

Hangar 4, Manchester Airport

Geo-Environmental Desk Study Assessment





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Geo-Environmental Desk Study Assessment

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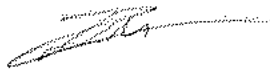
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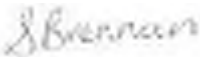
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EXECUTIVE SUMMARY

Brief	Tetra Tech Ltd (Tetra Tech) was commissioned by Threadneedle Curtis Limited (the Client) to undertake Geo-Environmental Desk Study for the land at Hangar 4, Manchester Airport (known hereafter as “the site”) to support potential development of the site. The location of the site is shown on B041631-TTE-00-XX-DR-U-0001-P01 (Site Location Plan).
The Site	The site is known as Hangar 4 and located between Wilmslow Old Road, Avro Way and Pinfold Lane within the Manchester Airport complex. (Grid reference: SJ 81121 84640). The site area is 2.10 ha and located approximately 0.30 km south of Manchester Airport.
Proposed Development	The proposed end-use for the site is as a 92,000ft ² distribution centre with an external service yard and car parking in the surrounding areas.
Surrounding Site Information	The site is surrounded by commercial/industrial units related to the nearby Manchester Airport to the north, west and east. An area of woodland is present beyond Old Wilmslow Road to the south of the site.
Site History	The site comprised farmland until around 1946 where an aerial photograph Fairey Aviation and Avro factory for the construction of aircraft onsite. Two hangars are recorded as being present onsite with one located to the south and a hangar located to the north encroaching onto the site from the northwest, a bund is also shown as being present from 1954. A tank is recorded as being present to the centre onsite from 1987 and the hangars are no longer described as hangars on the plans. The bund is no longer annotated. A second tank is recorded on the western boundary from 1995. The northern hangar is no longer recorded from 2001. Off-site, the surrounding area underwent commercial/industrial development related to the aviation industry from 1954 onwards to the present day, including hangars, tanks, fire stations and electricity substations.
Geology	The published geological plan Stockport, Sheet 98 (1:50,000) for the site indicates that the site is underlain by superficial Devensian Glacial Till with some evidence of Glacial sands in localised areas overlying the Bollin Mudstone Member, previously known as the Mercia Mudstone Group or Keuper Marl, Lower.
Hydrogeology & Hydrology	The Superficial Deposits are classified as Secondary Undifferentiated Aquifers. Bedrock is classified as a Secondary B Aquifer.
Environmental database search	The site lies within an SSSI Impact Risk Zone. An area of Designated Ancient Woodland is found 44m to the south of the site. The Environmental Database indicates that the superficial and bedrock strata are categorized as low vulnerability, with an low infiltration value of <40% and a flow mechanism of well-connected fractures.
Preliminary ground contamination assessment	• Future site users (commercial) – the risk is Moderate/Low from identified contamination sources and pathways. • Construction / maintenance workers – the risk is Moderate/Low (High for asbestos) from identified contamination sources and pathways but can be reduced to Low through the use of appropriate PPE. • Building infrastructure and supply pipes specifically water supply pipes - the risk is Moderate/Low in the absence of mitigation.

	- Controlled waters - the risk is Moderate/Low from the identified contamination sources and pathways. - Risk to site from adjacent properties and Aquifers (Bedrock and Superficial) is Low. The risk from other off-site sources is Low to all receptors
Preliminary Geotechnical Assessment	Potential geotechnical constraints have been identified associated with development of the site, relating to: - Presence of Made Ground deposits across site. - Ground conditions across the site may differ to those anticipated. - Possible infilled ground associated with Cotterill Clough Brook on eastern boundary. - Potential for underlying obstructions associated with historic structures
Conclusions and Recommendations	It is recommended that a Ground Investigation is undertaken comprising of exploratory holes to bedrock to inform foundation design with geotechnical and chemical testing to determine the geotechnical characteristics and chemical analysis of the underlying soils.

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THIRD PARTY DRAWINGS

NK018329-RPS-SI-XX-DR-A-9448 (Hangar 4 Plot - Unit 92k Option 01) Drawn by RPS dated February 2022

DRAWINGS

B041631-TTE-00-XX-DR-U-0001-P01 (Site Location Plan)

B041631-TTE-00-XX-DR-U-0002-P01 (Site Boundary Plan)

B041631-TTE-00-XX-DR-U-0003-P02 (Exploratory Hole Location Plan)

APPENDICES

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
aOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, Food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desk Top Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit Of Detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Poly Chlorinated Biphenyl
PPE	Personal Protective Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TSV	Tier 1 Screening Values
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons

1.0 INTRODUCTION

1.1 INSTRUCTION

Tetra Tech Ltd (Tetra Tech) was commissioned by Threadneedle Curtis Limited (the Client) to undertake a Geo-Environmental Desk Study for the land at Hangar 4, Manchester Airport (known hereafter as “the site”) to support the proposed redevelopment of the site into a distribution centre with external service yard and car parking areas. The location of the site is shown on B041631-TTE-00-XX-DR-U (Site Location Plan).

1.2 BRIEF

The brief was to provide a Phase 1 Geo-environmental Desk Study report including a preliminary qualitative geotechnical and contamination risk assessment to assess the key geo-environmental and geotechnical constraints at the site.

The report has been written in general accordance and with reference to the Environment Agency’s *Land Contamination Risk Management* (Environmental Agency, 2021).

1.3 PROPOSED DEVELOPMENT

The proposed end-use for the site is as a 92,000ft² distribution centre with an external service yard and car parking in the surrounding areas. A masterplan was provided to Tetra Tech and the drawing by RPS is shown on NK018329-RPS-SI-XX-DR-A-9448 (Hangar 4 Plot – Unit 92k Option 01).

1.4 REPORT SCOPE

This report includes the following key elements:

- A record of the site visit and visual inspection walkover.
- A historical site and local area review, primarily referring to past editions of Ordnance Survey Maps.
- Procurement and review of commercially available environmental database information, including information on waste facilities, water abstractions, environmental sensitive areas etc.
- A review of relevant web-based information including British Geological Society (BGS) and others.
- A baseline UXO risk assessment using on-line databases to classify the site with regards to UXO risk.
- A discussion of the anticipated ground and groundwater conditions based on geological and hydrogeological maps.
- A preliminary geotechnical hazard assessment.
- A Qualitative Risk Assessment for ground contamination (compliant with CIRIA C552 (CIRIA, 2001) methodology).
- An executive summary of the report to aid a layman’s overview.

1.5 LIMITATIONS

The recommendations and opinions expressed in this report are based on information obtained as part of the desk study or provided by others. Information provided from other sources is taken in good faith and Tetra Tech cannot guarantee its accuracy.

This report is subject to the report conditions presented in .

The information contained in this report is intended for the use of Threadneedle Curtis Limited (the Client) and Tetra Tech can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

2.0 SITE INFORMATION

2.1 LOCATION

The site is located at Hangar 4, Western maintenance area, Manchester Airport, M90 5PQ within the Manchester Airport complex (Grid reference: SJ 81121 84640). The site is 2.10 ha and located approximately 0.30 km south of Manchester Airport.

A site location plan is presented as B041631-TTE-00-XX-DR-U-0001 (Site Location Plan). Table 2-1 below describes the surrounding land uses.

Table 2-1 – Surrounding Landuses

Direction	Description
North	Pinfold Lane – Buildings and infrastructure related to Manchester Airport
East	Pinfold Lane – Airport Hangars and infrastructure
South	Wilmslow Old Road – an area of woodland and a car park.
West	Pinfold Lane – Commercial development, warehousing

2.2 SITE DESCRIPTION

A site walkover inspection was undertaken by Tetra Tech on 14th December 2022. This section is to be read in conjunction with the photo plates in Appendix D.

2.2.1 Current Site Usage

The site comprises of a hangar building approximately 15 metres in height. The hangar consists of a steel frame with masonry and steel profile walls and a pitched roof of profiled steel sheet. Internal walls split the hangar into 2 working areas. A 2-storey mezzanine office building is located internally.

To the south-west is located a 2-storey office building of masonry construction. A vacant single storey workshop building is located to the northwest. This is of masonry construction with a profiled asbestos cement sheet roof. This is referred to as the Hangar 4 annexe building.

In addition to the main buildings, the site contains several ancillary buildings which includes a substation and gas meter building, significant areas of hardstanding (car parks, walkways and access roads).

The fuel farm for the airport is located to the northeast of the site.

2.2.2 Access and Boundaries

The whole of the site can only be officially accessed by vehicle or by foot from Pinfold Lane to the West and East. The site is bound by mesh fencing and surrounded on the western, northern and eastern boundaries by Pinfold Lane. The southern boundary is Wilmslow Old Road.

2.2.3 Topography

The site shows elevation changes between 69m AOD and 70m AOD across the whole site as detailed by Google Earth with a general slope to the south.

2.2.4 Ground Cover and Vegetation

The site is entirely hardstanding with areas of concrete and bituminous macadam. The southern half of the site is occupied by the warehouse building of Hangar 4. The remainder of the site to the North is open vehicle storage and car parking.

2.2.5 On-site Structures and Fuel Tanks

The site is mainly an old airport hangar which has been repurposed as a vehicle/equipment storage facility. Diesel tanks, a gas bottle compound and single storey ancillary buildings are located to the north east of the main building.

A fuel dispensing unit is present on the northern wall of the hangar (Photo 7, Appendix B).

2.2.6 Electricity Substations

There is one electricity substation located onsite adjacent to Hangar 4 (Photo 6, Appendix B), there are three electricity substation within 250m of the site boundary. The closest of which is 97m to the North East of the site.

2.2.7 Asbestos Containing Materials

An asbestos report has been provided for Hangar 4, which notes that ACMs are present in the hangar. Galbestos is present on external walls, and galbestos sheeting is present on the ground floor. Felt is present behind metal cladding on external doors, behind galbestos on external walls, and on high level metal panels on the ground floor. (Airborne Environmental Consultants Ltd. Dec 2017).

2.2.8 Signs of Contamination

No significant areas of obvious contamination were observed during the site walkover.

3.0 SITE HISTORY

3.1 INTRODUCTION

The historical development of the site and surrounding area has been assessed using information available from historical Ordnance Survey (OS) maps (GS-9274062) within the Groundsure Report (GS-9274063) for the site which are presented in Appendix C of this report.

A summary of historical development of the surrounding areas is presented below, the descriptions are limited to within approximately 250 m of the site boundary, unless specified otherwise.

3.2 SITE HISTORY

Table 3.1 below provides a summary of the review of available OS mapping coverage, Google Earth Imagery, and historical aerial imagery for the site dating back to 1872.

Table 3-1 – Summary of On-site Historical Data

Feature	Map Years	Section	Notes
Farmland	1872-1938	Sitewide	The entire site boundary is covered by vacant farmland.
Aircraft hangars	1954-1976 (UXO DS from 1946)	Sitewide	Two hangars are recorded as being present onsite with one located to the south and a hangar located to the north encroaching onto the site from the northwest from 1946.
Unspecified Mound	1954 – 1987	Western boundary	There's an unspecified mound located on the western boundary which appears to have been removed from 1987.
Tank	1987-2009	North of Centre	An unspecified tank appears on the maps from 1987 to 2003 and absent on google earth from 2010.
Tank	1995 – 2003	Western boundary	Google Earth suggests that the tank has disappeared from 2000.
Side road	2022	Central	On the 2022 map, there is an addition of a small-scale road (Pinfold Lane) through the centre of the site.

There are several potentially contaminative land-uses near to the site; the main ones within 250 m of the site boundary are listed in Table 3.2 below.

Table 3-2 – Summary of Surrounding Contaminative Historical Data within 250m

Feature	Map Years	Location	Notes
Sewage Works	1976-1987	Just beyond southeast site boundary	A sewage works is identified in the southeast boundary of the site. This is not present on the mapping after 1987.
Farm buildings, a church, and a Smithy	1872-1938	Surrounding the site within 120m	From earliest mapping there are several buildings in the surrounding area. Pinfold Farm is 100m to the North. All Saints Church is situated 120m West. A smithy is also located in the same area 120m west of the site between 1872-1909.
Aircraft Hangars	1954	Surrounding the site within 100m	The area has been developed to support the nearby airport. Four aircraft hangars have been developed and can be seen on the map.
Engineering Works	1954-1970	East of site	To the northeast of the site within 100m from the mapping in 1954 there are two buildings specified as engineering works, which are no longer present on the 1987 mapping
Tanks	1987- Present	Surrounding site	From 1987, several unspecified tanks are seen on the maps to the north of the site within 50m. These are associated with the continued development of the airport.
Airport	1954- Present	Extends offsite 160m North and 180m East	From 1954 the development of Manchester Airport can be seen on the maps. This continues to be developed and feature until present day google earth imagery.
Fire Station	1974-1989	243m East	A fire station related to the airport can be seen on maps from 1974.
Ponds	1968-1969	90m Northwest	There is a pond located c.90m north west of the site until prior to the 1987 mapping where it appears to be infilled and developed over.
Substations	1987-1992	97m Northeast, 102m North, 108m North, 232m Northwest	Electricity substations are seen on mapping from 1987. They are present mainly to the north / northwest and are associated with the development of the surrounding airport.

4.0 GEOLOGY, HYDROGEOLOGY, HYDROLOGY AND RADON

4.1 GEOLOGY

Details of the geology underlying the site have been obtained from the following sources:

- BGS GeoIndex Onshore British, Geological Survey 2023 accessed January 2023.
- BGS Interactive Geology Viewer of Britain, British Geological Survey 2023 accessed January 2023.
- Environmental database (Groundsure, GS-9274063) presented in Appendix C.
- Geological Survey of England and Wales 1:50,000 geological map series: Sheet 98 – Stockport Drift, 1971.
- Geological Survey of England and Wales 1:50,000 geological map series: Sheet 98 – Stockport Solid, 1977.
- AECOM Technical Note - DNATA Ground Investigation - 60585257/TN/16012019 (2019)
- BWB Final Validation Report – DTA-BWB-SGT-XX-RE-CE-0003_A1_P1_EW Val. – MCG2005 (March 2020)

4.1.1 Made Ground

The BGS mapping suggests that Made Ground is not present on-site however, given the historic and current landuse of the site, Made Ground is anticipated. The Ground investigation undertaken on the adjacent site to the west describes Made Ground as being present, see section 4.1.7.

4.1.2 Superficial Geology

The published geological map and BGS GeoIndex mapping indicates that the site is entirely underlain by Devensian Glacial Till (Diamicton). Till is described by the BGS as “Till is 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 heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton).” The Ground investigation undertaken on the adjacent site describes Superficial strata as being present and is described in Section 4.1.7.

4.1.3 Solid Geology

The published geological plan Stockport, Sheet 98 (1:50,000) and the BGS GeoIndex Onshore ‘Bedrock Geology 1:50,000 scale’ for the site indicates that the site is underlain by the Bollin Mudstone Member, previously known as the Mercia Mudstone Group or Keuper Marl, Lower. The BGS describe the mudstone as The upper part is a dominantly laminated reddish-brown and greenish-grey mudstone with siltstones. The lower part is a structureless and laminated, dominantly reddish-brown mudstone. Within the lower part of the member, a unit termed the ‘Lower Keuper Sandstone’ has been recognised in the Stockport area. This unit closely resembles the Tarporley Siltstone Formation of adjacent areas. The Ground investigation undertaken on the adjacent site encountered bedrock strata and is described as in Section 4.1.7.

4.1.4 Linear Features

The published data does not indicate any linear features such as faults or dykes on site, however the surrounding area contains normal faults within 250 m of the site boundary. The nearest normal fault is 108 m north east of the site boundary and is inferred.

4.1.5 Coal Mining

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

4.1.6 Ground Workings and Natural Cavities

The absence or presence of BGS registered sites and cavities at or within 250 m of the site boundary have been summarised in Table 4-1 and Table 4-2 below.

Table 4-1– Summary of BGS Features / Cavities

Feature	On-Site	Off-Site (within 250m)
Brit Pits	No	No
Surface Ground Workings	Yes	Yes
Recorded Underground Workings	No	No
Recorded Natural Cavities	No	No
BGS Mineral Sites	No	No
Mineral Planning Area	No	No

Table 4-2– Surface Ground Workings

Feature	Location	Mapping year
Sewage Works	On-site	1974
Unspecified Pit	106m south	1974, 1989
Pond	134m north	1974

4.1.7 Historic Borehole Logs

There are six historic British Geological Survey (BGS) logs within the site boundary. These are all confidential boreholes records. However, there was a ground investigation carried out to the adjacent site (Hangar 3) to the west, details below.

Table 4-3– BGS Borehole Logs

BGS Reference Number, Depth and Date	Grid Reference, Distance and Direction	Details
BH01, 4.90m, 2018	381004 384790 – Adjacent to site (West)	0-0.20m Made Ground: Concrete 0.20-0.35m Made Ground: Stiff slightly gravelly clay with low cobble content. Gravel is angular fine to coarse of mixed lithologies including brick. Cobbles are brick. 0.35-2.50m Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of mixed lithologies. (slightly sandy from 2.45m) 2.50-2.60m Firm brown sandy CLAY. Locally very clayey SAND. Sand is fine to medium. 2.60-3.20m Firm to stiff brown CLAY with sand bands. Sand is fine to medium.

		3.20-4.90m Weak brown MUDSTONE residually weathered.
BH02, 6.38m, 2018	381060 384733 – Adjacent to site (West)	0-0.12m Made ground: Concrete 0.12-0.36m Made Ground: Stiff slightly gravelly clay with low cobble content. Gravel is angular to fine coarse of mixed lithologies including brick. Cobbles of brick. 0.36-2.40m Stiff to very stiff brown slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of mixed lithologies. 2.40-3.80m Dense to medium dense brown fine to medium SAND. 3.80-4.70m Stiff to very stiff brown slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of mixed lithologies. 4.70-6.38m Weak brown MUDSTONE residually weathered.
BH03A, 4.50m, 2018	381003 384699 - Adjacent to site (West)	0-0.15m Made Ground: Concrete 0.10-0.35m Made Ground: Stiff slightly gravelly clay. Gravel is angular fine to coarse of mixed lithologies including brick. 0.35-4.70m Stiff to very stiff brown slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of mixed lithologies. 4.70-7.00m Medium dense slightly gravelly blown SAND. Sand is fine to medium. Gravel is angular fine of coal. 7.00-11.58m Weak brown MUDSTONE residually weathered.

4.1.8 BGS Soil Chemistry

The Groundsure Report provides Estimated Background Soil Chemistry Averages for the site. The information is summarized in Table 4-4.

