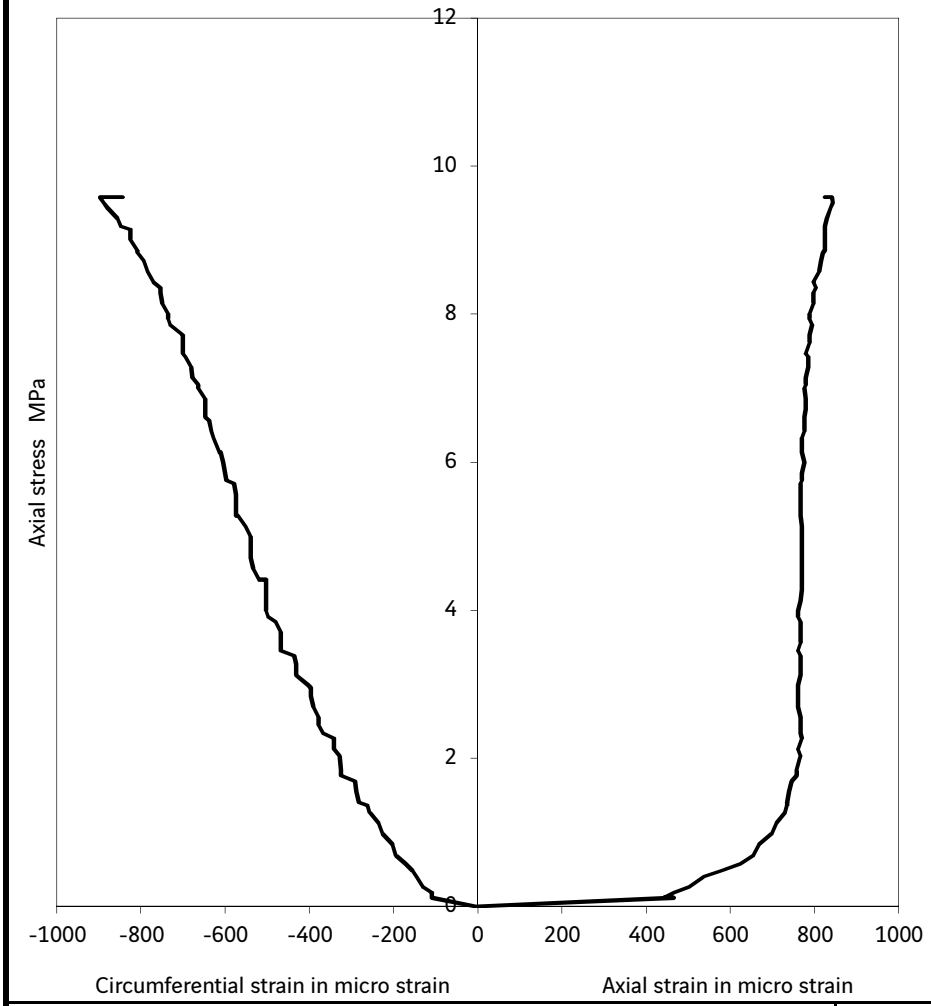
Specimen Remarks

Approved by:	Leeds Laboratory		
Kevin Walker		Print date 09/04/2019	SOIL ENGINEERING
	Revision No. 2.06	Issue Date 20/11/2012	Part of the Bachy Soletanche Group

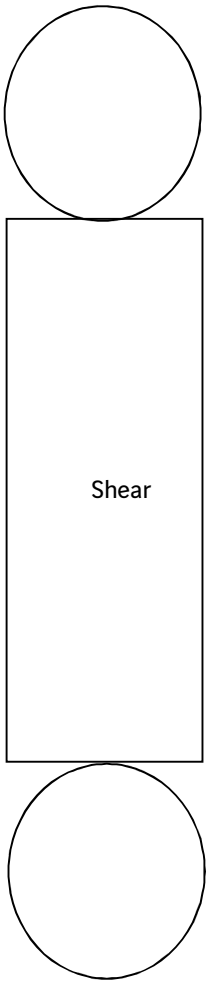
Project Name	The Christie, Manchester	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID BH1
Project No.	LT1792		Sample Depth 15.80m
Engineer	CC Geotechnical		Sample Number
Employer	CC Geotechnical	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Thinly laminated brown SANDSTONE.		Specimen Depth 15.80m
			Specimen Number 1

Date and method of sampling Details not supplied
Storage history and environment Details not supplied

Graph of stress strain curves



Failure sketch



Moisture content	%	16.1	Stress rate	MPa/s	0.02	Tangent modulus	Et 280	GPa	50 % stress
Length	mm	194.51	Test duration	min	07:39	Average modulus	Eave 3.74	GPa	0.9-12 % stress
Diameter	mm	85.37	U.C.S.	MPa	9.89	Secant modulus	Esec 15.3	GPa	0-50 % stress
Mass	g	2367.01	Type of machine	Controls 1300 / Automax 5		Poissons ratio	v 0.247		
Bulk density	kg/m3	2130				(Determined using Average modulus)			
Dry density	kg/m3	1830							
Date		26/02/2019							

Test remarks: Loading axis relative to anisotropy: 70deg to bedding
Tested on specimen with length to diameter ratio outside 2.5-3.0 recommendation.

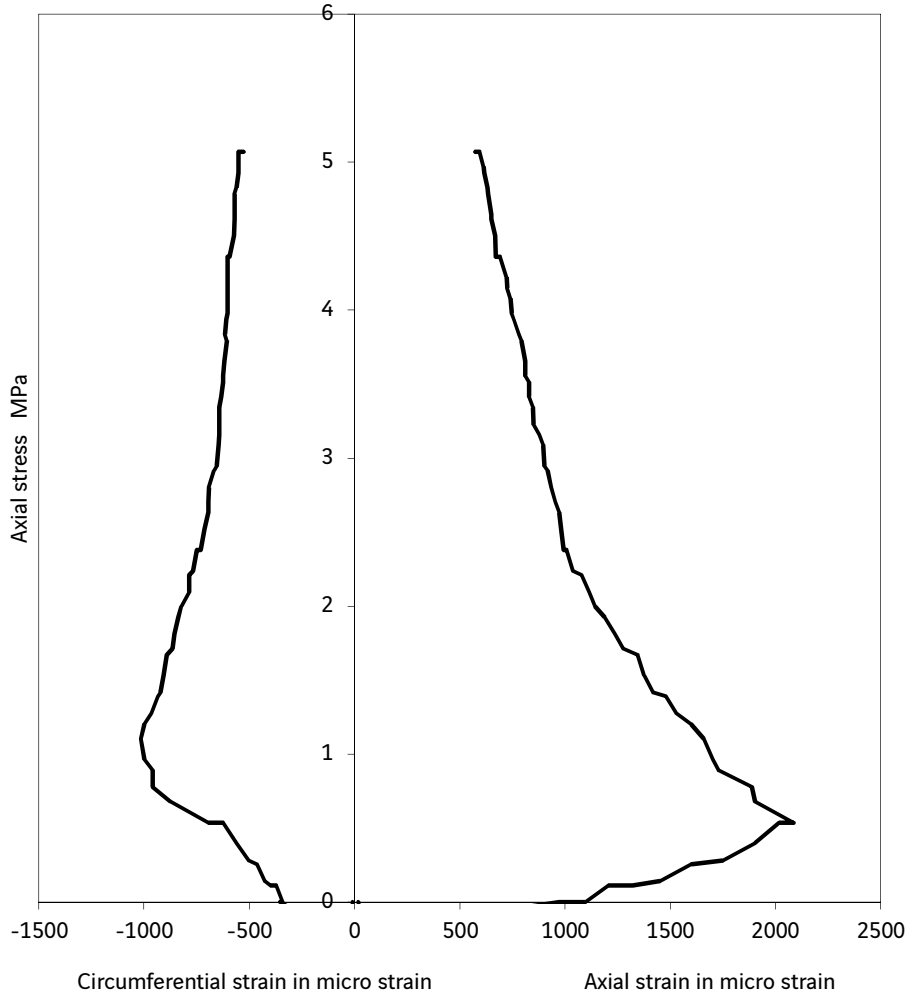
Specimen remarks

Approved by: Ian Linton	Leeds Laboratory	Print date 09/04/2019	SOIL ENGINEERING Part of the Bachy Soletanche Group
	Revision No. 2.06	Issue Date 20/11/2012	

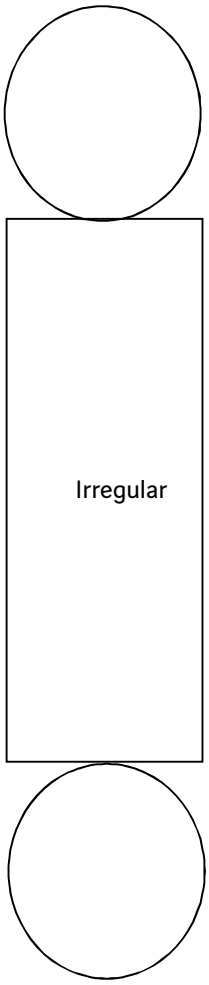
Project Name	The Christie, Manchester	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID: BH3
Project No.	LT1792		Sample Depth: 23.55m
Engineer	CC Geotechnical		Sample Number:
Employer	CC Geotechnical	I.S.R.M. Suggested methods 1981	Sample Type: C
Description	Thinly laminated brown SANDSTONE.		Specimen Depth: 23.55m
			Specimen Number: 1

Date and method of sampling: Details not supplied
Storage history and environment: Details not supplied

Graph of stress strain curves



Failure sketch



Moisture content	%	14	Stress rate	MPa/s	0.01	Tangent modulus	Et	1.09	GPa	50 % stress
Length	mm	216.65	Test duration	min	01:41	Average modulus	Eave	1.09	GPa	12-93 % stress
Diameter	mm	85.91	U.C.S.	MPa	1.25	Secant modulus	Esec	1.19	GPa	0-50 % stress
Mass	g	2730.40	Type of machine	Controls 1300 / Automax 5		Poissons ratio	v	0.258		
Bulk density	kg/m3	2170				(Determined using Average modulus)				
Dry density	kg/m3	1910								
Date		26/02/2019								