Table 4-4 – BGS Estimated Soil Chemistry

Determinand	Soil Concentration Range	
	Minimum (mg/kg)	Max (mg.kg)
Arsenic	15	15
Cadmium	1.8	1.8
Total Chromium	60	90
Lead	100	100
Nickel	15	15

4.2 HYDROGEOLOGY

Details of the hydrology of the area have been obtained from the following sources:

- Environmental database – GS-9274063 (Groundsure).
- MAGIC interactive mapping website (MAGIC, 2022).

4.2.1 Aquifer Classification

The superficial deposits are classified as a Secondary Undifferentiated Aquifer, described 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”.

The bedrock is classified as a Secondary B aquifer, described as “Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers”.

4.2.2 Groundwater Vulnerability

Guidance released by the EA (Environment Agency, March 2017) states that activities that have the potential to affect the quality or quantity of groundwater must prevent groundwater pollution. All groundwater is vulnerable to pollution, and some geological formations are more vulnerable than others. The risks of groundwater pollution from any given activity depend in part on:

- The physical, chemical and biological properties of the underlying soil and rocks.
- Depth and quality of soil;
- The presence of glacial sediment and other materials – known as ‘Superficial’ deposits; and,
- Depth of the unsaturated zone.
- All the above affect how groundwater is more or less vulnerable to pollution, with type of vulnerability generally one of the following:
- Intrinsic vulnerability – this relates to the physical characteristics, it includes soil type, presence of superficial soils, or rock type; and,
- Specific vulnerability – this relates to the effect of the proposed activity including any contaminant and consequent risk to groundwater.

The Environmental Database indicates that the Soil/Surface has a Low leaching class, an infiltration value of <40% and a dilution value of 300-550mm/year. The superficial geology is categorized as Low vulnerability, Secondary aquifer, a thickness of 3-10m, patchiness of >90% with a low recharge potential. The bedrock geology has a Low vulnerability, Secondary aquifer, with a flow mechanism of well-connected fractures.

4.2.3 Groundwater Source Protection Zones

The site is not shown to be situated within an EA defined groundwater Source Protection Zone (SPZ).

4.2.4 Groundwater Abstractions

The absence or presence of groundwater abstraction wells at or within 500 m of the site boundary have been summarised in Table 4-5 below.

Table 4-5 – Summary of Abstractions

Feature	On-Site	Off-Site – Within 500m
Groundwater Abstraction License	No	No
Surface Water Abstraction	No	No
Source Protection Zone	No	No

4.3 HYDROLOGY

Details of the hydrology of the area have been obtained from the following sources:

- Environmental database – GS-9274063 (Groundsure).
- MAGIC interactive mapping website.

4.3.1 Watercourses

The absence or presence of watercourses at or within 200m of the site boundary have been summarised in Table 4-6 below. Details are provided in Table 4-7.

Table 4-6 – Summary of Watercourses

Feature	On-Site	Off-Site
Watercourses	No	Yes

Table 4-7 – Description of Watercourses

Feature	Location and Distance	Description
Cotterill Clough Brook	48m South	Inland river not influenced by normal tidal action, on the ground surface Located in Cotteril Clough Reserve
-	114m Southeast	Lake, loch, or reservoir, on the ground surface

4.3.2 Water Framework Directive Surface Water Body Catchments

The Water Framework Directive (European Parliament and Council, 2000) 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. The absence or presence of Water Framework Directive (WFD). Surface Water Body Catchments at or within 250m of the site boundary have been summarised in Table 4-8 and detailed in Table 4-9 below.

Table 4-8 – Summary of WFD Features

Feature	On-Site	Off-Site (250m)
WFD Catchments	Yes	No
WFD Groundwater Bodies	Yes	No
WFD Surface Water Bodies	No	Yes

Table 4-9 – Details of WFD Features

Feature	Location	Detail
Water Catchment Body & Surface Water Body: Bollin (River Dean to Ashley Mill)	On-site	Operational Catchment: Bollin Dean Mersey Upper Management Catchment: Mersey Upper Overall Rating: Moderate Chemical rating: Fail

Groundwater Bodies	On-site	Ecological Rating: Moderate
		Weaver and Dane Quaternary Sand and Gravel Aquifers
		Overall Rating: Poor (2019)

4.3.3 Surface Water Abstractions

The absence or presence of surface water abstractions at or within 250m of the site boundary have been summarised in Table 4-10 below.

Table 4-10– Summary of Surface Water Abstractions

Feature	On-Site	Off-Site
Surface Water Abstractions	No	No

4.3.4 Discharge to Controlled Waters including Pollution Incidents

The absence or presence of licenced discharge to controlled waters including pollution incidents at or within 250m of the site boundary have been summarised in Table 4-11 below. Further details are given in Table 4-12.

Table 4-11 – Summary of Discharge to Controlled Waters and Pollution Incidents

Feature	On-Site	Off-Site (250 m)
Licensed Discharges to Controlled Waters	No	Yes
Pollutant release to surface waters (Red List)	No	No
Pollutant release to public sewer	No	No
List 1 Dangerous Substances	No	No
List 2 Dangerous Substances	No	No
Pollution Inventory Substances	No	No
Pollution Waste Transfers	No	No
Pollution Inventory Radioactive Waste	No	No
Pollution Incidents (EA/NRW)	No	No

Table 4-12 – Details of Discharge to Controlled Waters and Pollution Incidents

Feature	Location	Details
Licensed Discharges to Controlled Waters	42m South	Manchester Airport, Doublewood Brook Outfall, Manchester Airport, Greater Manchester, M90 1QX Effluent Type: Surface water Issue Date: 30/09/1994 Revocation Date: 16/11/2015
Licensed Discharges to Controlled Waters	45m South	Manchester Airport, Olympic House, Off Domestic Approach Road, Manchester M90 1QX Effluent Type: Site drainage

		Permit Version: 2 Issue Date: 15/02/2019 Revocation Date: -
Licensed Discharges to Controlled Waters	105 m East	Manchester Airport, Doublewood Brook Outfall, Manchester Airport, Greater Manchester, M90 1QX Effluent Type: Sewage discharges – final treated Issue date: 01/06/1980 Revocation Date: 26/04/1991
Licensed Discharges to Controlled Waters	199 m Southwest	The Romper PS, The Romper Public House, Wilmslow Road, Altrincham, Greater Manchester, WA15 8XJ Effluent Type: Sewage & Trade combined – unspecified Issue date: 20/03/1997 Revocation Date: -

4.4 RADON

Both the Groundsure environmental database and the Radon Interactive Viewer (UK Health Security Agency, 2022) indicate that most of the site is within a very low probability area where <1% of homes are estimated to be above the action level. Building control measures suggest that radon protection measures are not required for properties in England and Wales.

4.5 UNEXPLODED ORDNANCE (UXO)

A preliminary desk study assessment indicated the site is located within a low-risk area with regards to Unexploded Ordnance (UXO) however is presented as a WW2 Luftwaffe target. The site was formerly an RAF Base in WW2 as such a UXO desk study was commissioned undertaken by EOD which designated the site as Low risk. Therefore, no further measures are required.

5.0 ENVIRONMENTAL DATABASE SEARCH

5.1 INTRODUCTION

Regulatory authority information relevant to the site and its surroundings has been obtained from the undertaking of an environmental database search (GS-9274063). The information is summarised below, and the environmental database records are enclosed in . Distances stated are approximate and are taken from the boundary of the site to the database recorded entries.

The following summary is generally limited to locations within 250 m of the site boundaries unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the development of the site.

5.2 WASTE

The absence or presence of waste facilities at or within 250m of the site boundary have been summarised in Table 5-1 below and detailed in Table 5-2.

Table 5-1 - Summary of Waste Facilities

Facility Type	On-Site	Off-Site (250m)
Active or Recent Landfill	No	No
Historical Landfill (BGS records)	No	No
Historical Landfill (LA/mapping records)	No	No
Historical Landfill (EA/NRW records)	No	No
Historical Waste Sites	No	No
Licensed Waste Sites	No	No
Waste Exemptions	No	Yes

Table 5-2 - Details of Waste Facilities – Off-Site

Facility Type	Site Name & Location	Detail
Waste Exemption EPR/UE5840MZ/A001	Hanger 3 Fuelling Farm, Olympic House, Manchester, M90 1QX 37m NW	Category: Using a waste exemption Sub-category: Non-agricultural waste only Description: Use of waste in construction
	Materials Innovation Factory, University of Liverpool, Grove St, Liverpool, L69 7ZJ 37m NW	Category: Treating a waste exemption Sub-category: non-agricultural waste only Description: Treatment of waste wood and waste plant matter by chipping, shredding, cutting, or pulverising
	Materials Innovation Factory, University of Liverpool, Grove St, Liverpool, L69 7ZJ 37m NW	Category: Using waste exemption Sub-category: Non-agricultural waste only Description: Use of waste in construction
Waste Exemption WEX162999	Manchester Airport, Pinfold Lane, off Avro Way, Manchester, M90 5XA 191m NE	Category: Using waste exemption Sub Category: Not on a farm Description: Use of waste in construction

5.3 HAZARDOUS SUBSTANCES AND HEALTH & SAFETY

The absence or presence of sites subject to restrictions in relation to Health & Safety within 1 km of the site boundary has been summarised in Table 5-3 below. Further detail is provided in Table 5-4.

Table 5-3 - Summary of Facilities Subject to Active Consents

Facility Type	On-Site	Off-Site
Regulated Explosive Sites	No	No
Hazardous Substance Storage/Usage	No	Yes
Historical Licenced Industrial Activities	No	No
Licensed Industrial Activities (Part A (1))	No	No
Licensed Pollutant Release (Part A(2)/B)	No	Yes
Registered Radioactive Substances Consents	No	No
Control of Major Accident Hazard sites	No	Yes

Table 5-4 - Detail of Environmental Designations

Location	Description	Details
18m Northeast	Control of Major Accidents Hazards (COMAH)	Air BP Limited, Manchester Airport, Pinfold Lane, Manchester, Greater Manchester, M90 5AX Operation Status: Current COMAH site Tier: COMAH Upper tier operator
178m southeast	Licensed Pollutant Release (Part A(2)/B)	Air Livery PLC, Off Pinfold Lane, Hangar 2, Manchester Airport, M90 5BA Process: Respraying of road vehicles Status: Current Permit Permit Type: Part B

5.4 ENVIRONMENTAL AND CULTURAL DESIGNATIONS

The absence or presence of Environmental Designations at or within 250m of the site boundary have been summarised in Table 5-5 below. Further detail is provided in Table 5-6.

Table 5-5 - Summary of Environmental Designations

	On-Site	Off-Site
Environmental Designated Areas	No	Yes
Visual and Cultural Designations	No	No

Table 5-6 - Detail of Environmental Designations

Designation	Location	Description	Details
Designated Ancient Woodland: Cotterill Clough	44m S	Designated Ancient Woodland	Ancient and Semi-Natural Woodland
SSSI Impact Risk Zone	On-site (Entire Site)	Air Pollution	Types of developments requiring consultation: Infrastructure: Overhead cables and pipelines, any transport proposals. Any aviation proposals. Large non-residential developments outside existing settlements where internal floorspace is >1,000m ² . Waste – Mechanical & Biological waste treatment, inert landfill, demolition, and excavation waste. Water supply – Large infrastructure such as warehousing / industry where net additional gross internal floorspace is >1,000m ² .

5.5 FLOODING

The absence or presence of flooding potential at the site is summarised in Table 5-7 below.

Table 5-7 - Summary of Flooding Potential

Designation	On Site	Detail
Risk of Flooding from Rivers and Sea	No	-
Historical Flood Events	No	-
Flood Defences	No	-
Area Benefiting from Flood Defences	No	-
Flood Storage Areas	No	-
Flood Zone 2	No	-
Flood Zone 3	No	-
Groundwater Flooding	Yes	Highest risk on site: Low Highest risk within 50 m: Low
Surface Water Flooding	Yes	Highest risk on site: 1 in 30 years, 0.1m – 0.3m Highest risk within 50 m: 1 in 30 years, >1.0m

5.6 HISTORICAL LAND USES

The absence or presence of Historical Land Uses at or within 100 m of the wider site boundary have been summarised in Table 5-7 below. Further detail is given in Table 5-8.

Table 5-8 - Summary of Industrial Land Uses

Feature	On-Site	Off-Site (100 m)
Historical Industrial Land Uses	Yes	Yes
Historical Tanks	Yes	Yes
Historical Energy Features	No	Yes
Historical Petrol Stations	No	No
Historical Garages	No	No
Historical Military Land	No	No (Site Noted as being part of RAF Ringway in the UXO desk study)

Table 5-9 – Detail of Historical Land Uses

Type	Entry	Distance (Direction)	Mapping Date
Historical Industrial Land Uses	Airport	On-site	1953, 1989
	Sewage Works	On-site	1974
	Unspecified Commercial / Industrial	On-site	1974
	Unspecified Works	6m east	1974
	Unspecified Tank	15m south	1974
	Unspecified Tanks	36m northeast	1989
	Unspecified Pit	106m south	1974, 1989
	Smithy	171m west, 193m west	1899-1910, 1938
Historical Tanks	Unspecified Tank	On-site	1987-1996
	Tanks	On-site	1995-1996
	Unspecified Tanks	Five (5m-150m South) Three (50m-250m North)	1968, 1987-1990, 1987-1997
Historical Energy Features	Electricity Substation	97m northeast	1987
		102m north	1987-1996
		108m north	1987-1990
		232m northwest	1987

5.7 CURRENT INDUSTRIAL LAND USES

The absence or presence of potentially contaminative Current Industrial Land Uses at or within 100 m of the wider site boundary have been summarised in Table 5-10 below. Further detail is given in Table 5-11.

Table 5-10 - Summary of Current Industrial Land Uses

Entry	On-Site	Off-Site (100 m)
Recent Industrial Land Uses	Yes	Yes
Current or Recent Petrol Stations	No	No
Electricity Cables	No	No
Gas Pipelines	No	No
Sites Determined as Contaminated Land	No	No

Table 5-11 - Detail of Current Industrial Land Uses

Type	Entry	Distance (Direction)	Details
Recent Industrial Land Uses	Tank	Central On-site	Tanks (Generic)
	Aviation Engineers	On-site	Aeroco Group, Engineering services.
	Airline Services Ltd.	On-site	Aeroplanes, Industrial products
	Tank	Southwest On-site	Tanks (Generic)
	Tank	14m south, 20m south, 22m east, 44m northeast, 44m north, 52m north, 74m northeast, 75m northeast, 91m northeast, 99m northeast, 100m west	Tank (Generic)
	Sage Parts	61m east	Aeroplanes, Industrial Products
	Swissport	61m east	Aviation Engineers / Services
	Electricity Substation	102m north	Electrical Features (infrastructure and facilities)

6.0 CONCEPTUAL SITE MODEL AND PRELIMINARY GROUND CONTAMINATION RISK ASSESSMENT

6.1 OVERVIEW

The information presented in the previous sections of this report have been collated and evaluated to establish an initial qualitative risk assessment for the site. A conceptual model of the site has been generated based on information derived from this Phase 1 Geo-environmental Assessment, supplemented by information attained during the Tetra Tech site walkover.

The site has been considered with regard to current UK legislation and guidance, namely Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2006, as amended, and in accordance with current UK good practice guidelines (for example BS10175:2011).

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

For a risk of pollution or environmental harm to occur because of ground contamination, all of the following elements must be present:

- Source, i.e., a substance that is capable of causing pollution or harm;
- Pathway, i.e., a route by which the contaminant can reach a target; and
- Receptor (target), i.e., something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

6.2 CURRENT SITE USAGE AND PROPOSED DEVELOPMENT

The site is currently in use as a vehicle maintenance and storage warehouse for Manchester Airport, (approximately 15 m tall) in the south-western half, and car parking/storage areas across the rest of the site. Vehicles used in relation to the airport are stored in the car parks. The site is surrounded by roads.

The proposed end-use for the site is as a 92,000ft² distribution centre with an external service yard and car parking in the surrounding areas.

6.3 CONCEPTUAL SITE MODEL

The key source, pathways and receptor model is outlined below within the context of potential development of the site.

6.3.1 Potential Sources of Contamination

Potential sources within the current proposed development area include the following:

On-site Sources

- Made Ground – potential contaminants associated with historic and current land use.
- Made Ground – Associated with potential infilled land, associated with the unknown bund.
- Asbestos in soils – related to previous industrial uses and former structures onsite.
- Works – potential contaminants associated with previous and current industrial use of the site.

- Fuel stores – associated with aviation fuel, regular vehicle fuel (HGVs), former tank on the western boundary as well to the centre north site.

Off-site Sources

- Tanks – contaminants associated with transfer and storage of fuels to the north of site.
- Airport Activities – potential contaminated land associated with aircraft hangars, services and engineering.
- Electricity Substations – potential contaminated land associated with PCB's.
- Sewage Treatment works – potential contaminated land associated located at the southeastern boundary.
- Made Ground - potential contaminants associated with historic and current land use.
- Made Ground – Associated with infilled land, with on/off site ponds and similar features

6.3.2 Potential Contaminant Pathways

The following contaminant pathways are considered to potentially be active based on the current site use and proposed development:

Human Exposure Pathways

- Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapors (i.e., human interaction with surface and sub-surface materials).

Environmental Pathways

- Leaching and horizontal or vertical migration through the unsaturated ground, either through permeable sub-surface materials and/or preferential pathways.
- Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways.
- Leaching to surface water run-off/drainage.
- The migration and accumulation of gases or vapors through permeable sub-surface materials and/ or preferential pathways.

6.3.3 Potential Receptors at Risk

The following potential receptors have been identified:

Human Health

- Future site users (commercial).
- Construction / Maintenance Workers (during and post construction).
- Adjacent site users (commercial).

Wider Environment

- Building Infrastructure and supply pipes.
- Adjacent Properties.
- Underlying Superficial Secondary Undifferentiated Aquifer and Bedrock Secondary B Aquifer.
- Designated ancient woodland

- Surface water course - Cotterill Clough Brook

6.4 GROUND CONDITIONS RISK ASSESSMENT

The source, pathway, receptor linkages identified in the previous section are outlined and a qualitative risk assessment shown in Table 6.1, and off-site sources in Table 6.2.

The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, the methodology for which is presented in Appendix F.