Test remarks: Loading axis relative to anisotropy: 70deg to bedding

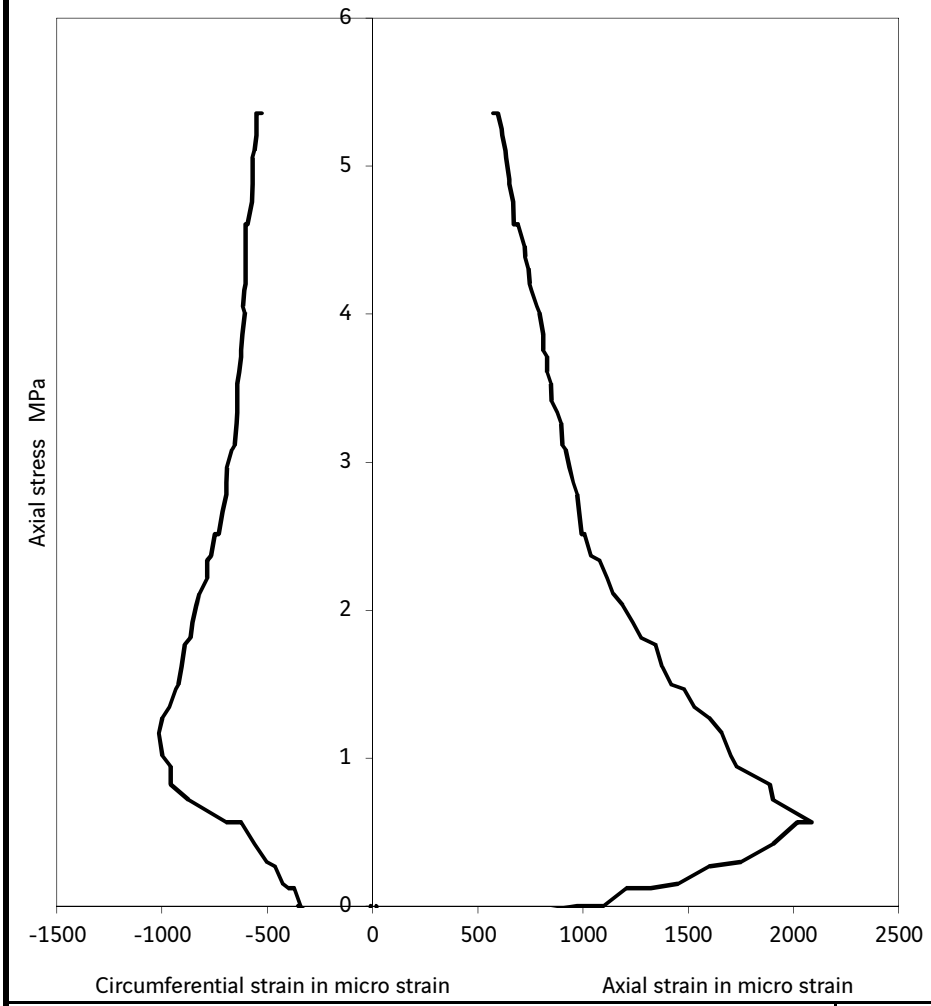
Specimen remarks:

Approved by: Ian Linton	Leeds Laboratory	Print date 09/04/2019	SOIL ENGINEERING
	Revision No. 2.06	Issue Date 20/11/2012	Part of the Bachy Soletanche Group

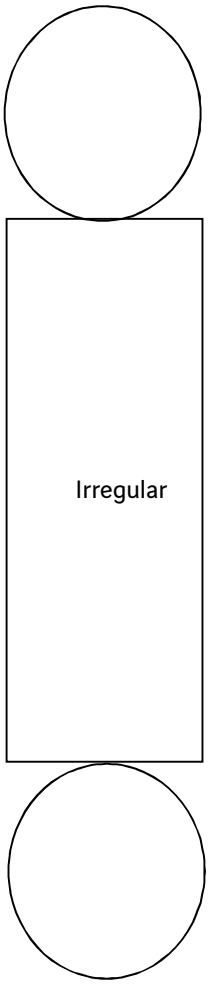
Project Name	The Christie, Manchester	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID BH4
Project No.	LT1792		Sample Depth 12.40m
Engineer	CC Geotechnical		Sample Number
Employer	CC Geotechnical	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Thinly laminated brown SANDSTONE.		Specimen Depth 12.40m
			Specimen Number 1

Date and method of sampling	Details not supplied
Storage history and environment	Details not supplied

Graph of stress strain curves



Failure sketch



Moisture content	%	11.8	Stress rate	MPa/s	0.02	Tangent modulus	Et	4.18	GPa	50 % stress
Length	mm	169.71	Test duration	min	05:50	Average modulus	Eave	0.520	GPa	0-8 % stress
Diameter	mm	83.58	U.C.S.	MPa	5.65	Secant modulus	Esec	2.77	GPa	0-50 % stress
Mass	g	2092.43	Type of machine	Controls 1300 / Automax 5		Poissons ratio	v	0.324		
Bulk density	kg/m3	2250				(Determined using Average modulus)				
Dry density	kg/m3	2010								
Date		26/02/2019								

Test remarks: Loading axis relative to anisotropy: 74deg to bedding
Tested on specimen with length to diameter ratio outside 2.5-3.0 recommendation.