Table 6-1 - CIRIA C552 Qualitative Risk Assessment (On-Site Sources)

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix G						
Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Justification & Potential Risk Management (if required)
Ground Conditions – Made Ground contaminants associated with industrial usage and unknown infill material.	Dermal contact, ingestion and/or inhalation of or dusts	Human Health – Future site users (commercial)	Medium	Unlikely	Moderate/Low	The proposed development is for warehouse distribution and office space. As such, hardstanding associated with the proposed development will act as an Impermeable barrier and break the source pathway receptor linkage. Any damaged or cracked hardstanding would require replacing as part of the development works
		Human Health (Construction and Maintenance Workers with PPE)		Low	Moderate/Low	Risk reduced to low through the use of appropriate site practices and PPE.
	Leaching to groundwater, drainage, and lateral / vertical migration.	Adjacent properties and land users	Mild	Low	Low	The diamicton identified as part of the adjacent ground investigation describe cohesive layers of superficial deposits which are expected to be present onsite and are of low permeability and will therefore limit vertical and lateral migration pathway. To be confirmed through ground investigation.
		On-site drainage	Mild	Likely	Moderate/Low	
		Secondary Undifferentiated Aquifer	Mild	Low	Low	
	Migration along/into service ducts and pipework	Buildings and Services	Mild	Likely	Moderate/Low	
Site Conditions - Asbestos within in soils	Dermal contact, ingestion and/or inhalation of or dusts	Human Health – Future site users (residential)	Severe	Unlikely	Moderate/Low	Based on the historic landuse and demolition of historic structures there is the potential for asbestos in the Made Ground soils.
		Human Health (Construction and	Severe	Likely	High	

		Maintenance Workers with PPE)				
Made Ground - Ground Gas and vapors associated with Made Ground and industrial usage	Generation and migration / accumulation of ground gases	Human Health – Future Site Users	Severe (Asphyxiation & Explosion)	Likely	Moderate	Anticipated to be limited ground gas generation. Potential for paints/solvents to have been used in vehicle maintenance. A ground investigation should be carried out to fully assess the risks.
		Buildings and Services	Severe (Explosion)			
Fuels associated with Historic land use (Aviation, HGV's) and for generators	Dermal contact, ingestion and/or inhalation of vapours or dusts	Human Health (Current / Future Site Users)	Medium	Unlikely	Low	Due to the proposed development the source pathway receptor linkage is broken by the impermeable hardstanding and therefore future site users are unlikely to come into contact with possible contamination. Due to the anticipated impermeable nature of the superficial strata Any damaged or cracked hardstanding would require replacing as part of the development works.
		Human Health (Construction and Maintenance Workers with PPE)		Likely	Moderate	Due to a proposed new unit onsite, excavation and removal of the concrete hardstanding is likely to take place and as such construction workers will be exposed to potential contamination. This can be mitigated through the use of appropriate PPE and good site practices.
	Leaching to groundwater, drainage and lateral / vertical migration.	Secondary B Bedrock Aquifer	Medium	Unlikely	Low	Due to the proposed development and through the use of hardstanding, the source pathway receptor linkage is broken by the impermeable concrete. Any damaged or cracked hardstanding would require replacing as part of the development works. Low permeability of cohesive layers within superficial deposits will limit the vertical and lateral migration pathways for potential contaminants.
		Secondary Undifferentiated Aquifer Superficial Deposits		Unlikely	Low	The contamination is considered likely localised due to low permeable soils encountered.
		Building Infrastructure and supply pipes		Likely	Moderate	Testing of the soil in the locations of proposed service supply lines once known. To determine the level and nature of contaminants and propose mitigation as necessary.
		Adjacent Properties		Unlikely	Low	Low permeability of cohesive layers within superficial deposits will limit the vertical and lateral migration pathways for potential contaminants.

Table 6-2 - CIRIA C552 Qualitative Risk Assessment (Off-Site Sources)

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix G						
Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Justification & Potential Risk Management (if required)
Tanks for storing aviation fuels and other aviation related activities.	Leaching to groundwater, drainage and lateral / vertical migration.	Aquifers beneath site	Medium	Low likelihood	Moderate/Low	There is potential for mobile contaminants (hydrocarbons) to leach into the aquifers underlying the site. Any underground storage tanks used by the aviation industry could potentially be leaking mobile contaminants into the underlying aquifer. The presence of low permeability cohesive soils underlying the site provide an unlikely pathway for off-site contaminants to migrate to the site area.
	Leaching to surface waters via drainage and lateral migration	Surface waters: Cotterill Clough Brook	Medium	Low likelihood	Moderate/Low	There is potential for leaching or migration of mobile contaminants from any spillages or leaks in relation to the use of the aviation fuel storage tanks. The presence of low permeability cohesive soils underlying the site provide an unlikely pathway for off-site contaminants to migrate to the site area.
	Ground gases/vapours	Human Health – Future site users (residential)	Medium	Low likelihood	Moderate/Low	There is some potential for generation of ground gases from the volatile hydrocarbons used in relation to the aviation fuel storage tanks. The presence of low permeability cohesive soils underlying the site provide an unlikely pathway for off-site contaminants to migrate to the site area.
Electricity Substation: Potential for Polychlorinated biphenyls	Dermal contact, ingestion and/or inhalation of or dusts	Human Health – Future site users (residential)	Medium	Unlikely	Low	Contaminants associated with electricity sub-stations, such as PCBs are of low mobility and therefore are unlikely to travel onto the site. Risk to be confirmed following intrusive investigation.
		Human Health (Construction and Maintenance Workers with PPE)	Medium	Unlikely	Low	Risk reduced to low using appropriate site practices and PPE.
	Leaching to groundwater, drainage and lateral / vertical migration.	Adjacent properties and land users	Medium	Unlikely	Low	Limited mobility of PCBs means unlikely to reach controlled waters receptors. To be confirmed following intrusive investigation and monitoring.

7.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the information identified in the preceding sections, the sections below summarise the anticipated ground conditions and associated geotechnical assessment for the site, including highlighting the potential constraints for future development. Actual ground conditions may need to be confirmed through ground investigation in due course.

7.1 ANTICIPATED GROUND CONDITIONS

The following ground conditions are anticipated to be underlying the site:

- Superficial Deposits anticipated beneath this site are superficial deposits of Devensian Glacial Till (Diamicton) across the entirety of the site and in some areas Glacial Sands (AECOM Technical Note, 2019).
- The Bedrock Strata mapped beneath the site indicates that it is underlain by the Bollin Mudstone Member, previously known as the Mercia Mudstone Group or Keuper Marl, Lower.

7.2 GROUND STABILITY

Table 7-1 indicates the potential ground stability hazards on-site, as obtained from the Groundsure report.

Table 7-1 – Ground Stability Hazards

Name	Details	Rating
Shrink Swell Clay	The potential hazard presented by soils that absorb water when wet (making them swell) and lose water as they dry (making them shrink).	Very Low – Ground conditions predominantly low plasticity.
Running Sands	The potential hazard presented by types of ground 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.	Very Low - Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.
Compressible Deposits	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.	Negligible – Compressible strata are not thought to occur.
Collapsible deposits	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.	Very Low - Deposits with potential to collapse when loaded and saturated are unlikely to be present.
Landslides	The potential for land sliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of	Very Low - Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas

	superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.	impacting on the site should always be considered.
Ground dissolution of soluble rocks	The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems.	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.

7.3 GEOCHEMISTRY

A full suite of sulphate testing to allow the characterisation of ground aggressivity for concrete classification across the site will be required at the ground investigation stage.

7.4 SLOPE STABILITY

The site is relatively flat with minimal sloping, therefore slope stability is not likely to be a constraint to developing the site.

7.5 ENABLING WORKS

7.5.1 Anticipated Cut and Fill

Cut and fill is not likely to be required given the presence of flat land on site.

7.5.2 Temporary Works

All excavations requiring entry of personnel should be fully supported.

7.6 DRAINAGE

The shallow soils underlying the site are anticipated to exhibit low permeability therefore alternative forms of drainage are recommended.

7.7 SUMMARY OF RELEVANT GEOTECHNICAL FACTORS

Within the context of this geotechnical assessment and based on the information above, the following potential constraints have been identified with respect to the proposed development:

- Presence of Made Ground deposits across site.
- Ground conditions across the site may differ to those anticipated.
- Possible infilled ground associated with Cotterill Clough Brook on eastern boundary after 1877.
- Potential for underlying obstructions associated with historic structures.

It should be noted that the actual ground conditions will need to be confirmed through intrusive investigation and laboratory testing in due course to assess the in-ground abnormalities.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

8.1.1 Geotechnical Assessment

Potential geotechnical constraints have been identified associated with development of the site, relating to:

- Presence of Made Ground deposits across site.
- Ground conditions across the site may differ to those anticipated.
- Possible infilled ground associated with Cotterill Clough Brook on eastern boundary.
- Potential for underlying obstructions associated with historic structures.

8.1.2 Ground Contamination

The risk from ground contamination at the site is generally considered to be as follows:

- Future site users (commercial) – the risk is **Moderate/Low** from identified contamination sources and Asbestos and pathways.
- Construction / maintenance workers – the risk is **Moderate/Low** for contamination and **High** for asbestos and pathways but can be reduced to Low through the use of appropriate PPE.
- Building infrastructure and supply pipes specifically water supply pipes - the risk is **Moderate/Low** in the absence of mitigation.
- Controlled waters - the risk is **Moderate/Low** from the identified contamination sources and pathways.
- Risk to site from adjacent properties and Aquifers (Bedrock and Superficial) is **Low**.
- The risk from other off-site sources is **Moderate/Low** to **Low**.

8.2 RECOMMENDATIONS

It is recommended to undertake a ground investigation to further assess potential ground risks at the site.

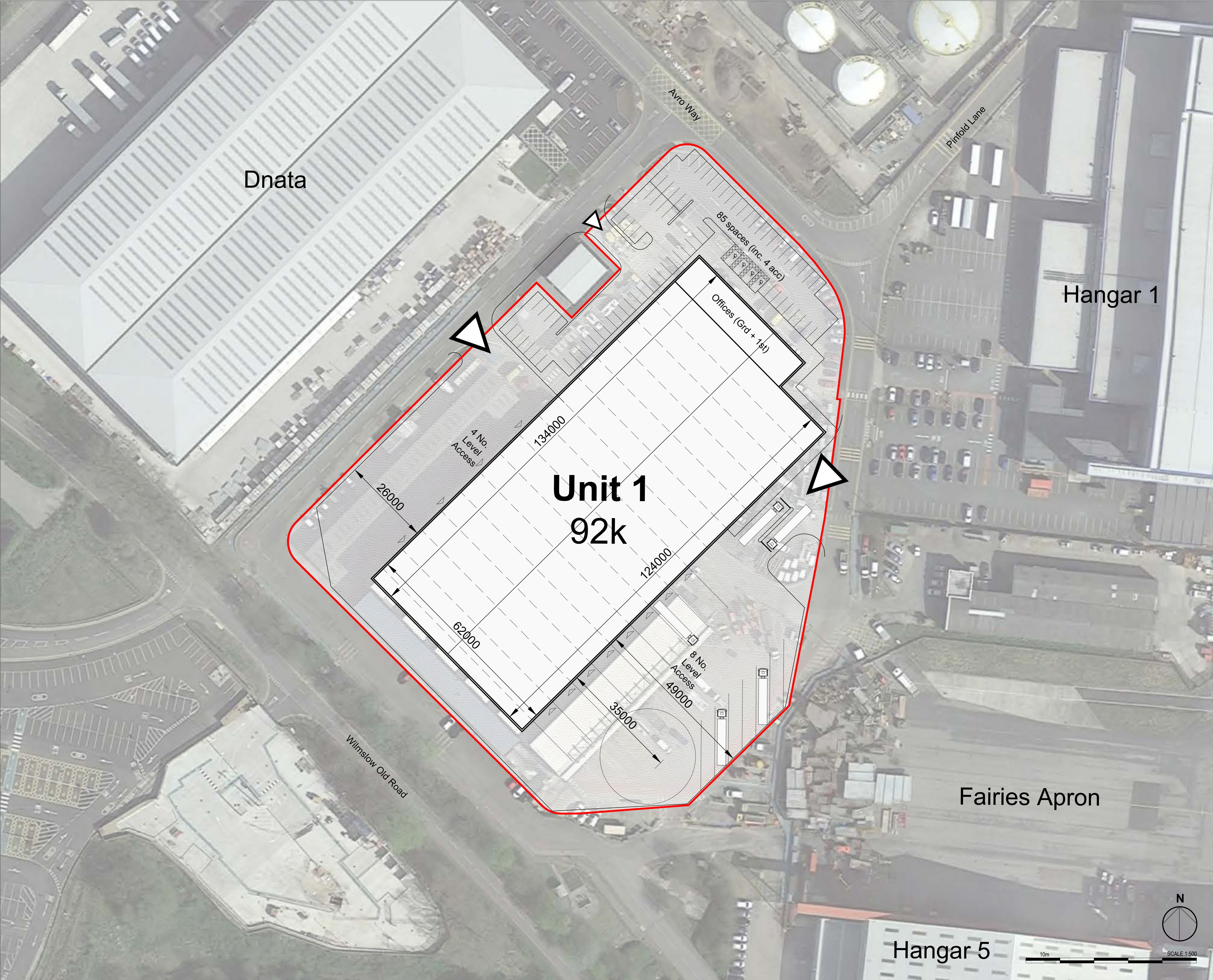
Based on the constraints identified regarding the proposed masterplan, the exploratory ground investigation should comprise:

- Exploratory boreholes to ascertain the presence and depth/nature of Made Ground, depth to bedrock and to provide information for foundation design.
- Installation of gas and groundwater wells to inform the groundwater regime as well as the gas underlying the site.
- Geotechnical sampling of the underlying soils to assess the physical characteristics of superficial deposits.
- Geochemical samples of the Made Ground to assess the physical and chemical characteristics of superficial deposits.

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THIRD PARTY DRAWINGS



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Notes

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Schedule of Accommodation

Unit 1	m²	sq ft
Warehouse :	7,688	82,754
Office :	866	9,321
Total GIA :	8,554	92,075

Rev

Description

By

Ckd

Date



MAKING
COMPLEX
EASY

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Client



Project

Manchester Airport

Title

Hangar 4
Proposed Unit 92k
Option 01

Status

Preliminary

Scale

1:500 @A1

Date Created

04/02/22

Task Team Manager

KRP

Information Author

DEC

Task Information Manager

MJH

Document Number

NK018329-RPS-SI-XX-DR-A-9448

Project Code - Originator - Zone - Level - Type - Role - Drawing Number

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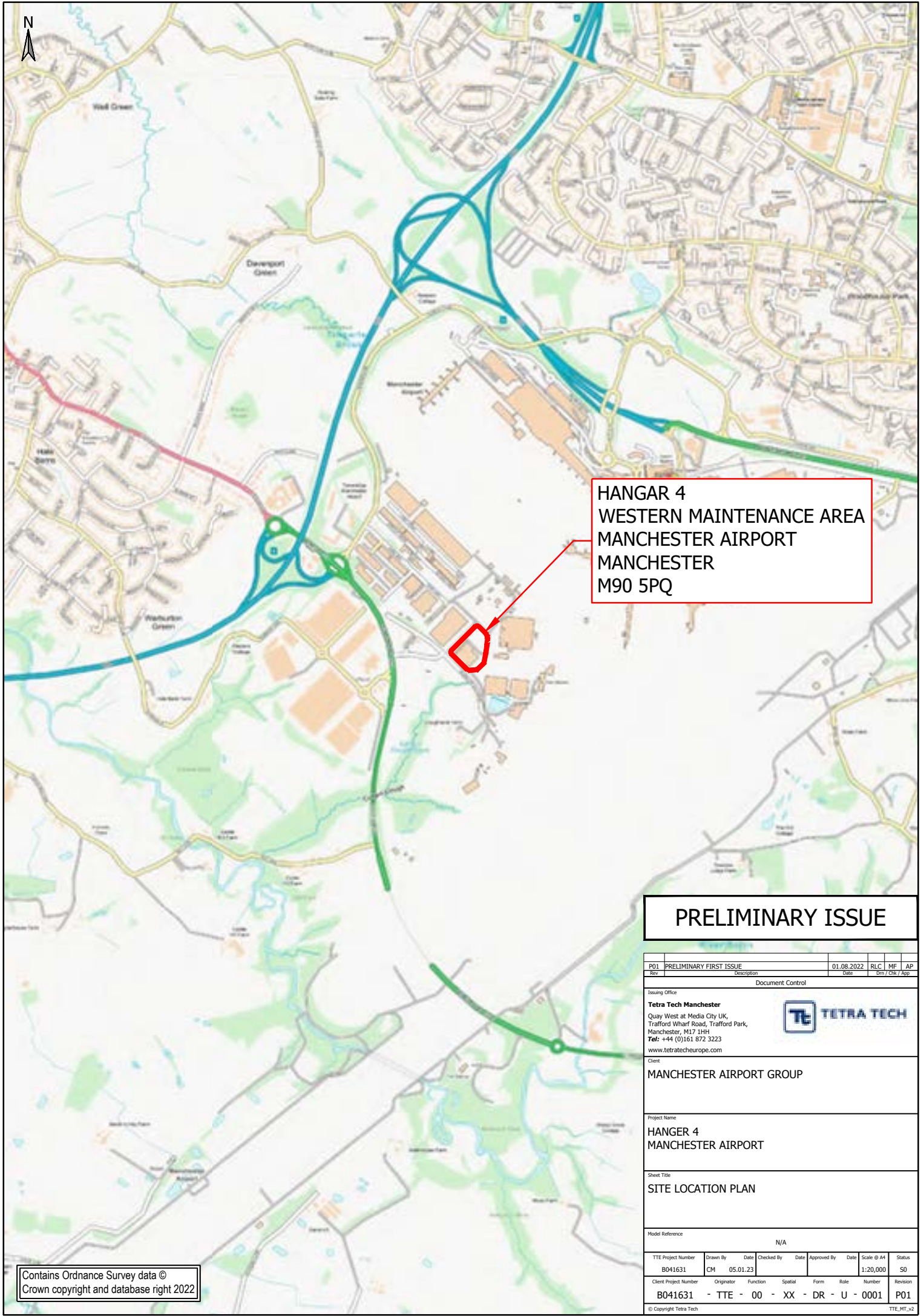
S0

Revision

P01

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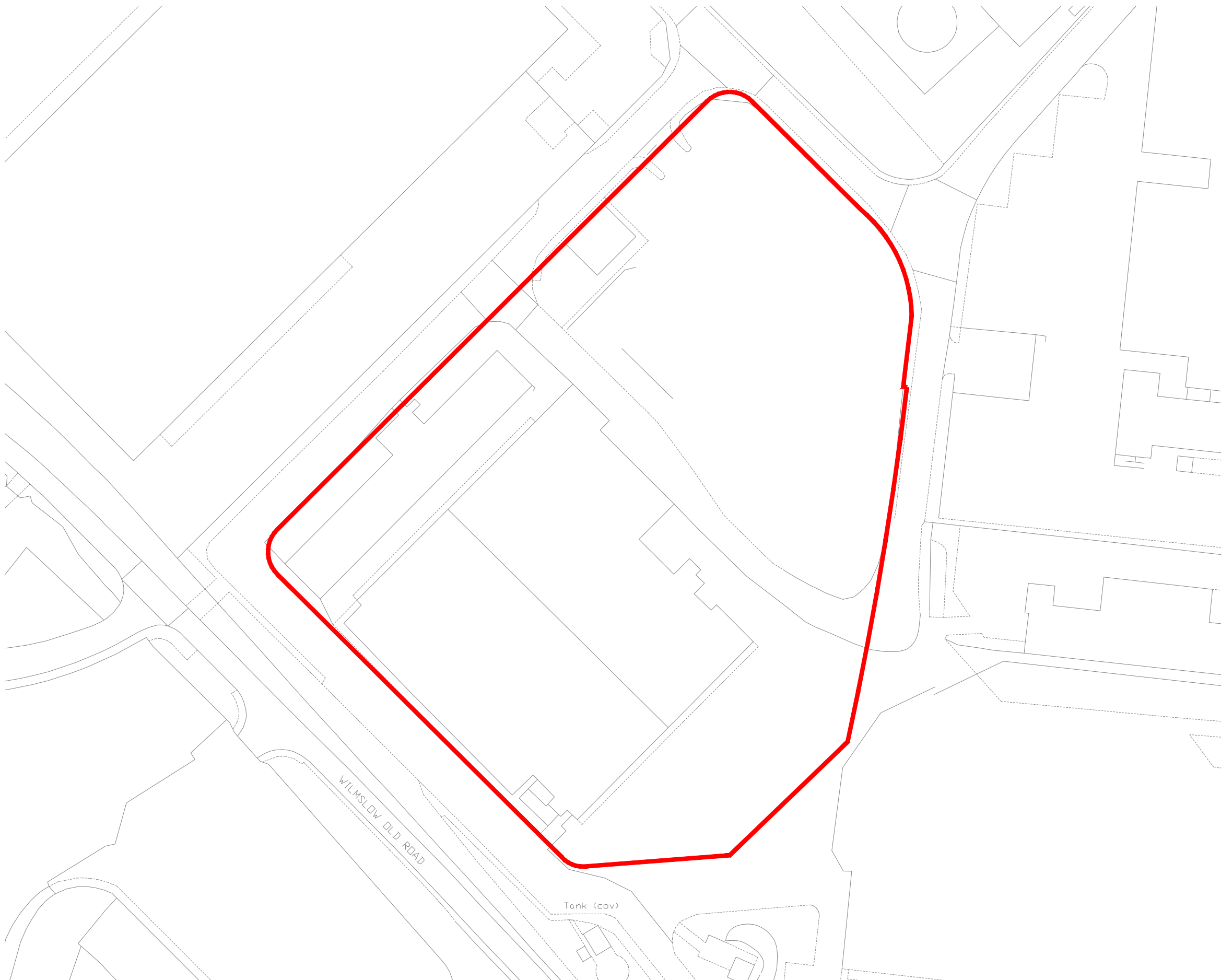
DRAWINGS



HANGAR 4
WESTERN MAINTENANCE AREA
MANCHESTER AIRPORT
MANCHESTER
M90 5PQ

PRELIMINARY ISSUE

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SITE BOUNDARY

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MANCHESTER AIRPORT GROUP

	Project Name

HANGER 4
MANCHESTER AIRPORT

Sheet Title

SITE BOUNDARY PLAN

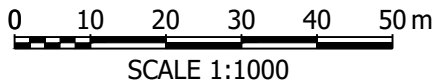
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02	13
TTE M	



KEY



SITE BOUNDARY

TETRA TECH GI 2023



CABLE PERCUSSION
BOREHOLE



WINDOW SAMPLE
BOREHOLE



DYNAMIC CONE
PENETRATION TEST

PRELIMINARY ISSUE

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Client:	MANCHESTER AIRPORT GROUP
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Project Name:	HANGER 4 MANCHESTER AIRPORT
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Sheet Title:	EXPLORATORY HOLE LOCATION PLAN
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Model Reference:	N/A
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TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A3	Status
B041631	CM	05.01.23					1:1,000	S0
Client Project Number	Originator	Function	Spatial	Form	Role	Number	Revision	
B041631	- TTE -	00	- XX -	DR	- U -	0003	P01	

APPENDICES

APPENDIX A – REPORT CONDITIONS

APPENDIX A - REPORT CONDITIONS

GEO-ENVIRONMENTAL DESK STUDY REVIEW

This report is produced solely for the benefit of Threadneedle Curtis Limited and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a study of readily accessible referenced historical records. Some of the opinions are based on unconfirmed data and information and are presented in good faith without exhaustive clarification. Where ground conditions are discussed but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to detailed activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question, as such bodies may have unpublished, often more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Tetra Tech. In time improved practices or amended guidance may necessitate a re-assessment. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites.

APPENDIX B – GROUNDSURE REPORT

HANGAR 4, MANCHESTER AIRPORT, RINGWAY ROAD, MANCHESTER, M90 5YF

Order Details

Date: 23/12/2022

Your ref: B041631

Our Ref: GS-9274063

Site Details

Location: 381156 384647

Area: 2.13 ha

Authority: [Manchester City Council](#)



Summary of findings

p. 2

Aerial image

p. 8

OS MasterMap site plan

p.13

groundsure.com/insightuserguide

Contact us with any questions at:

info@groundsure.com

08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
14	1.1	<u>Historical industrial land uses</u>	4	3	9	3	-
15	1.2	<u>Historical tanks</u>	2	11	20	3	-
17	1.3	<u>Historical energy features</u>	0	0	4	6	-
18	1.4	Historical petrol stations	0	0	0	0	-
18	1.5	Historical garages	0	0	0	0	-
18	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
19	2.1	<u>Historical industrial land uses</u>	4	3	12	3	-
20	2.2	<u>Historical tanks</u>	6	26	45	7	-
24	2.3	<u>Historical energy features</u>	0	0	8	8	-
24	2.4	Historical petrol stations	0	0	0	0	-
25	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
26	3.1	Active or recent landfill	0	0	0	0	-
26	3.2	Historical landfill (BGS records)	0	0	0	0	-
27	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
27	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
27	3.5	Historical waste sites	0	0	0	0	-
27	3.6	Licensed waste sites	0	0	0	0	-
27	3.7	<u>Waste exemptions</u>	0	3	1	2	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
29	4.1	<u>Recent industrial land uses</u>	4	6	18	-	-
31	4.2	<u>Current or recent petrol stations</u>	0	0	0	1	-
31	4.3	Electricity cables	0	0	0	0	-
31	4.4	Gas pipelines	0	0	0	0	-
31	4.5	Sites determined as Contaminated Land	0	0	0	0	-



32	4.6	<u>Control of Major Accident Hazards (COMAH)</u>	0	1	0	0	-
32	4.7	Regulated explosive sites	0	0	0	0	-
32	4.8	<u>Hazardous substance storage/usage</u>	0	0	3	0	-
33	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
33	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
33	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	1	0	2	1	-
34	4.12	Radioactive Substance Authorisations	0	0	0	0	-
34	4.13	<u>Licensed Discharges to controlled waters</u>	0	5	2	4	-
36	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
36	4.15	Pollutant release to public sewer	0	0	0	0	-
37	4.16	List 1 Dangerous Substances	0	0	0	0	-
37	4.17	List 2 Dangerous Substances	0	0	0	0	-
37	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
37	4.19	Pollution inventory substances	0	0	0	0	-
37	4.20	Pollution inventory waste transfers	0	0	0	0	-
38	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
39	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
41	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
43	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
44	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
44	5.5	Groundwater vulnerability- local information	None (within 0m)				
45	5.6	Groundwater abstractions	0	0	0	0	0
45	5.7	Surface water abstractions	0	0	0	0	0
45	5.8	Potable abstractions	0	0	0	0	0
45	5.9	Source Protection Zones	0	0	0	0	-
46	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
47	6.1	<u>Water Network (OS MasterMap)</u>	0	1	1	-	-



48	6.2	<u>Surface water features</u>	0	1	3	-	-
48	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
48	6.4	<u>WFD Surface water bodies</u>	0	1	0	-	-
49	6.5	<u>WFD Groundwater bodies</u>	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
50	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
50	7.2	Historical Flood Events	0	0	0	-	-
50	7.3	Flood Defences	0	0	0	-	-
51	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
51	7.5	Flood Storage Areas	0	0	0	-	-
52	7.6	Flood Zone 2	None (within 50m)				
52	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
53	8.1	<u>Surface water flooding</u>	1 in 30 year, Greater than 1.0m (within 50m)				
Page	Section	Groundwater flooding					
55	9.1	<u>Groundwater flooding</u>	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
56	10.1	<u>Sites of Special Scientific Interest (SSSI)</u>	0	0	0	1	1
57	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
57	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
57	10.4	Special Protection Areas (SPA)	0	0	0	0	0
57	10.5	National Nature Reserves (NNR)	0	0	0	0	0
58	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
58	10.7	<u>Designated Ancient Woodland</u>	0	1	0	0	9
59	10.8	Biosphere Reserves	0	0	0	0	0
59	10.9	Forest Parks	0	0	0	0	0
59	10.10	Marine Conservation Zones	0	0	0	0	0
59	10.11	<u>Green Belt</u>	0	0	0	1	2
60	10.12	Proposed Ramsar sites	0	0	0	0	0



60	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
60	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
60	10.15	Nitrate Sensitive Areas	0	0	0	0	0
61	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
62	<u>10.17</u>	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
63	<u>10.18</u>	<u>SSSI Units</u>	0	0	0	1	1
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
65	11.1	World Heritage Sites	0	0	0	-	-
65	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
65	11.3	National Parks	0	0	0	-	-
65	11.4	Listed Buildings	0	0	0	-	-
66	11.5	Conservation Areas	0	0	0	-	-
66	11.6	Scheduled Ancient Monuments	0	0	0	-	-
66	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
67	<u>12.1</u>	<u>Agricultural Land Classification</u>	Grade 3 (within 250m)				
68	12.2	Open Access Land	0	0	0	-	-
68	12.3	Tree Felling Licences	0	0	0	-	-
68	12.4	Environmental Stewardship Schemes	0	0	0	-	-
68	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
69	<u>13.1</u>	<u>Priority Habitat Inventory</u>	0	1	4	-	-
70	13.2	Habitat Networks	0	0	0	-	-
70	13.3	Open Mosaic Habitat	0	0	0	-	-
70	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
71	<u>14.1</u>	<u>10k Availability</u>	Identified (within 500m)				
72	14.2	Artificial and made ground (10k)	0	0	0	0	-
73	<u>14.3</u>	<u>Superficial geology (10k)</u>	1	0	1	1	-

74	14.4	Landslip (10k)	0	0	0	0	-
75	14.5	<u>Bedrock geology (10k)</u>	1	0	3	0	-
76	14.6	<u>Bedrock faults and other linear features (10k)</u>	0	0	2	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
77	15.1	<u>50k Availability</u>	Identified (within 500m)				
78	15.2	Artificial and made ground (50k)	0	0	0	0	-
78	15.3	Artificial ground permeability (50k)	0	0	-	-	-
79	15.4	<u>Superficial geology (50k)</u>	1	0	0	0	-
80	15.5	<u>Superficial permeability (50k)</u>	Identified (within 50m)				
80	15.6	Landslip (50k)	0	0	0	0	-
80	15.7	Landslip permeability (50k)	None (within 50m)				
81	15.8	<u>Bedrock geology (50k)</u>	1	0	1	0	-
82	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
82	15.10	<u>Bedrock faults and other linear features (50k)</u>	0	0	1	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
83	16.1	<u>BGS Boreholes</u>	6	10	32	-	-
Page	Section	Natural ground subsidence					
86	17.1	<u>Shrink swell clays</u>	Very low (within 50m)				
87	17.2	<u>Running sands</u>	Very low (within 50m)				
88	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
89	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
90	17.5	<u>Landslides</u>	Very low (within 50m)				
91	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
92	18.1	Natural cavities	0	0	0	0	-
93	18.2	BritPits	0	0	0	0	-
93	18.3	<u>Surface ground workings</u>	1	0	3	-	-
93	18.4	Underground workings	0	0	0	0	0
93	18.5	Historical Mineral Planning Areas	0	0	0	0	-



94	18.6	Non-coal mining	0	0	0	0	0
94	18.7	Mining cavities	0	0	0	0	0
94	18.8	JPB mining areas	None (within 0m)				
94	18.9	Coal mining	None (within 0m)				
94	18.10	<u>Brine areas</u>	Identified (within 0m)				
95	18.11	Gypsum areas	None (within 0m)				
95	18.12	Tin mining	None (within 0m)				
95	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
96	19.1	<u>Radon</u>	Less than 1% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
98	20.1	<u>BGS Estimated Background Soil Chemistry</u>	1	3	-	-	-
98	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
98	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
99	21.1	Underground railways (London)	0	0	0	-	-
99	21.2	Underground railways (Non-London)	0	0	0	-	-
99	21.3	Railway tunnels	0	0	0	-	-
99	21.4	Historical railway and tunnel features	0	0	0	-	-
99	21.5	Royal Mail tunnels	0	0	0	-	-
100	21.6	Historical railways	0	0	0	-	-
100	21.7	Railways	0	0	0	-	-
100	21.8	Crossrail 1	0	0	0	0	-
100	21.9	Crossrail 2	0	0	0	0	-
100	21.10	HS2	0	0	0	0	-

Recent aerial photograph



Capture Date: 22/04/2019

Site Area: 2.13ha



Recent site history - 2016 aerial photograph



Capture Date: 21/04/2016

Site Area: 2.13ha



Recent site history - 2010 aerial photograph



Aerial photography supplied by Getmapping PLC. © Copyright Getmapping PLC 2022. All Rights Reserved.

Capture Date: 17/10/2010

Site Area: 2.13ha



Recent site history - 2005 aerial photograph



Capture Date: 02/09/2005

Site Area: 2.13ha



Recent site history - 2000 aerial photograph



Capture Date: 27/06/2000

Site Area: 2.13ha



OS MasterMap site plan



Site Area: 2.13ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

1.1 Historical industrial land uses

Records within 500m

19

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
1	On site	Airport	1989	878654

ID	Location	Land use	Dates present	Group ID
2	On site	Airport	1953	989364
A	On site	Unspecified Commercial/Industrial	1974	796960
B	On site	Sewage Works	1974	811850
3	6m E	Unspecified Works	1974	830660
B	15m S	Unspecified Tank	1974	824998
D	36m NE	Unspecified Tanks	1989	815435
E	106m S	Unspecified Pit	1989	853250
E	106m S	Unspecified Pit	1974	950609
5	160m N	Airport	1995	845359
G	171m W	Smithy	1899 - 1910	885346
6	183m E	Airport	1974 - 1975	897813
G	193m W	Smithy	1938	943361
7	218m N	Airport	1967	844689
I	243m E	Fire Station	1989	860400
I	243m E	Fire Station	1974	987457
9	287m NE	Unspecified Tank	1975	824999
11	454m NW	Wireless Station	1989	802256
M	475m W	Unspecified Tank	1989	825000

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

36

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 ungrouped 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	Unspecified Tank	1987 - 1996	128311
A	On site	Tanks	1995 - 1996	142707
B	8m S	Unspecified Tank	1987 - 1990	127696
B	10m S	Unspecified Tank	1995	128767
B	10m S	Unspecified Tank	1987 - 1996	149270
B	11m S	Unspecified Tank	1995 - 1996	139784
C	12m E	Tanks	1968	136089
B	13m S	Unspecified Tank	1995 - 1996	145845
C	14m E	Tanks	1968	125152
A	15m W	Tanks	1995 - 1996	126339
C	16m E	Unspecified Tank	1987	114873
C	18m E	Unspecified Tank	1987 - 1996	129923
D	35m NE	Tanks	1987 - 1996	137116
D	62m NE	Unspecified Tank	1995 - 1996	131170
D	70m NE	Unspecified Tank	1987 - 1996	147552
D	91m NE	Unspecified Tank	1995 - 1996	143549
E	93m SE	Unspecified Tank	1987 - 1990	133887
E	93m SE	Unspecified Tank	1995	143162
E	94m SE	Unspecified Tank	1987 - 1995	130265
4	95m W	Unspecified Tank	1968 - 1987	126292
D	100m NE	Unspecified Tank	1987 - 1996	148025
D	108m NE	Unspecified Tank	1987 - 1996	125562
D	112m NE	Unspecified Tank	1987 - 1996	143016
E	115m SE	Unspecified Tank	1987	136269
E	120m SE	Unspecified Tank	1995 - 1996	123647
E	123m SE	Unspecified Tank	1995 - 1997	127078
E	136m SE	Unspecified Tank	1995 - 1997	129845
E	137m SE	Unspecified Tank	1968	141112



ID	Location	Land use	Dates present	Group ID
E	137m SE	Unspecified Tank	1968	139281
E	163m SE	Unspecified Tank	1995 - 1997	147089
H	203m N	Unspecified Tank	1995 - 1996	131304
H	204m NE	Unspecified Tank	1987 - 1990	149283
J	250m N	Unspecified Tank	1987 - 1992	125764
L	337m NW	Unspecified Tank	1987 - 1995	146099
10	431m E	Unspecified Tank	1987	114875
M	478m W	Unspecified Tank	1987	114872

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

10

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 ungrouped 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
D	97m NE	Electricity Substation	1987	61807
F	102m N	Electricity Substation	1987 - 1996	67847
F	108m N	Electricity Substation	1987 - 1990	73083
8	232m NW	Electricity Substation	1987	61802
J	254m N	Electricity Substation	1992	64065
J	257m N	Electricity Substation	1987	79361
K	294m N	Electricity Substation	1992	68947
K	296m N	Electricity Substation	1987	64893
L	339m NW	Electricity Substation	1995	66850
L	340m NW	Electricity Substation	1987 - 1991	78382



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 ungrouped 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

0

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 ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

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



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features

2.1 Historical industrial land uses

Records within 500m

22

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 19**

ID	Location	Land Use	Date	Group ID
1	On site	Airport	1953	989364
A	On site	Airport	1989	878654
B	On site	Unspecified Commercial/Industrial	1974	796960