Specimen remarks:

Approved by:	Leeds Laboratory		
Ian Linton		Print date 09/04/2019	SOIL ENGINEERING
	Revision No. 2.06	Issue Date 20/11/2012	Part of the Bachy Soletanche Group

APPENDIX H

CHEMICAL TEST CERTIFICATES

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-21453
Issue:	1
Date of Issue:	29/01/2019
Contact:	Daniel O'Regan
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool Merseyside L33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-18-10614
Date Received:	21/01/2019
Date Approved:	29/01/2019
Details:	The Christie Hospital, Manchester
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

Sample Summary

Report No.: 19-21453

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
163214	TP1 0.30	17/01/2019	23/01/2019	Silty loam	
163215	TP1 0.50	17/01/2019	23/01/2019		
163216	TP1 1.00	17/01/2019	23/01/2019	Sandy silty loam	
163217	TP2 0.30	17/01/2019	23/01/2019	Sandy silty loam	
163218	TP2 0.50	17/01/2019	23/01/2019	Sandy silty loam	
163219	TP2 1.00	17/01/2019	23/01/2019		
163220	TP3 0.30	17/01/2019	23/01/2019		
163221	TP3 0.50	17/01/2019	23/01/2019	Sandy silty loam	
163222	TP3 1.00	17/01/2019	23/01/2019	Sandy silty loam	

Results Summary

Report No.: 19-21453

			ELAB Reference	163214	163216	163217	163218	163221	163222
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	TP1	TP1	TP2	TP2	TP3	TP3
			Sample Depth (m)	0.30	1.00	0.30	0.50	0.50	1.00
			Sampling Date	17/01/2019	17/01/2019	17/01/2019	17/01/2019	17/01/2019	17/01/2019
Determinand	**Codes**	**Units**	**LOD**						
Metals									
Antimony	N	mg/kg	2.5	n/t	< 2.5	n/t	3.6	< 2.5	n/t
Arsenic	M	mg/kg	1	n/t	7.7	n/t	37.0	18.5	n/t
Beryllium	U	mg/kg	1	n/t	< 1.0	n/t	1.1	1.1	n/t
Cadmium	M	mg/kg	0.5	n/t	< 0.5	n/t	< 0.5	< 0.5	n/t
Chromium	M	mg/kg	5	n/t	16.0	n/t	18.2	20.2	n/t
Copper	M	mg/kg	5	n/t	25.4	n/t	59.9	44.7	n/t
Lead	M	mg/kg	5	n/t	47.6	n/t	181	185	n/t
Mercury	M	mg/kg	0.5	n/t	< 0.5	n/t	0.7	< 0.5	n/t
Nickel	M	mg/kg	5	n/t	15.0	n/t	19.6	22.5	n/t
Selenium	M	mg/kg	1	n/t	< 1.0	n/t	< 1.0	< 1.0	n/t
Vanadium	M	mg/kg	5	n/t	22.1	n/t	27.1	27.1	n/t
Zinc	M	mg/kg	5	n/t	55.7	n/t	138	81.1	n/t
Anions									
Water Soluble Sulphate	M	g/l	0.02	< 0.02	n/t	< 0.02	n/t	n/t	< 0.02
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	n/t	< 0.8	n/t	< 0.8	< 0.8	n/t
Total Cyanide	M	mg/kg	1	n/t	< 1.0	n/t	< 1.0	< 1.0	n/t
Water Soluble Boron	N	mg/kg	0.5	n/t	0.6	n/t	< 0.5	< 0.5	n/t
Miscellaneous									
pH	M	pH units	0.1	7.6	7.9	7.8	7.7	7.9	8.0
Total Organic Carbon	N	%	0.01	n/t	0.74	n/t	1.2	1.6	n/t
Phenols									
Total Phenols	N	mg/kg	6	n/t	< 6	n/t	< 6	< 6	n/t

Tests marked N are not UKAS accredited.

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 19-21453

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
163215	0.50	TP1	Brown sandy soil, brick, stones	No asbestos detected	n/t	n/t	n/t	n/t
163219	1.00	TP2	Brown soil, stones, clinker	No asbestos detected	n/t	n/t	n/t	n/t
163220	0.30	TP3	Brown soil, stones, clinker	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-21453

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	25/01/2019	110	Colorimetry
pH	M	Air dried sample	28/01/2019	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	25/01/2019	118	ICPMS
Phenols in solids	N	As submitted sample	25/01/2019	121	HPLC
Water soluble anions	M	Air dried sample	25/01/2019	172	Ion Chromatography
Water soluble boron	N	Air dried sample	25/01/2019	202	Colorimetry
Total cyanide	M	As submitted sample	28/01/2019	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	28/01/2019	210	IR
Asbestos identification	U	Air dried sample	28/01/2019	PMAN	Microscopy