ID	Location	Land Use	Date	Group ID
C	On site	Sewage Works	1974	811850
2	6m E	Unspecified Works	1974	830660
C	15m S	Unspecified Tank	1974	824998
E	36m NE	Unspecified Tanks	1989	815435
F	106m S	Unspecified Pit	1989	853250
F	106m S	Unspecified Pit	1974	950609
I	160m N	Airport	1995	845359
J	171m W	Smithy	1910	885346
3	183m E	Airport	1974	897813
J	192m W	Smithy	1899	885346
J	193m W	Smithy	1938	943361
I	217m N	Airport	1989	878654
L	218m N	Airport	1967	844689
L	218m N	Airport	1975	897813
A	243m E	Fire Station	1989	860400
A	243m E	Fire Station	1974	987457
5	287m NE	Unspecified Tank	1975	824999
7	454m NW	Wireless Station	1989	802256
P	475m W	Unspecified Tank	1989	825000

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

84

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 19**

ID	Location	Land Use	Date	Group ID
B	On site	Tanks	1995	142707



ID	Location	Land Use	Date	Group ID
B	On site	Unspecified Tank	1995	128311
B	On site	Unspecified Tank	1996	128311
B	On site	Tanks	1996	142707
B	On site	Unspecified Tank	1987	128311
B	On site	Unspecified Tank	1990	128311
C	8m S	Unspecified Tank	1987	127696
C	8m S	Unspecified Tank	1990	127696
C	10m S	Unspecified Tank	1995	128767
C	10m S	Unspecified Tank	1987	149270
C	10m S	Unspecified Tank	1990	149270
C	11m S	Unspecified Tank	1995	139784
C	11m S	Unspecified Tank	1996	139784
C	11m S	Unspecified Tank	1995	149270
C	11m S	Unspecified Tank	1996	149270
D	12m E	Tanks	1968	136089
D	12m E	Tanks	1968	136089
C	13m S	Unspecified Tank	1995	145845
C	13m S	Unspecified Tank	1996	145845
D	14m E	Tanks	1968	125152
B	15m W	Tanks	1995	126339
B	15m W	Tanks	1996	126339
D	15m E	Tanks	1968	125152
D	16m E	Unspecified Tank	1987	114873
D	18m E	Unspecified Tank	1987	129923
D	18m E	Unspecified Tank	1990	129923
D	19m E	Unspecified Tank	1995	129923
D	19m E	Unspecified Tank	1996	129923
E	35m NE	Tanks	1987	137116



ID	Location	Land Use	Date	Group ID
E	35m NE	Tanks	1990	137116
E	36m NE	Tanks	1995	137116
E	36m NE	Tanks	1996	137116
E	62m NE	Unspecified Tank	1995	131170
E	62m NE	Unspecified Tank	1996	131170
E	70m NE	Unspecified Tank	1987	147552
E	70m NE	Unspecified Tank	1990	147552
E	71m NE	Unspecified Tank	1995	147552
E	71m NE	Unspecified Tank	1996	147552
E	91m NE	Unspecified Tank	1995	143549
E	91m NE	Unspecified Tank	1996	143549
F	93m SE	Unspecified Tank	1987	133887
F	93m SE	Unspecified Tank	1990	133887
F	93m SE	Unspecified Tank	1995	143162
F	94m SE	Unspecified Tank	1987	130265
F	95m SE	Unspecified Tank	1995	130265
G	95m W	Unspecified Tank	1968	126292
G	95m W	Unspecified Tank	1968	126292
G	95m W	Unspecified Tank	1973	126292
G	97m W	Unspecified Tank	1987	126292
E	100m NE	Unspecified Tank	1987	148025
E	100m NE	Unspecified Tank	1990	148025
E	100m NE	Unspecified Tank	1995	148025
E	100m NE	Unspecified Tank	1996	148025
E	108m NE	Unspecified Tank	1987	125562
E	108m NE	Unspecified Tank	1990	125562
E	110m NE	Unspecified Tank	1995	125562
E	110m NE	Unspecified Tank	1996	125562

ID	Location	Land Use	Date	Group ID
E	112m NE	Unspecified Tank	1987	143016
E	112m NE	Unspecified Tank	1990	143016
E	113m NE	Unspecified Tank	1995	143016
E	113m NE	Unspecified Tank	1996	143016
F	115m SE	Unspecified Tank	1987	136269
F	120m SE	Unspecified Tank	1995	123647
F	120m SE	Unspecified Tank	1996	123647
F	123m SE	Unspecified Tank	1995	127078
F	123m SE	Unspecified Tank	1997	127078
F	136m SE	Unspecified Tank	1995	129845
F	136m SE	Unspecified Tank	1997	129845
F	137m SE	Unspecified Tank	1968	141112
F	137m SE	Unspecified Tank	1968	139281
F	163m SE	Unspecified Tank	1995	147089
F	163m SE	Unspecified Tank	1997	147089
K	203m N	Unspecified Tank	1995	131304
K	203m N	Unspecified Tank	1996	131304
K	204m NE	Unspecified Tank	1987	149283
K	204m NE	Unspecified Tank	1990	149283
M	250m N	Unspecified Tank	1992	125764
M	251m N	Unspecified Tank	1987	125764
O	337m NW	Unspecified Tank	1995	146099
O	339m NW	Unspecified Tank	1987	146099
O	339m NW	Unspecified Tank	1990	146099
O	339m NW	Unspecified Tank	1991	146099
6	431m E	Unspecified Tank	1987	114875
P	478m W	Unspecified Tank	1987	114872

This data is sourced from Ordnance Survey / Groundsure.



2.3 Historical energy features

Records within 500m

16

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 19**

ID	Location	Land Use	Date	Group ID
E	97m NE	Electricity Substation	1987	61807
H	102m N	Electricity Substation	1995	67847
H	102m N	Electricity Substation	1996	67847
H	102m N	Electricity Substation	1987	67847
H	102m N	Electricity Substation	1990	67847
H	108m N	Electricity Substation	1987	73083
H	108m N	Electricity Substation	1990	73083
4	232m NW	Electricity Substation	1987	61802
M	254m N	Electricity Substation	1992	64065
M	257m N	Electricity Substation	1987	79361
N	294m N	Electricity Substation	1992	68947
N	296m N	Electricity Substation	1987	64893
O	339m NW	Electricity Substation	1995	66850
O	340m NW	Electricity Substation	1987	78382
O	340m NW	Electricity Substation	1990	78382
O	340m NW	Electricity Substation	1991	78382

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

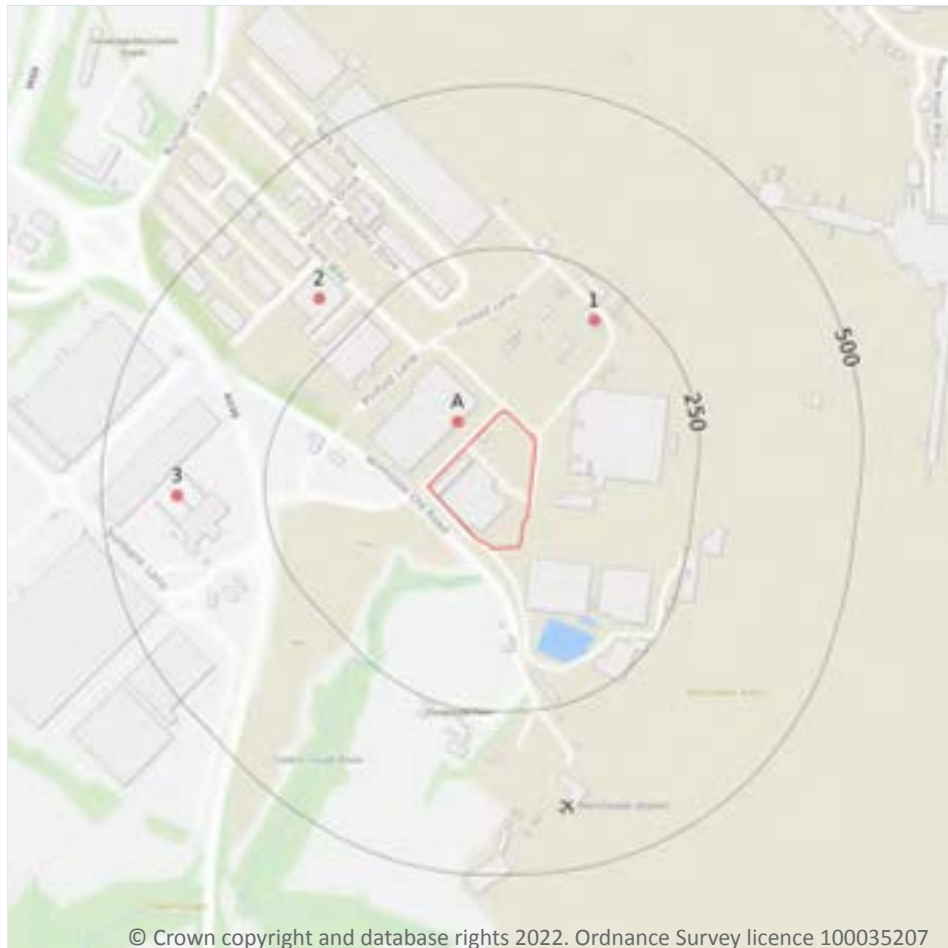
0

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'.

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



— Site Outline
Search buffers in metres (m)
● Waste exemptions

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**6**

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.

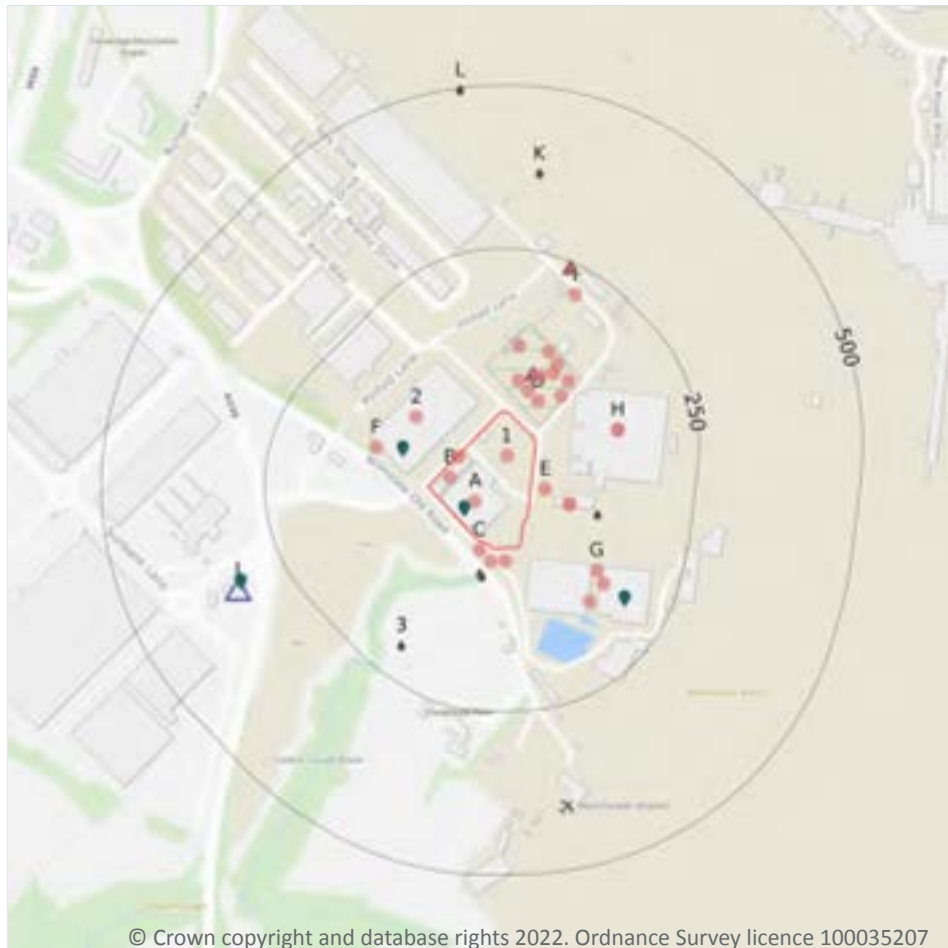
Features are displayed on the Waste and landfill map on **page 26**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	37m NW	Hanger 3 Fuelling Farm Olympic House MANCHESTER M90 1QX	EPR/UE5840M Z/A001	Using waste exemption	Non- Agricultura l Waste Only	Use of waste in construction
A	37m NW	Materials Innovation Factory University of Liverpool Grove Street Liverpool L69 7ZJ	EPR/HE5744G P/A001	Treating waste exemption	Non- Agricultura l Waste Only	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
A	37m NW	Materials Innovation Factory University of Liverpool Grove Street Liverpool L69 7ZJ	EPR/HE5744G P/A001	Using waste exemption	Non- Agricultura l Waste Only	Use of waste in construction
1	191m NE	Manchester Airport, Pinfold Lane, off Avro Way, Manchester, M90 5XA	WEX162999	Using waste exemption	Not on a Farm	Use of waste in construction
2	320m NW	BAM Construction, Pinfold Lane, Avro Way, World Freight Terminal, Manchester Airport, Manchester, M90 5AF	WEX089429	Using waste exemption	Not on a farm	Use of waste in construction
3	385m W	MAG DHL Warehouse Sunbank Lane	EPR/JE5382DE /A001	Using waste exemption	Non- Agricultura l Waste Only	Use of waste in construction

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



4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- △ Current or recent petrol stations
- Control of Major Accident Hazards
- ▲ Hazardous substance storage/usage
- ◆ Licensed pollutant release (Part A(2)/B)
- ◆ Licensed Discharges to controlled waters

4.1 Recent industrial land uses

Records within 250m

28

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Company	Address	Activity	Category
1	On site	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
A	On site	Aeroco Group	Hangar 4 Manchester Airport, Ringway Road, Manchester, Greater Manchester, M90 5YP	Aviation Engineers	Engineering Services
B	On site	Airline Services Ltd	Hangar 4, Pinfold Lane, Manchester Airport, Manchester, Greater Manchester, M90 5YF	Aeroplanes	Industrial Products



ID	Location	Company	Address	Activity	Category
B	On site	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
C	14m S	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
C	20m S	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
C	20m S	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
E	22m E	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	44m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	44m N	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	52m N	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
E	61m E	Sage Parts	Western Maintenance Area, Manchester Airport, Manchester, Greater Manchester, M90 5UZ	Aeroplanes	Industrial Products
E	61m E	Swissport	Western Maintenance Area, Manchester Airport, Manchester, Greater Manchester, M90 5UZ	Aviation Engineers	Engineering Services
D	74m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	75m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
2	87m NW	Dnata	2, Pinfold Lane, Manchester, Greater Manchester, M90 5YF	Distribution and Haulage	Transport, Storage and Delivery
D	91m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	99m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
F	100m W	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	102m N	Electricity Sub Station	Greater Manchester, M90	Electrical Features	Infrastructure and Facilities
D	105m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
D	112m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
G	123m SE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
H	127m NE	A S I G	Pinfold Lane, Manchester Airport, Manchester, Greater Manchester, M90 5XA	Aeroplanes	Industrial Products
H	128m NE	Thomas Cook Airlines Ltd	Stores Adjacent No 1 Hangar Manchester Airport, Ringway Road, Manchester, Greater Manchester, M90 5FL	Airlines and Airline Services	Transport, Storage and Delivery
G	135m SE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features

ID	Location	Company	Address	Activity	Category
G	140m SE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features
I	207m NE	Tank	Greater Manchester, M90	Tanks (Generic)	Industrial Features

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 29**

ID	Location	Company	Address	LPG	Status
J	332m SW	BP	Wilmslow Road, Icon Manchester Airport, Altrincham, Greater Manchester, WA15 0PT	No	Open

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

1

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.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Company	Address	Operational status	Tier
D	18m NE	Air BP Limited	Air BP Limited, Manchester Airport, Pinfold Lane, Manchester, Greater Manchester, M90 5AX	Current COMAH Site	COMAH Upper Tier Operator

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

3

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.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Details	
D	68m N	Application reference number: 065383/HSC/SOUTH2/02 Application status: Approved Application date: 03/10/2002 Address: Air BP Ltd, c/o Manchester Airport Storage and Hydrant Company Ltd, Pinfold Lane, Manchester Airport, Manchester, Greater Manchester, England, M90 5XA	Details: Storage Of Jet A1 Fuel Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified



ID	Location	Details	
D	68m N	Application reference number: 065383/HSC/SOUTH2/02 Application status: Historical Consent Application date: 03/10/2002 Address: Pinfold Lane, Manchester Airport, Manchester, M90 5XA	Details: Storage Of Jet A1 Fuel Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
I	240m N	Application reference number: 059375/HSC/SOUTH2/00 Application status: Unknown Application date: 31/01/2001 Address: Shell UK Ltd, Pinfold Lane, Manchester Airport, Ringway, M90 5XR	Details: Hazardous Substances Consent For Storage Of Aviation AVGAS Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0
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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
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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	4
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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 29**

ID	Location	Address	Details	
A	On site	Airline Services Limited, Hanger 4, Western Maintenance Area, Manchester Airport M90 5YP	Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
F	68m W	Fls Aerospace Ltd, Runger Lane, M90 5FL	Process: Respraying of Road Vehicles Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
G	178m SE	Air Livery Plc, Off Pinfold Lane, Hanger 2, Manchester Airport, Manchester, M90 5BA	Process: Respraying of Road Vehicles Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
J	322m W	BP Airport City, BP Airport City SF Connect, Airport City South, Wilmslow Road, Manchester, WA15 OPT	Process: Unloading of Petrol into Storage at Service Stations Status: Current 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