Tests marked N are not UKAS accredited

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Report Information

Report No.: 19-21453

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

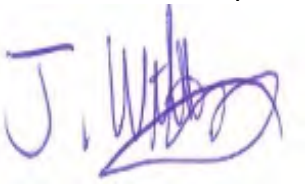
All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-21472
Issue:	1
Date of Issue:	29/01/2019
Contact:	Daniel O'Regan
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool Merseyside L33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-18-10614
Date Received:	24/01/2019
Date Approved:	29/01/2019
Details:	The Christie Hospital, Manchester
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

Sample Summary

Report No.: 19-21472

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
163321	WS1 0.20	17/01/2019	24/01/2019	Sandy silty loam	
163322	WS1 0.50	17/01/2019	24/01/2019		

Results Summary

Report No.: 19-21472

ELAB Reference	163321
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS1
Sample Depth (m)	0.20
Sampling Date	17/01/2019

Determinand	Codes	Units	LOD	
Anions				
Water Soluble Sulphate	M	g/l	0.02	0.05
Miscellaneous				
pH	M	pH units	0.1	8.3

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 19-21472

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
163322	0.50	WS1	Brown sandy soil, stones, concrete,	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-21472

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	28/01/2019	113	Electromeric
Water soluble anions	M	Air dried sample	25/01/2019	172	Ion Chromatography
Asbestos identification	U	Air dried sample	25/01/2019	PMAN	Microscopy

2683

Report Information

Report No.: 19-21472

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
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*	UKAS accreditation not applicable for sample matrix
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SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

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Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-21509
Issue:	2. Replaces Analytical Report number 19-21509; issue no.1
Date of Issue:	30/01/2019
Contact:	Daniel O'Regan
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool Merseyside L33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-18-10614
Date Received:	28/01/2019
Date Approved:	30/01/2019
Details:	The Christie Hospital, Manchester
Approved by:	

John Wilson, Operations Manage

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

Sample Summary

Report No.: 19-21509

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
163572	BH04 0.50	21/01/2019	28/01/2019		
163573	BH04 1.00	21/01/2019	28/01/2019	Silty loam	
163574	BH04 1.50	21/01/2019	28/01/2019	Silty clayey loam	

Results Summary

Report No.: 19-21509

			ELAB Reference	163573	163574
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH04	BH04
			Sample Depth (m)	1.00	1.50
			Sampling Date	21/01/2019	21/01/2019
Determinand	**Codes**	**Units**	**LOD**		
Metals					
Antimony	N	mg/kg	2.5	3.6	n/t
Arsenic	M	mg/kg	1	27.5	n/t
Beryllium	U	mg/kg	1	1.3	n/t
Cadmium	M	mg/kg	0.5	0.9	n/t
Chromium	M	mg/kg	5	49.7	n/t
Copper	M	mg/kg	5	223	n/t
Lead	M	mg/kg	5	224	n/t
Mercury	M	mg/kg	0.5	0.7	n/t
Nickel	M	mg/kg	5	33.5	n/t
Selenium	M	mg/kg	1	< 1.0	n/t
Vanadium	M	mg/kg	5	39.2	n/t
Zinc	M	mg/kg	5	251	n/t
Anions					
Water Soluble Sulphate	M	g/l	0.02	n/t	0.05
Inorganics					
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t
Total Cyanide	M	mg/kg	1	< 1.0	n/t
Water Soluble Boron	N	mg/kg	0.5	0.6	n/t
Miscellaneous					
pH	M	pH units	0.1	7.5	7.6
Total Organic Carbon	N	%	0.01	3.1	n/t
Phenols					
Total Phenols	N	mg/kg	6	< 6	n/t

2683

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 19-21509

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
163572	0.50	BH04	brown sandy soil with stones, clinker and twigs	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-21509

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	29/01/2019	110	Colorimetry
pH	M	Air dried sample	29/01/2019	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	29/01/2019	118	ICPMS
Phenols in solids	N	As submitted sample	29/01/2019	121	HPLC
Water soluble anions	M	Air dried sample	29/01/2019	172	Ion Chromatography
Water soluble boron	N	Air dried sample	29/01/2019	202	Colorimetry
Total cyanide	M	As submitted sample	29/01/2019	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	30/01/2019	210	IR
Asbestos identification	U	Air dried sample	29/01/2019	PMAN	Microscopy

Tests marked N are not UKAS accredited

2683

Report Information

Report No.: 19-21509

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
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SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-21557
Issue:	1
Date of Issue:	05/02/2019
Contact:	Daniel O'Regan
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool Merseyside L33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-18-10614
Date Received:	30/01/2019
Date Approved:	05/02/2019
Details:	The Christie Hospital, Manchester
Approved by:	

Mike Varley, Technical Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

Sample Summary

Report No.: 19-21557

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
163810	BH01 0.50	25/01/2019	30/01/2019		
163811	BH01 1.00	25/01/2019	30/01/2019	Sandy silty loam	
163812	BH01 1.50	25/01/2019	30/01/2019	Sandy loam	

Results Summary

Report No.: 19-21557

				ELAB Reference	163811	163812
				Customer Reference		
				Sample ID		
				Sample Type	SOIL	SOIL
				Sample Location	BH01	BH01
				Sample Depth (m)	1.00	1.50
				Sampling Date	25/01/2019	25/01/2019
Determinand	**Codes**	**Units**	**LOD**			
Metals						
Antimony	N	mg/kg	2.5	4.7	n/t	
Arsenic	M	mg/kg	1	19.0	n/t	
Beryllium	U	mg/kg	1	< 1.0	n/t	
Cadmium	M	mg/kg	0.5	1.0	n/t	
Chromium	M	mg/kg	5	23.2	n/t	
Copper	M	mg/kg	5	50.7	n/t	
Lead	M	mg/kg	5	160	n/t	
Mercury	M	mg/kg	0.5	0.8	n/t	
Nickel	M	mg/kg	5	19.5	n/t	
Selenium	M	mg/kg	1	< 1.0	n/t	
Vanadium	M	mg/kg	5	28.4	n/t	
Zinc	M	mg/kg	5	153	n/t	
Anions						
Water Soluble Sulphate	M	g/l	0.02	n/t	0.06	
Inorganics						
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t	
Total Cyanide	M	mg/kg	1	< 1.0	n/t	
Water Soluble Boron	N	mg/kg	0.5	< 0.5	n/t	
Miscellaneous						
pH	M	pH units	0.1	9.3	8.4	
Total Organic Carbon	N	%	0.01	1.9	n/t	
Phenols						
Total Phenols	N	mg/kg	6	< 6	n/t	

Tests marked N are not UKAS accredited.

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Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 19-21557

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
163810	0.50	BH01	Brown sandy soil,stones	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-21557

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	01/02/2019	110	Colorimetry
pH	M	Air dried sample	04/02/2019	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	01/02/2019	118	ICPMS
Phenols in solids	N	As submitted sample	31/01/2019	121	HPLC
Water soluble anions	M	Air dried sample	01/02/2019	172	Ion Chromatography
Water soluble boron	N	Air dried sample	01/02/2019	202	Colorimetry
Total cyanide	M	As submitted sample	01/02/2019	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	04/02/2019	210	IR
Asbestos identification	U	Air dried sample	01/02/2019	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 19-21557

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-21558
Issue:	1
Date of Issue:	05/02/2019
Contact:	Daniel O'Regan
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool Merseyside L33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-18-10614
Date Received:	30/01/2019
Date Approved:	05/02/2019
Details:	The Christie Hospital, Manchester
Approved by:	

Mike Varley, Technical Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

Sample Summary

Report No.: 19-21558

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
163813	BH02 0.50	25/01/2019	30/01/2019		
163814	BH02 1.00	25/01/2019	30/01/2019	Silty loam	
163815	BH02 1.50	25/01/2019	30/01/2019	Sandy silty loam	

Results Summary

Report No.: 19-21558

			ELAB Reference	163814	163815
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH02	BH02
			Sample Depth (m)	1.00	1.50
			Sampling Date	25/01/2019	25/01/2019
Determinand	**Codes**	**Units**	**LOD**		
Metals					
Antimony	N	mg/kg	2.5	6.3	n/t
Arsenic	M	mg/kg	1	16.2	n/t
Beryllium	U	mg/kg	1	1.3	n/t
Cadmium	M	mg/kg	0.5	< 0.5	n/t
Chromium	M	mg/kg	5	29.3	n/t
Copper	M	mg/kg	5	56.0	n/t
Lead	M	mg/kg	5	201	n/t
Mercury	M	mg/kg	0.5	0.5	n/t
Nickel	M	mg/kg	5	19.9	n/t
Selenium	M	mg/kg	1	< 1.0	n/t
Vanadium	M	mg/kg	5	34.4	n/t
Zinc	M	mg/kg	5	89.3	n/t
Anions					
Water Soluble Sulphate	M	g/l	0.02	n/t	< 0.02
Inorganics					
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t
Total Cyanide	M	mg/kg	1	< 1.0	n/t
Water Soluble Boron	N	mg/kg	0.5	< 0.5	n/t
Miscellaneous					
pH	M	pH units	0.1	7.8	7.5
Total Organic Carbon	N	%	0.01	2.5	n/t
Phenols					
Total Phenols	N	mg/kg	6	< 6	n/t

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Results Summary

Report No.: 19-21558

Asbestos Results

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Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
163813	0.50	BH02	Brown sandy soil	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-21558

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	01/02/2019	110	Colorimetry
pH	M	Air dried sample	04/02/2019	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	01/02/2019	118	ICPMS
Phenols in solids	N	As submitted sample	31/01/2019	121	HPLC
Water soluble anions	M	Air dried sample	01/02/2019	172	Ion Chromatography
Water soluble boron	N	Air dried sample	01/02/2019	202	Colorimetry
Total cyanide	M	As submitted sample	01/02/2019	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	04/02/2019	210	IR
Asbestos identification	U	Air dried sample	01/02/2019	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 19-21558

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n/t	Not tested
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UKAS TESTING 2683