0

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

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

4.13 Licensed Discharges to controlled waters

Records within 500m

11

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

Features are displayed on the Current industrial land use map on **page 29**



ID	Location	Address	Details	
C	42m S	MANCHESTER AIRPORT DOUBLEWOOD BROOK, DOUBLE WOOD BROOK OUTFALL, MANCHESTER AIRPORT, MANCHESTER, GREATER MANCHESTER, M90 1QX	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: 016992832 Permit Version: 1 Receiving Water: COTTERIL CLOUGH BROOK	Status: SURRENDERED UNDER EPR 2010 Issue date: - Effective Date: 30/09/1994 Revocation Date: 16/11/2015
C	45m S	MANCHESTER AIRPORT: SITE DRAINAGE, AND CONTAINMENT SYSTEM, OLYMPIC HOUSE, OFF THE DOMESTIC APPROACH ROAD, MANCHESTER, M90 1QX	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRCB3299EN Permit Version: 1 Receiving Water: RIVER BOLLIN & NEARBY TRIBS	Status: NEW ISSUED UNDER EPR 2010 Issue date: 30/10/2015 Effective Date: 16/11/2015 Revocation Date: 14/02/2019
C	45m S	MANCHESTER AIRPORT: SITE DRAINAGE, AND CONTAINMENT SYSTEM, OLYMPIC HOUSE, OFF THE DOMESTIC APPROACH ROAD, MANCHESTER, M90 1QX	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRCB3299EN Permit Version: 1 Receiving Water: RIVER BOLLIN & NEARBY TRIBS	Status: NEW ISSUED UNDER EPR 2010 Issue date: 30/10/2015 Effective Date: 16/11/2015 Revocation Date: 14/02/2019
C	45m S	MANCHESTER AIRPORT: SITE DRAINAGE, AND CONTAINMENT SYSTEM, OLYMPIC HOUSE, OFF THE DOMESTIC APPROACH ROAD, MANCHESTER, M90 1QX	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRCB3299EN Permit Version: 2 Receiving Water: RIVER BOLLIN & NEARBY TRIBS	Status: VARIED UNDER EPR 2010 Issue date: 15/02/2019 Effective Date: 15/02/2019 Revocation Date: -
C	45m S	MANCHESTER AIRPORT: SITE DRAINAGE, AND CONTAINMENT SYSTEM, OLYMPIC HOUSE, OFF THE DOMESTIC APPROACH ROAD, MANCHESTER, M90 1QX	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRCB3299EN Permit Version: 2 Receiving Water: RIVER BOLLIN & NEARBY TRIBS	Status: VARIED UNDER EPR 2010 Issue date: 15/02/2019 Effective Date: 15/02/2019 Revocation Date: -
E	105m E	MANCHESTER AIRPORT DOUBLEWOOD BROOK, DOUBLE WOOD BROOK OUTFALL, MANCHESTER AIRPORT, MANCHESTER, GREATER MANCHESTER, M90 1QX	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 016990207 Permit Version: 1 Receiving Water: COTTERILL CLOUGH BROOK	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01/06/1980 Revocation Date: 26/04/1991
3	199m SW	THE ROMPER PS, THE ROMPER PUBLIC HOUSE, WILMSLOW ROAD, ALTRINCHAM, GREATER MANCHESTER, WA15 8XJ	Effluent Type: SEWAGE & TRADE COMBINED - UNSPECIFIED Permit Number: 016993171 Permit Version: 1 Receiving Water: COTERILL CLOUGH	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 20/03/1997 Effective Date: 20/03/1997 Revocation Date: -



ID	Location	Address	Details	
K	367m N	MANCHESTER AIRPORT: SITE DRAINAGE, AND CONTAINMENT SYSTEM, OLYMPIC HOUSE, OFF THE DOMESTIC APPROACH ROAD, MANCHESTER, M90 1QX	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRCB3299EN Permit Version: 1 Receiving Water: RIVER BOLLIN & NEARBY TRIBS	Status: NEW ISSUED UNDER EPR 2010 Issue date: 30/10/2015 Effective Date: 16/11/2015 Revocation Date: 14/02/2019
K	367m N	MANCHESTER AIRPORT: SITE DRAINAGE, AND CONTAINMENT SYSTEM, OLYMPIC HOUSE, OFF THE DOMESTIC APPROACH ROAD, MANCHESTER, M90 1QX	Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRCB3299EN Permit Version: 2 Receiving Water: RIVER BOLLIN & NEARBY TRIBS	Status: VARIED UNDER EPR 2010 Issue date: 15/02/2019 Effective Date: 15/02/2019 Revocation Date: -
L	496m N	AIRCRAFT STANDS SWO, MANCHESTER AIRPORT PLC, RINGWAY, GREATER MANCHESTER	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: 016991392 Permit Version: 1 Receiving Water: RIVER BOLLIN	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01/10/1994 Revocation Date: 31/10/1994
L	496m N	AIRCRAFT STANDS SWO, MANCHESTER AIRPORT PLC, RINGWAY, GREATER MANCHESTER	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: 016991392 Permit Version: 2 Receiving Water: RIVER BOLLIN	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 01/11/1994 Revocation Date: 02/12/1994

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**0**

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

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

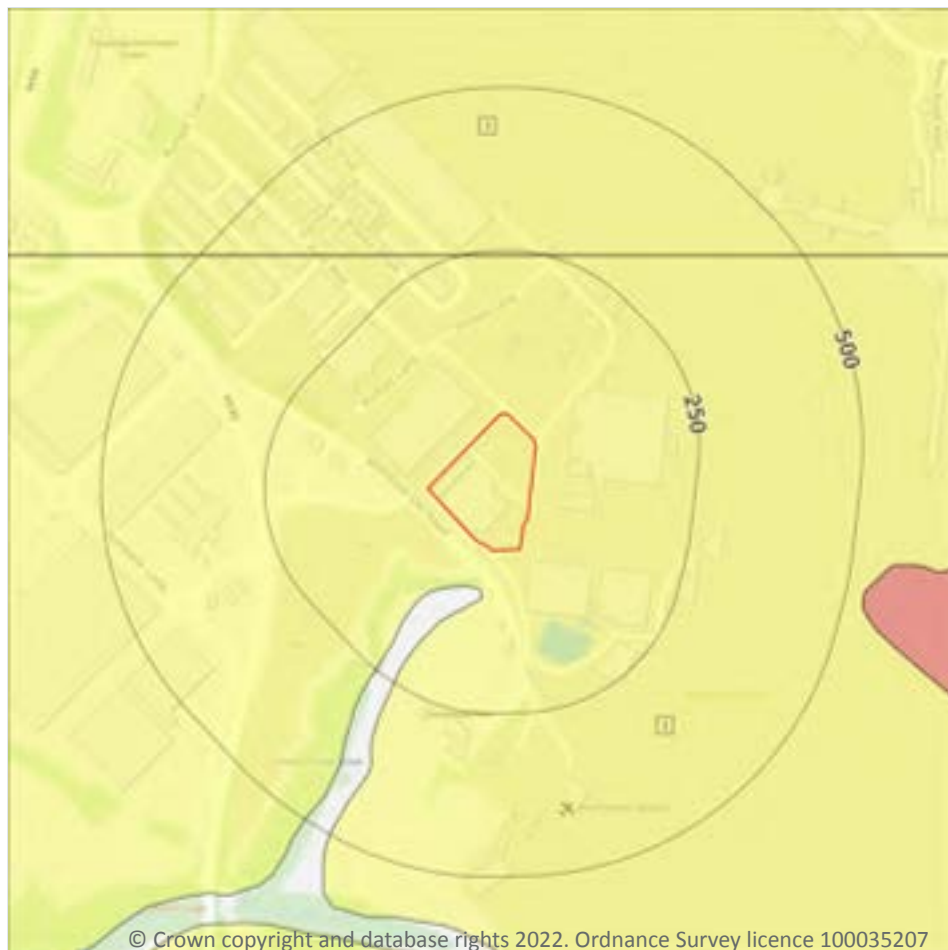
0

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.

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

2

Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 39**

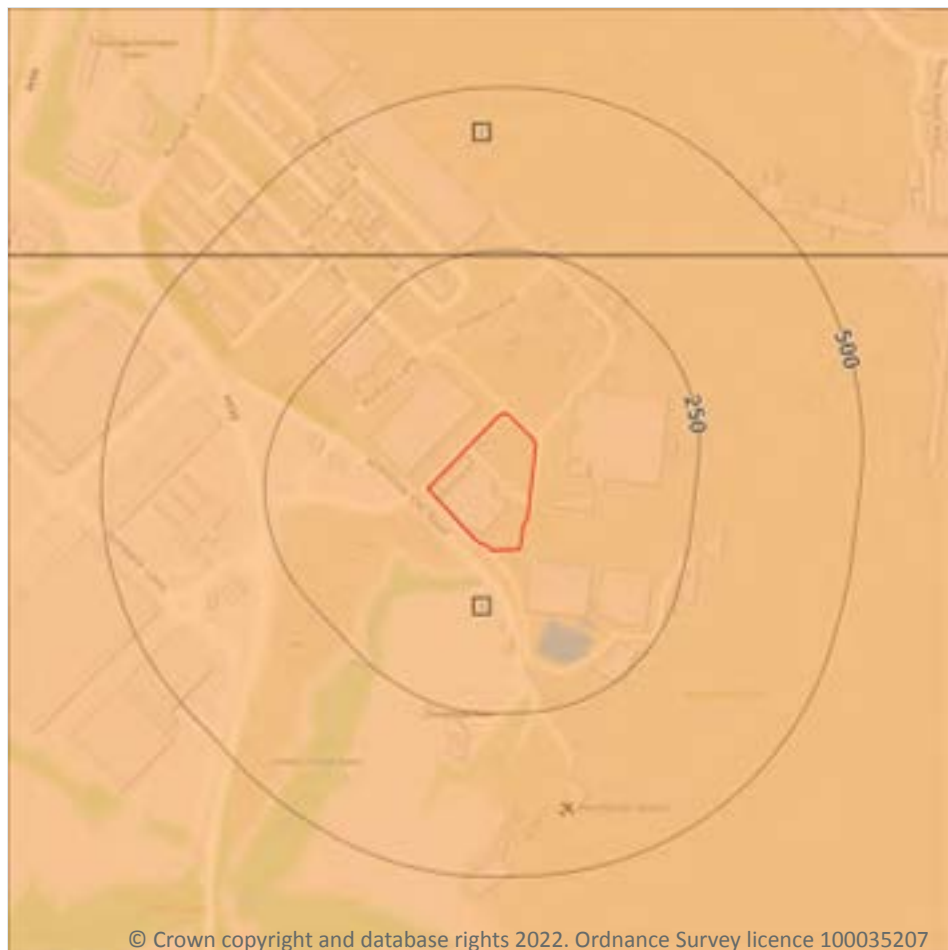
ID	Location	Designation	Description
1	On site	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
2	242m N	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



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



Bedrock aquifer



- 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 41**

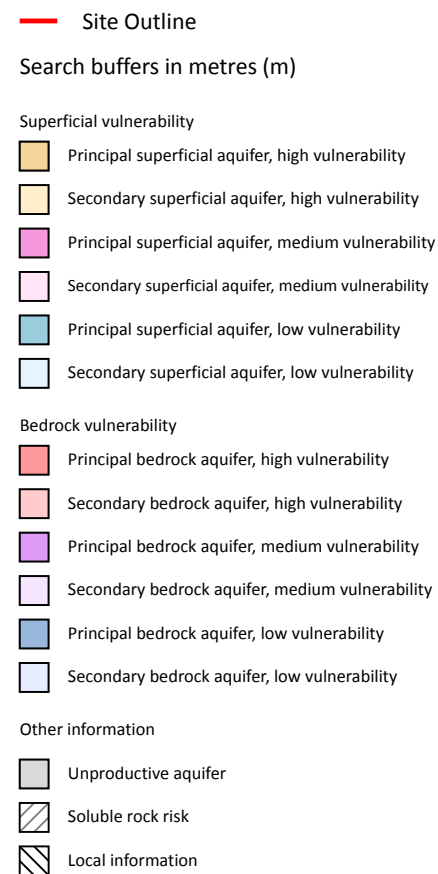
ID	Location	Designation	Description
1	On site	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers
2	242m N	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers



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



Groundwater vulnerability



5.3 Groundwater vulnerability

Records within 50m

2

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 43**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary superficial aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures
2	40m W	Summary Classification: Secondary superficial aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: Low	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures

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

5.6 Groundwater abstractions

Records within 2000m

0

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.

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



- 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

2

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 47**

ID	Location	Type of water feature	Ground level	Permanence	Name
5	48m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Cotteril Clough Brook

ID	Location	Type of water feature	Ground level	Permanence	Name
A	114m SE	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	4
----------------------------	----------

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.

Features are displayed on the Hydrology map on **page 47**

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 47**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	On site	River	Bollin (River Dean to Ashley Mill)	GB112069061381	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 47**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
4	47m S	River	Bollin (River Dean to Ashley Mill)	GB112069061381	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 47**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
2	On site	Weaver and Dane Quaternary Sand and Gravel Aquifers	GB41202G991700	Poor	Poor	Good	2019

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

7 River and coastal flooding

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**0**

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.

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

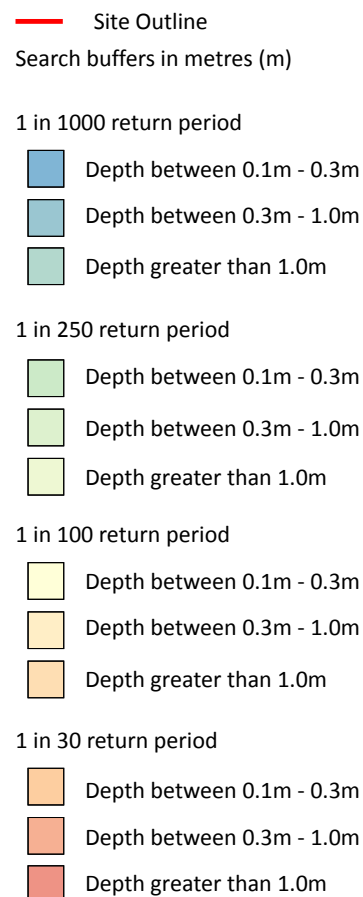
Records within 50m

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



8.1 Surface water flooding

Highest risk on site

1 in 30 year, 0.1m - 0.3m

Highest risk within 50m

1 in 30 year, Greater than 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 53**

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	Between 0.3m and 1.0m
1 in 250 year	Between 0.3m and 1.0m
1 in 100 year	Between 0.3m and 1.0m
1 in 30 year	Between 0.1m and 0.3m

This data is sourced from Ambiantal Risk Analytics.



9 Groundwater flooding



- Site Outline
- Search buffers in metres (m)
- High
 - Moderate - High
 - Moderate
 - Low
 - Negligible

9.1 Groundwater flooding

Highest risk on site

Low

Highest risk within 50m

Low

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 55**

This data is sourced from Ambiantal Risk Analytics.

10 Environmental designations



- Site Outline
- Search buffers in metres (m)
- Sites of Special Scientific Interest (SSSI)
- Designated Ancient Woodland
- Green Belt

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m

2

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.

Features are displayed on the Environmental designations map on **page 56**

ID	Location	Name	Data source
A	253m SW	Cotteril Clough	Natural England

ID	Location	Name	Data source
B	674m SW	Cotteril Clough	Natural England

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
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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
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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**0**

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.

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

10.7 Designated Ancient Woodland

Records within 2000m**10**

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 56**

ID	Location	Name	Woodland Type
A	44m S	Cotterill Clough	Ancient & Semi-Natural Woodland
B	674m SW	Cotterill Clough	Ancient & Semi-Natural Woodland
2	691m W	Sunbank Wood	Ancient & Semi-Natural Woodland
5	1192m SE	Oversley Farm Wood	Ancient & Semi-Natural Woodland
6	1264m W	Bollin Bank	Ancient & Semi-Natural Woodland
-	1352m NW	Davenport Green Wood	Ancient & Semi-Natural Woodland
-	1482m W	Hennersley Bank	Ancient & Semi-Natural Woodland
-	1692m S	Unknown	Ancient & Semi-Natural Woodland
-	1749m W	Warburton Wood	Ancient & Semi-Natural Woodland
-	1997m SW	Unknown	Ancient Replanted 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**3**

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

Features are displayed on the Environmental designations map on **page 56**

ID	Location	Name	Local Authority name
1	250m SW	Merseyside and Greater Manchester	Manchester
3	826m NW	Merseyside and Greater Manchester	Trafford
4	1053m SE	Merseyside and Greater Manchester	Cheshire East

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



- 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 62**

ID	Location	Type of developments requiring consultation
1	On site	Infrastructure - Pipelines, pylons and overhead cables. any transport proposal including road, rail and by water (excluding routine maintenance). airports, helipads and other aviation proposals. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, review of minerals permissions (romp), extensions, variations to conditions etc. oil & gas exploration/extraction. Rural non-residential - Large non residential developments outside existing settlements/urban areas where net additional gross internal floorspace is > 1,000m² or footprint exceeds 0.2ha. Residential - Residential development of 100 units or more. Rural residential - Any residential development of 50 or more houses outside existing settlements/urban areas. Air pollution - Any development that could cause air pollution (incl: industrial/commercial processes, livestock & poultry units, slurry lagoons & digestate stores, manure stores). Combustion - All general combustion processes. incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion. Waste - Mechanical and biological waste treatment, inert landfill, non-hazardous landfill, hazardous landfill, household civic amenity recycling facilities construction, demolition and excavation waste, other waste management. Composting - Any composting proposal. incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management. Discharges - Any discharge of water or liquid waste that is discharged to ground (ie to seep away) or to surface water, such as a beck or stream. Water supply - Large infrastructure such as warehousing / industry where net additional gross internal floorspace is > 1,000m² or any development needing its own water supply .

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	2
-----------------------------	----------

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.

Features are displayed on the SSSI Impact Zones and Units map on **page 62**

ID:	B
Location:	253m SW
SSSI name:	Cotteril Clough
Unit name:	Eastern Woodland
Broad habitat:	Broadleaved, Mixed And Yew Woodland - Lowland
Condition:	Favourable
Reportable features:	

Feature name	Feature condition	Date of assessment
Lowland mixed deciduous woodland	Favourable	13/06/2013



Feature name	Feature condition	Date of assessment
Wet woodland	Favourable	13/06/2013

ID: C
Location: 674m SW
SSSI name: Cotteril Clough
Unit name: Western Woodland
Broad habitat: Broadleaved, Mixed And Yew Woodland - Lowland
Condition: Favourable
Reportable features:

Feature name	Feature condition	Date of assessment
Lowland mixed deciduous woodland	Favourable	30/05/2014
Wet woodland	Favourable	30/05/2014

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



11 Visual and cultural designations

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

0

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.



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

11.5 Conservation Areas

Records within 250m

0

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.