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-21559
Issue:	1
Date of Issue:	05/02/2019
Contact:	Daniel O'Regan
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool Merseyside L33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-18-10614
Date Received:	30/01/2019
Date Approved:	05/02/2019
Details:	The Christie Hospital, Manchester
Approved by:	

Mike Varley, Technical Manager

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Sample Summary

Report No.: 19-21559

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
163816	BH03 0.50	25/01/2019	30/01/2019		
163817	BH03 1.00	25/01/2019	30/01/2019	Silty loam	
163818	BH03 1.50	25/01/2019	30/01/2019		
163819	BH03 2.50	25/01/2019	30/01/2019	Sandy loam	

Results Summary

Report No.: 19-21559

			ELAB Reference	163817	163819
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH03	BH03
			Sample Depth (m)	1.00	2.50
			Sampling Date	25/01/2019	25/01/2019
Determinand	**Codes**	**Units**	**LOD**		
Metals					
Antimony	N	mg/kg	2.5	< 2.5	n/t
Arsenic	M	mg/kg	1	16.9	n/t
Beryllium	U	mg/kg	1	< 1.0	n/t
Cadmium	M	mg/kg	0.5	0.9	n/t
Chromium	M	mg/kg	5	26.7	n/t
Copper	M	mg/kg	5	65.0	n/t
Lead	M	mg/kg	5	200	n/t
Mercury	M	mg/kg	0.5	< 0.5	n/t
Nickel	M	mg/kg	5	22.5	n/t
Selenium	M	mg/kg	1	< 1.0	n/t
Vanadium	M	mg/kg	5	29.3	n/t
Zinc	M	mg/kg	5	195	n/t
Anions					
Water Soluble Sulphate	M	g/l	0.02	n/t	0.14
Inorganics					
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t
Total Cyanide	M	mg/kg	1	< 1.0	n/t
Water Soluble Boron	N	mg/kg	0.5	0.7	n/t
Miscellaneous					
pH	M	pH units	0.1	8.6	8.0
Total Organic Carbon	N	%	0.01	2.3	n/t
Phenols					
Total Phenols	N	mg/kg	6	< 6	n/t

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Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
163816	0.50	BH03	Brown sandy soil,Stones,brick	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-21559

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	01/02/2019	110	Colorimetry
pH	M	Air dried sample	04/02/2019	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	01/02/2019	118	ICPMS
Phenols in solids	N	As submitted sample	31/01/2019	121	HPLC
Water soluble anions	M	Air dried sample	01/02/2019	172	Ion Chromatography
Water soluble boron	N	Air dried sample	01/02/2019	202	Colorimetry
Total cyanide	M	As submitted sample	01/02/2019	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	04/02/2019	210	IR
Asbestos identification	U	Air dried sample	01/02/2019	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

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Sample Retention and Disposal

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APPENDIX I

GAS / GROUNDWATER MONITORING RESULTS & CALIBRATION CERTIFICATES

GAS AND WATER MONITORING RESULTS

	Date:	13-Feb-19	21-Feb-19	28-Feb-19	04-Mar-19								
	Visit Number	1	2	3	4								
	Atmos Press mb	1025	1020	1011	989								
	Pressure Trend	Rising	Rising	Steady	Rising								
	Air Temp °C	10	13	7	9								
	Cloud cover	Overcast	Partial	Overcast	Overcast								
	Wind velocity	Light	Light	Light	Light								
	Precipitation	Dry	Dry	Dry	Dry								
	State of Ground	Dry	Dry	Dry	Dry								
BH1	CH_4 (%) (max/steady):	0.0	0.0	0.0	0.0								
	CO_2 (%) (max/steady):	0.4	0.9	0.4	0.6								
	O_2 (%) (max/steady):	19.6	18.3	19.9	19.7								
	H_2S (ppm) (max/steady):	0.0	0.0	0.0	0.0								
	CO (ppm) (max/steady):	0.0	0.0	0.0	0.0								
	PID (ppm) (max/steady)	0.0	0.0	0.0	0.0								
	Flow (l/hr) (max/steady)	<0.1	<0.1	<0.1	<0.1								
	Water Level / depth to base (m):	Dry	Dry	Dry	Dry								
BH2	CH_4 (%) (max/steady):	0.0	0.0	0.0	0.0								
	CO_2 (%) (max/steady):	1.6	2.9	2.2	4.7								
	O_2 (%) (max/steady):	17.4	14.4	16.4	14.2								
	H_2S (ppm) (max/steady):	0.0	0.0	0.0	0.0								
	CO (ppm) (max/steady):	0.0	0.0	0.0	0.0								
	PID (ppm) (max/steady)	0.0	0.0	0.0	0.0								
	Flow (l/hr) (max/steady)	<0.1	<0.1	<0.1	<0.1								
	Water Level / depth to base (m):	4.00	3.94	3.94	3.95								
BH4	CH_4 (%) (max/steady):	0.0	0.0	0.0	0.0								
	CO_2 (%) (max/steady):	5.8	4.8	3.4	3.8								
	O_2 (%) (max/steady):	13.1	10.8	16.2	15.9								
	H_2S (ppm) (max/steady):	0.0	0.0	0.0	0.0								
	CO (ppm) (max/steady):	0.0	0.0	0.0	0.0								
	PID (ppm) (max/steady)	0.0	0.0	0.0	0.0								
	Flow (l/hr) (max/steady)	<0.1	<0.1	<0.1	<0.1								
	Water Level / depth to base (m):	Dry	Dry	Dry	Dry								