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

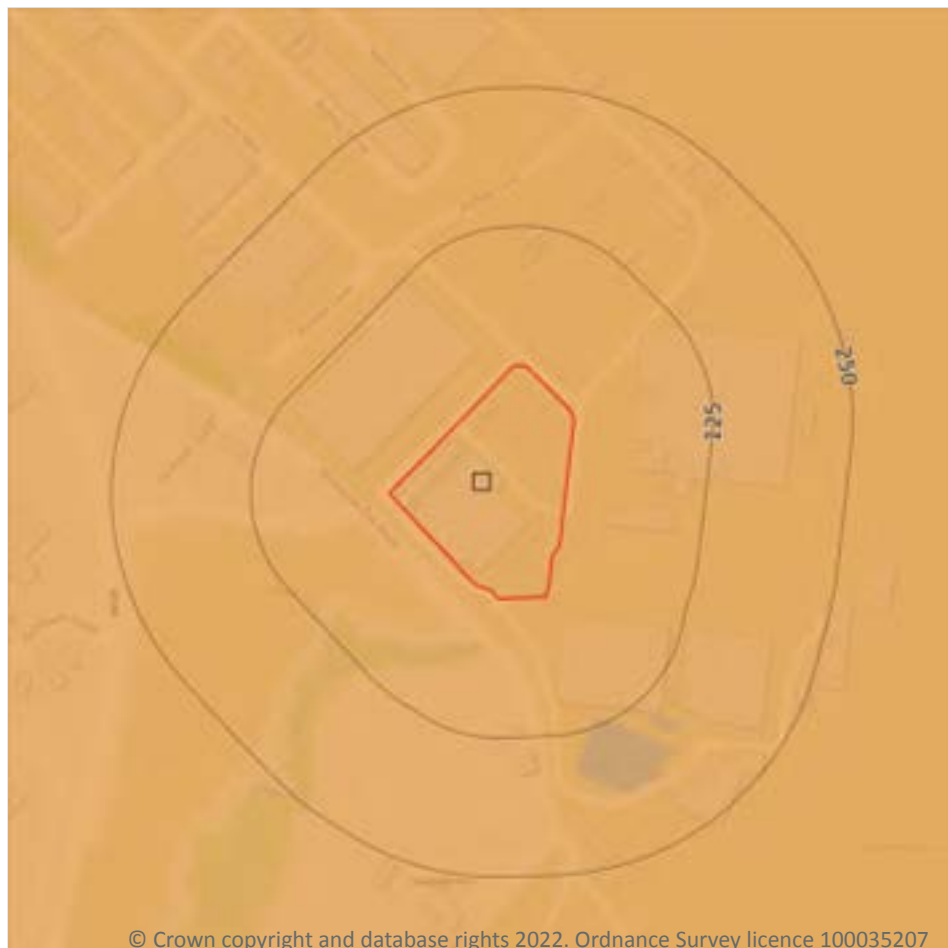
0

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



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- 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 67**

ID	Location	Classification	Description
1	On site	Grade 3	Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

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



- Site Outline
- Search buffers in metres (m)
- Priority Habitat Inventory
- Open Mosaic Habitat
- Limestone Pavement Orders
- Habitat Networks
- Primary Habitat
- Restorable Habitat
- Associated Habitats
- Habitat Restoration-Creation
- Network Enhancement Zone 1
- Network Enhancement Zone 2

13.1 Priority Habitat Inventory

Records within 250m

5

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

Features are displayed on the Habitat designations map on **page 69**

ID	Location	Main Habitat	Other habitats
1	44m S	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
2	162m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
A	164m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
A	169m NW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)



ID	Location	Main Habitat	Other habitats
3	241m SW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

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 71**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	No coverage	Full	Full	No coverage	SJ88SW
2	242m N	No coverage	Full	Full	No coverage	SJ88NW

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

3

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 73**

ID	Location	LEX Code	Description	Rock description
1	On site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton
2	242m N	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton
3	497m E	GFDUD-XSV	Glaciofluvial 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

4

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 75**

ID	Location	LEX Code	Description	Rock age
1	On site	BOM-MDST	Bollin Mudstone Member - Mudstone	Anisian Age
2	108m NE	BOM-MDST	Bollin Mudstone Member - Mudstone	Anisian Age
4	242m N	BOM-MDST	Bollin Mudstone Member - Mudstone	Anisian Age
5	242m N	BOM-MDST	Bollin Mudstone Member - Mudstone	Anisian Age

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m

2

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.

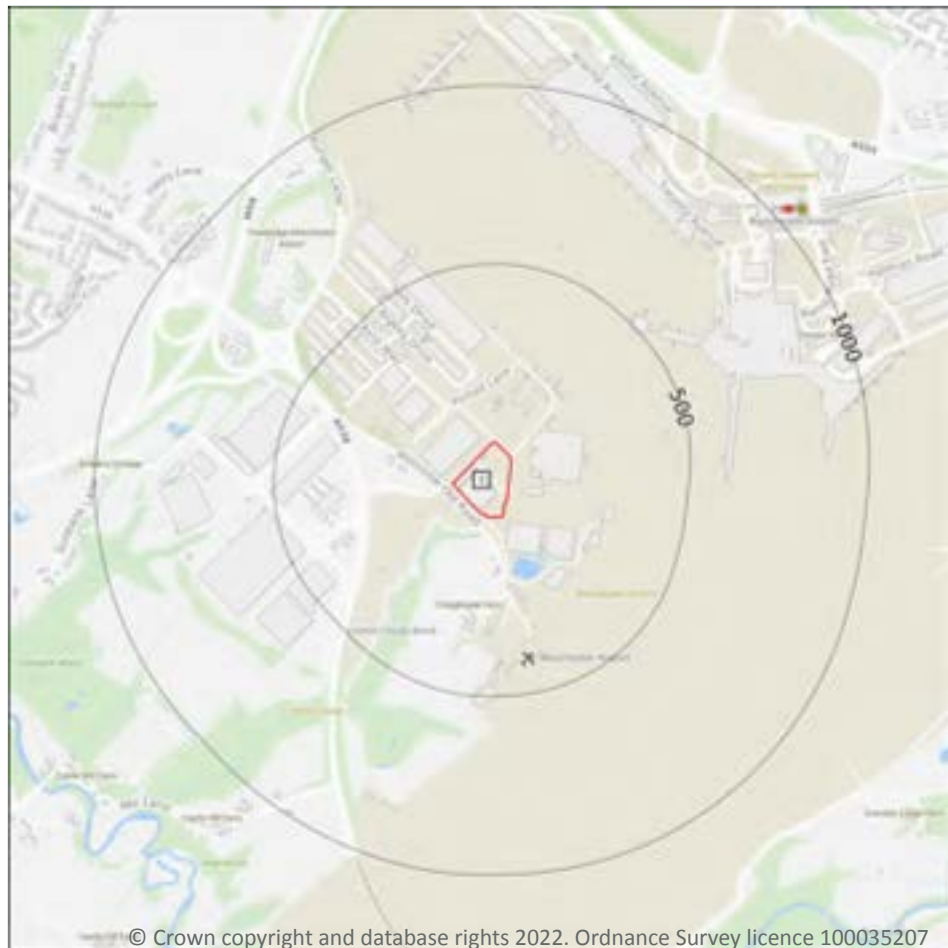
Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 75**

ID	Location	Category	Description
3	108m NE	FAULT	Normal fault, inferred; crossmarks on downthrow side
6	242m N	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 77**

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

1

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 79**

ID	Location	LEX Code	Description	Rock description
1	On site	TILLD-DMTN	TILL, DEVANSIAN	DIAMICTON

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

2

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 81**

ID	Location	LEX Code	Description	Rock age
1	On site	BOM-MDST	BOLLIN MUDSTONE MEMBER - MUDSTONE	ANISIAN
2	131m NE	BOM-MDST	BOLLIN MUDSTONE MEMBER - MUDSTONE	ANISIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock 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 bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	Fracture	Low	Low

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m

1

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.

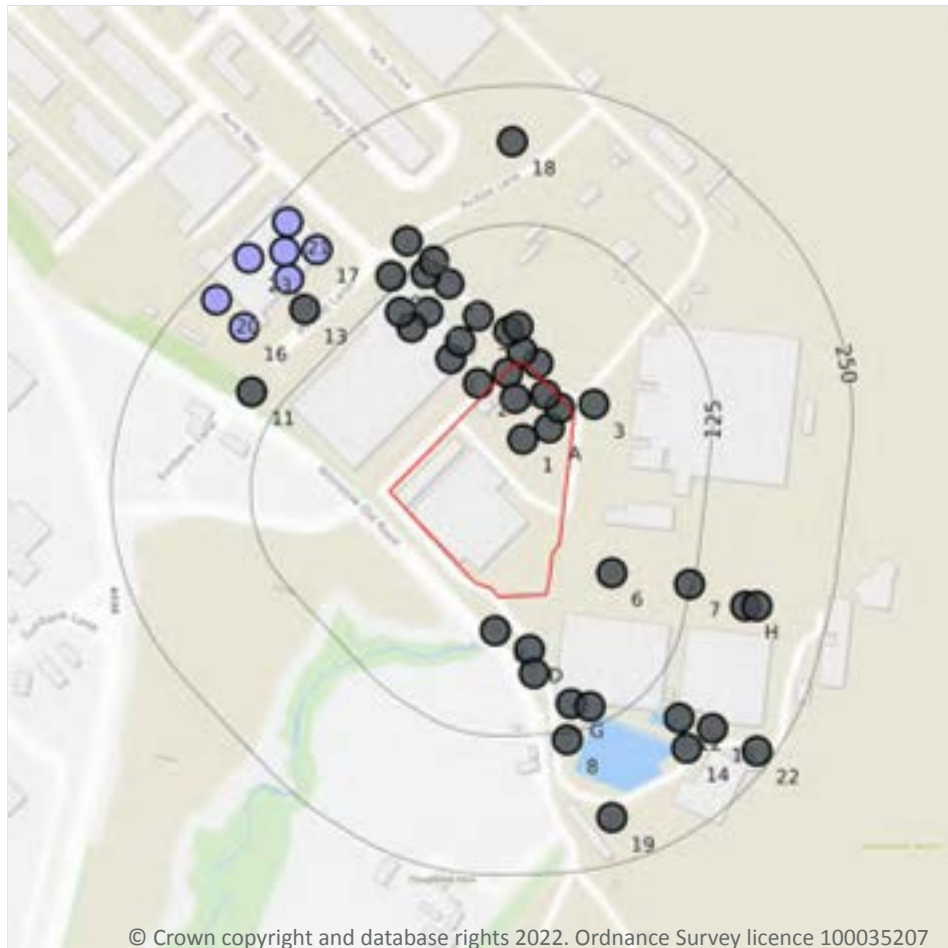
Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 81**

ID	Location	Category	Description
3	131m NE	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

48

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 83**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	On site	381160 384690	HANGAR 5 MANCHESTER AIRPORT H5WS6	-	Y	N/A
A	On site	381184 384700	MTMF RINGWAY 5	-	Y	N/A
A	On site	381193 384718	MTMF RINGWAY TP 9	-	Y	N/A



ID	Location	Grid reference	Name	Length	Confidential	Web link
A	On site	381180 384730	HANGAR 5 MANCHESTER AIRPORT H5WS5	-	Y	N/A
B	On site	381146 384749	MTMF RINGWAY TP 7	-	Y	N/A
B	On site	381153 384726	MTMF RINGWAY TP 8	-	Y	N/A
B	8m N	381174 384758	MTMF RINGWAY TP 6	-	Y	N/A
2	11m N	381120 384740	HANGAR 5 MANCHESTER AIRPORT H5WS4	-	Y	N/A
B	11m N	381159 384769	MTMF RINGWAY 4	-	Y	N/A
3	21m NE	381224 384721	SURFACE WTR OUTFALL R BOLLIN	-	Y	N/A
B	30m N	381147 384787	MTMF RINGWAY TP 5	-	Y	N/A
4	31m S	381135 384518	MANCHESTER AIRPORT DRAIN BH107	-	Y	N/A
B	34m N	381156 384791	SURFACE WTR OUTFALL R BOLLIN	-	Y	N/A
C	44m N	381095 384762	MTMF RINGWAY 3	-	Y	N/A
C	48m N	381104 384777	MTMF RINGWAY TP 4	-	Y	N/A
D	49m S	381166 384501	MANCHESTER AIRPORT DRAIN BH106	-	Y	N/A
5	53m N	381120 384800	HANGAR 5 MANCHESTER AIRPORT H5WS3	-	Y	N/A
6	54m SE	381240 384570	MANCHESTER AIRPORT HANGAR DEVELOPMENT C3	-	Y	N/A
D	70m S	381170 384480	MANCHESTER AIRPORT HANGAR DEVELOPMENT TP 1	-	Y	N/A
E	88m N	381075 384804	MTMF RINGWAY TP 3	-	Y	N/A
E	89m NW	381060 384790	HANGAR 5 MANCHESTER AIRPORT H5WS2	-	Y	N/A
F	92m N	381094 384829	MTMF RINGWAY 2	-	Y	N/A
G	101m S	381203 384452	MANCHESTER AIRPORT DRAIN BH105	-	Y	N/A
E	106m NW	381050 384804	MTMF RINGWAY TP 2	-	Y	N/A
G	108m S	381220 384450	MANCHESTER AIRPORT HANGAR DEVELOPMENT 4	-	Y	N/A
F	114m N	381073 384839	MTMF RINGWAY TP 1	-	Y	N/A
F	117m N	381080 384850	HANGAR 5 MANCHESTER AIRPORT H5WS1	-	Y	N/A
7	122m SE	381310 384560	MANCHESTER AIRPORT HANGAR DEVELOPMENT C2	-	Y	N/A
8	132m S	381200 384420	MANCHESTER AIRPORT HANGAR DEVELOPMENT TP 2	-	Y	N/A

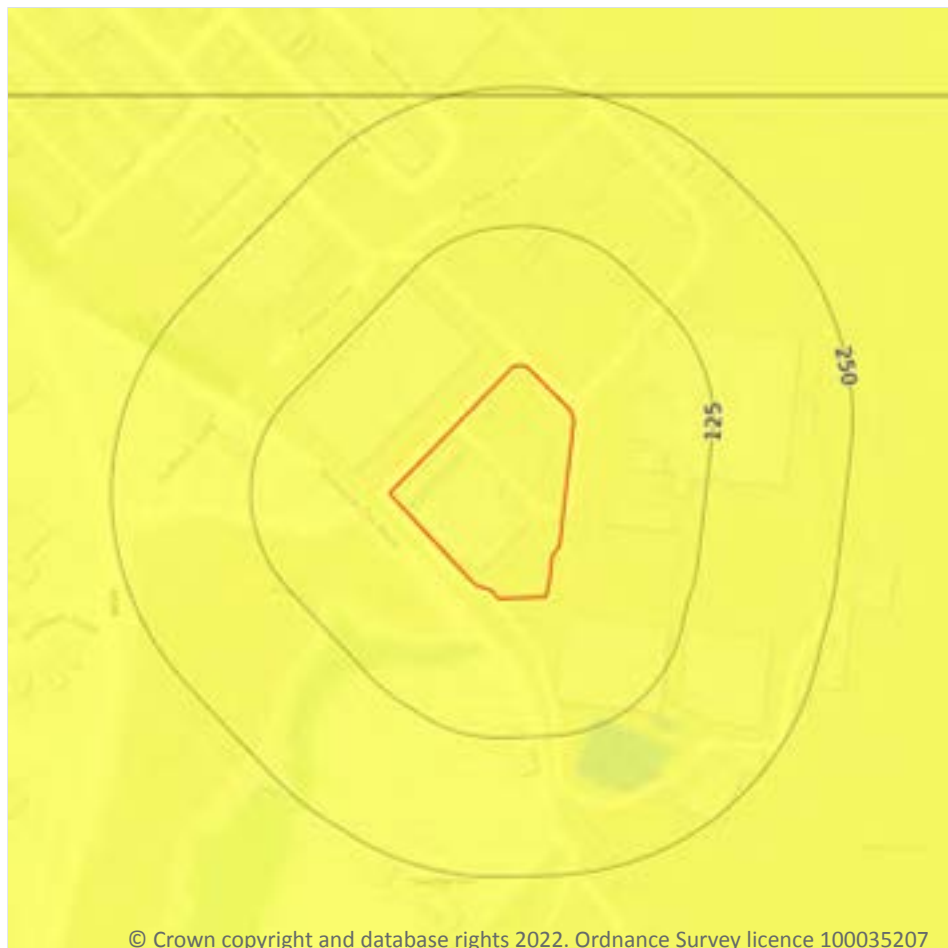


ID	Location	Grid reference	Name	Length	Confidential	Web link
9	134m NW	381042 384836	MTMF RINGWAY 1	-	Y	N/A
10	146m N	381056 384868	SURFACE WTR OUTFALL R BOLLIN	-	Y	N/A
11	152m W	380917 384732	SURFACE WTR OUTFALL R BOLLIN	-	Y	N/A
12	162m SE	381300 384440	MANCHESTER AIRPORT HANGAR DEVELOPMENT 3	-	Y	N/A
13	169m NW	380964 384806	SURFACE WTR OUTFALL R BOLLIN	-	Y	N/A
H	176m SE	381360 384540	MANCHESTER AIRPORT HANGAR DEVELOPMENT C1	-	Y	N/A
H	186m SE	381370 384540	MANCHESTER AIRPORT HANGAR DEVELOPMENT 2	-	Y	N/A
14	187m SE	381307 384412	MANCHESTER AIRPORT DRAIN BH104	-	Y	N/A
15	192m SE	381330 384430	MANCHESTER AIRPORT HANGAR DEVELOPMENT TP 3	-	Y	N/A
16	196m NW	380910 384790	CATERAIR INTERNATIONAL, MANCHESTER AIRPORT BH8.	4.0	N	18525495
I	198m NW	380950 384834	MARRIOTT IN-FLITE SERVICES LTD, MANCHESTER AIRPORT 3	4.0	N	17877422
17	198m NW	380975 384860	MARRIOTT IN-FLITE SERVICES LTD, MANCHESTER AIRPORT 4	4.0	N	17877423
18	200m N	381151 384957	SURFACE WTR OUTFALL R BOLLIN	-	Y	N/A
19	209m S	381240 384350	MANCHESTER AIRPORT HANGAR DEVELOPMENT TP 3	-	Y	N/A
I	218m NW	380946 384858	MARRIOTT IN-FLITE SERVICES LTD, MANCHESTER AIRPORT 5	4.5	N	17877424
20	231m NW	380885 384815	CATERAIR INTERNATIONAL, MANCHESTER AIRPORT BH7.	4.0	N	18525494
21	234m NW	380949 384885	MARRIOTT IN-FLITE SERVICES LTD, MANCHESTER AIRPORT 2	4.0	N	17877421
22	235m SE	381370 384410	MANCHESTER AIRPORT HANGAR DEVELOPMENT TP 2	-	Y	N/A
23	236m NW	380914 384852	MARRIOTT IN-FLITE SERVICES LTD, MANCHESTER AIRPORT 1	4.0	N	17877420

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).