Job No: CCG-C-18-10614 | **Site: The Christie, Manchester**

Instrument: **GSXI**

TEST DATE AND CONDITIONS		
Date	20/06/2018	
Atmospheric Pressure	1000	mB
Ambient Temperature	23.4	°C
Environics Serial No.	5089	

GAS DATA LTD
Unit 4, Fairfield Court
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LJ
Tel 02476303311 Fax 02476307711

GFM436 Final Inspection & Calibration Check Certificate

Customer	C C Geotechnical
Certificate Number	120242
Order Number	319979

Serial Number	12220
Software Version	G436-00.0027/0009

Recalibration DUE Date
20/06/2019

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	450	Accept 20 c/min	Pump Flow @ -200mB	250	Accept > 200
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH_4		CO_2		O_2	
	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
	60.1	60	40.3	40	20.9	20.9
					Accept ±0.5	
	4.9	5	5	5	6	6
	Accept ±0.3				Accept ±0.3	
Zero Reading 100% N2	0	0	0	0	0	0
			t ±0.0		Accept ±0	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings *(ppm)*			
Gas Type	Range *(ppm)*		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5
CO	2000	1000	0	Accept ±0.0	1003	Accept ±5.0
				Accept ±0.0		Accept ±5.0
				Accept ±0.0		Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±0.1

Cross Gas Effects									
Applied Gas *(ppm)*		Instrument Readings *(ppm)*							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:			
H2S	*1500*	1500		0					
CO		90		1003					
Hexane	*0%*	0		0					

Pressure Checks				
Atmospheric Pressure [AP] *(mB)*				
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)		
AP Open Ports		1000	*Accept ±2.0*	
AP Port (Internal)	*mB*	800	*Accept ±5.0*	
	1200	1200	*Accept ±5.0*	

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading *(l/h)*	Instrument Reading *(l/h)*		Applied Pressure *(Pa)*	Instrument Reading *(Pa)*	
-30	-30.9		-452	-482	*Accept ±50*
-3	-3.1	*Accept ±1.0*	-19	-22	*Accept ±6.0*
0	0	*±0.0*	0	0	*±0.5*
	3	*Accept ±0.5*	16	17	*Accept ±3.0*
	30.9		339	359	*Accept ±5*
	61.3		1023	1070	
	91.1	*Accept ±9.0*	1998	O/R	

Temperature Checks		
Calibration Temperature Applied Temperature °C	Instrument Temperature Reading °C	
	-10	*Accept ±2.0*
	0	*±1.0*
	30	*Accept ±1.0*
	60	*Acc*
	100.5	

Technician:	Date Tested:
Les Treece	*20/06/19*

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015. Certificate NQA 8374. Valid until 22/03/2019

APPENDIX J

NOTES ON LIMITATIONS

Notes on Limitations
For
Geoenvironmental and Geotechnical Consultancy Services

General

This document has been prepared by CC GEOTECHNICAL LTD within the terms of the contract, scope of work, and resources agreed in writing with the client. The limitations of liability of CC GEOTECHNICAL LTD for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

This document is intended for the sole use of the client indicated above and CC GEOTECHNICAL LTD accepts no responsibility of whatever nature to third parties to whom this document or any part of this document is made known. Any such party relies upon that information at their own risk.

The findings and opinions provided in this document are made in good faith and are subject to the limitations imposed by employing site assessment methods and techniques, appropriate to the time of investigation and within the limitations and constraints defined in this document.

The findings and opinions are relevant to the dates when the assessment was undertaken, but should not necessarily be relied upon to represent conditions at a substantially later date. In particular, seasonal groundwater levels, with the effects of precipitation, may affect the conditions found during the investigation. The report should be read in conjunction with the further Notes on Limitations included in Appendix A.

Where opinions expressed in this report are based on current available guidance and legislation, no liability can be accepted by CC GEOTECHNICAL LTD for the effects of any future changes to such guidelines and legislation. Additional information, improved practices, new guidance, changes in legislation, or amendments to design proposals, may necessitate this report having to be reviewed in whole or in part after that date. Opinions and interpretations are not accredited by UKAS.

Factual data contained in this report may have been obtained from enquiries with reputable third parties, the results of which are relied on unless indicated to be inaccurate by contradictory information.

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CC GEOTECHNICAL LTD accepts no responsibility or liability for:

1. the consequences of this document being used for any purpose or project other than for which it was commissioned

and/or

2. the consequences of use of this document by any party with whom an agreement has not been executed.

Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by the timescale available, and the locations of the exploratory holes may have been restricted to areas unoccupied by the building(s) on the site, and further restricted by the existence of buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out to provide sufficient information within the agreed scope of the investigation, under the general headings of type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