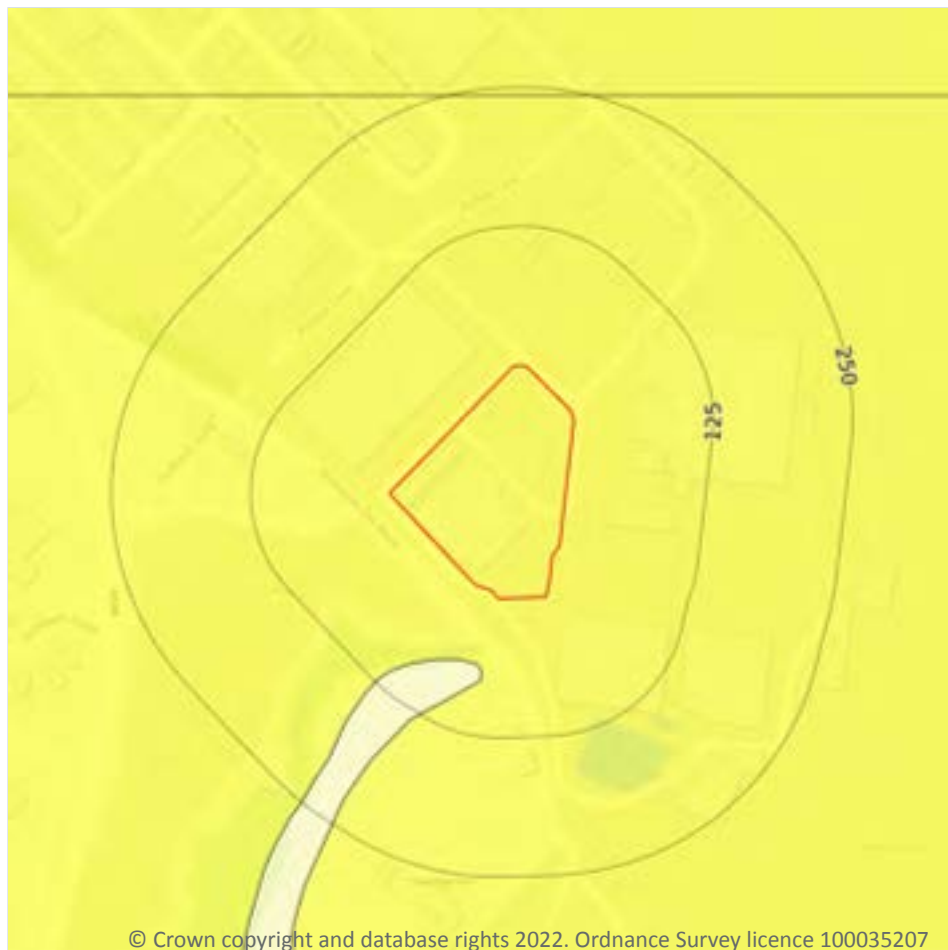
Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 86**

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 87**

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



- 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.

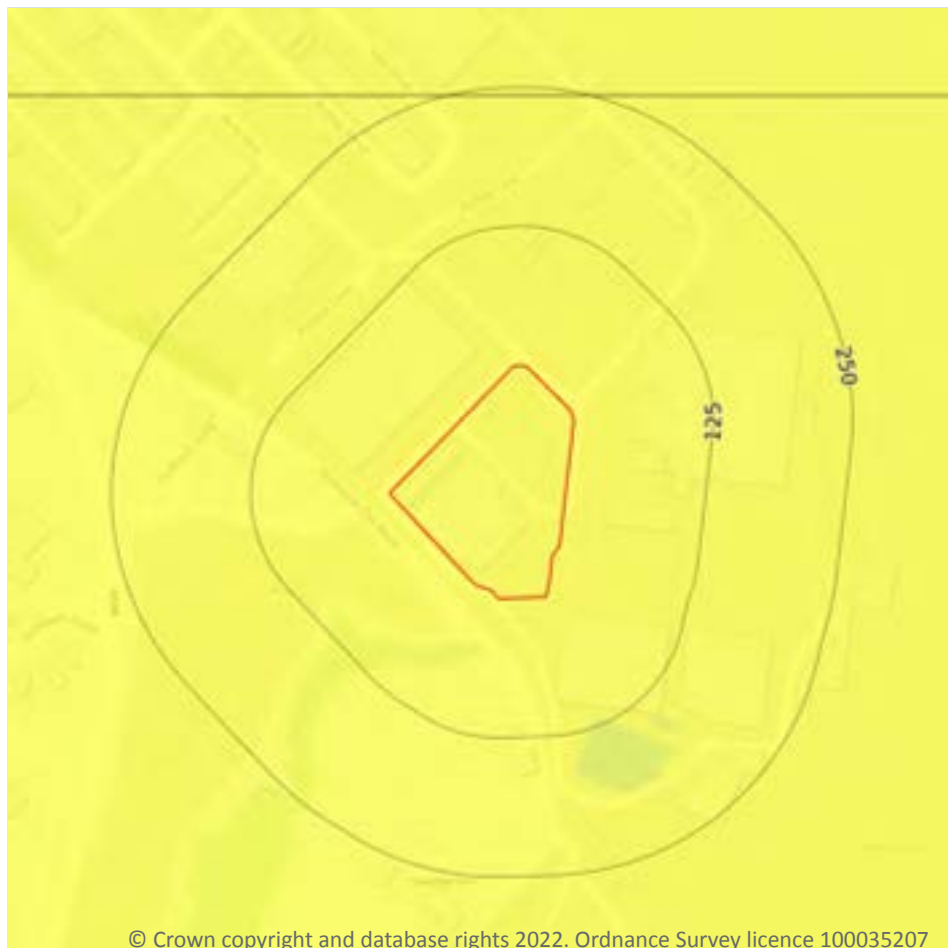
Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 88**

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



- 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.

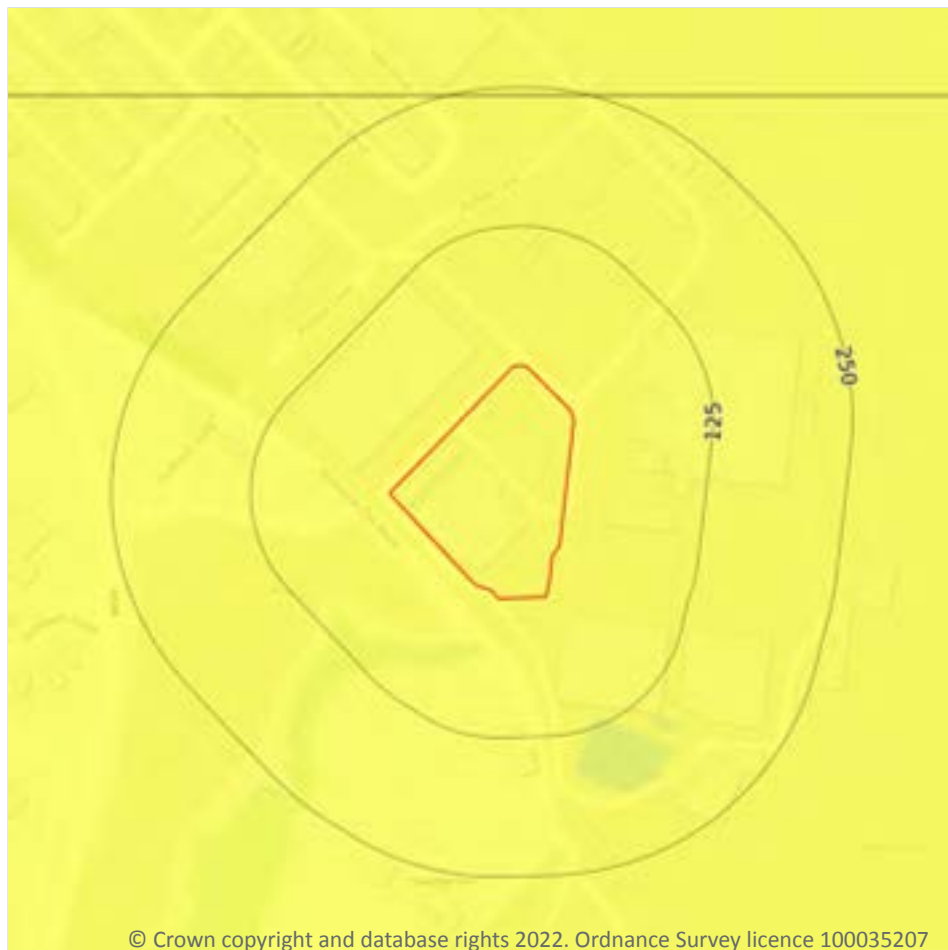
Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 89**

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 90**

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 91**

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, ground workings and natural cavities



- Site Outline
- Search buffers in metres (m)
- Natural cavities (Area)
- Natural cavities (Point)
- BritPits
- Surface ground workings
- Underground workings
- Historical Mineral Planning Areas
- Mining Cavities
- 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 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.

18.2 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.

18.3 Surface ground workings

Records within 250m

4

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, ground workings and natural cavities map on **page 92**

ID	Location	Land Use	Year of mapping	Mapping scale
1	On site	Sewage Works	1974	1:10000
A	106m S	Unspecified Pit	1974	1:10000
A	106m S	Unspecified Pit	1989	1:10000
2	134m N	Pond	1974	1:10000

This data is sourced from Ordnance Survey/Groundsure.

18.4 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 data is sourced from Ordnance Survey/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 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.

18.8 JPB mining areas

Records on site

0

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

This data is sourced from Johnson Poole and Bloomer.

18.9 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.

18.10 Brine areas

Records on site

1

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.

Location	Details
On site	The site is located within the Cheshire Brine Compensation District. The extraction of brine over many years has caused some properties within the Cheshire area to be at risk of subsidence. This subsidence can occur a considerable distance from the location of the extraction and further assessment is recommended. A Cheshire Salt search can be obtained direct from Groundsure or your preferred search provider.

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

18.11 Gypsum areas

Records on site	0
-----------------	---

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0
-----------------	---

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

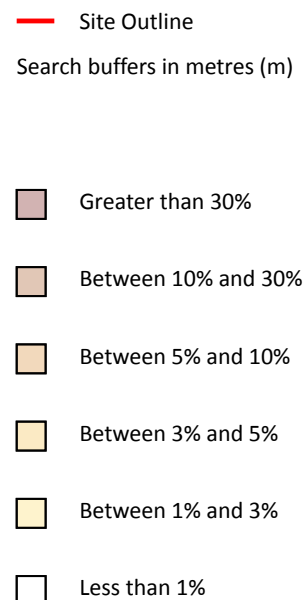
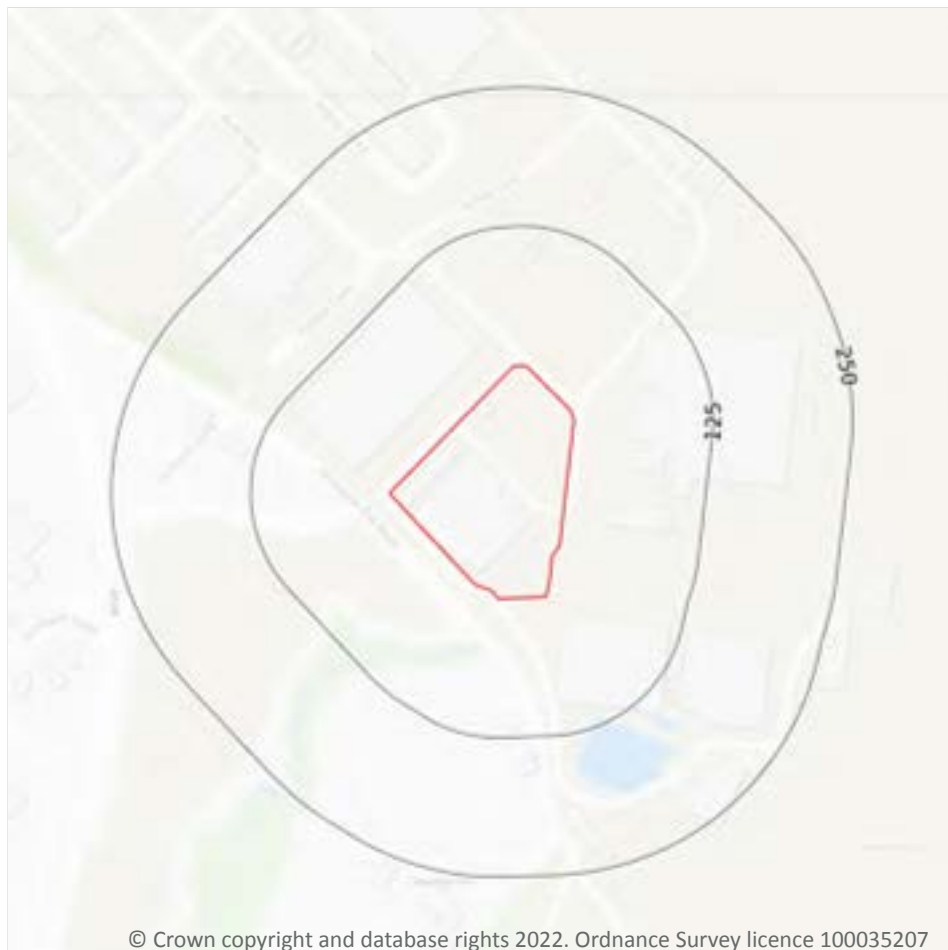
18.13 Clay mining

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 Radon



19.1 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 96**

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.



20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m

4

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 km². 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 km²; 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 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 mg/kg
41m W	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 mg/kg
41m W	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 mg/kg
49m S	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 mg/kg

This data is sourced from the British Geological Survey.

20.2 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 km²).

This data is sourced from the British Geological Survey.

20.3 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 km².

This data is sourced from the British Geological Survey.



21 Railway infrastructure and projects

21.1 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.

21.2 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.

21.3 Railway tunnels

Records within 250m**0**

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 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.

21.5 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.

21.6 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.

21.7 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.

21.8 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.

21.9 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.

21.10 HS2

Records within 500m	0
---------------------	---

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.

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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APPENDIX C – HISTORICAL MAPS

Site Details:

HANGAR 4, MANCHESTER
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Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: County Series

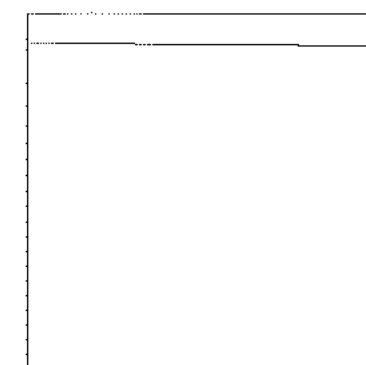
Map date: 1872-1877

Scale: 1:2,500

Printed at: 1:2,500



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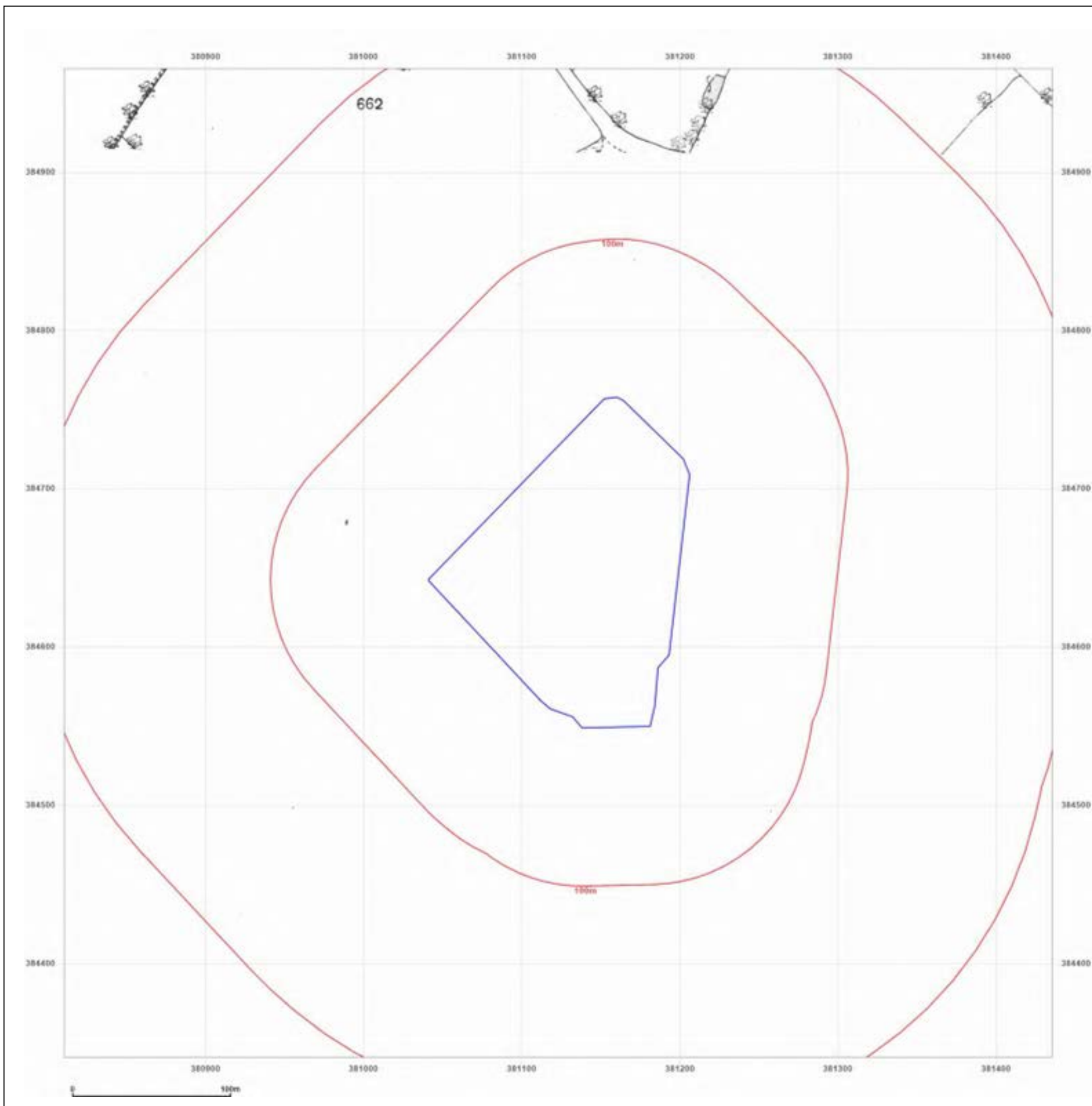


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MANCHESTER, M90 5YF

Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: County Series

Map date: 1872-1877

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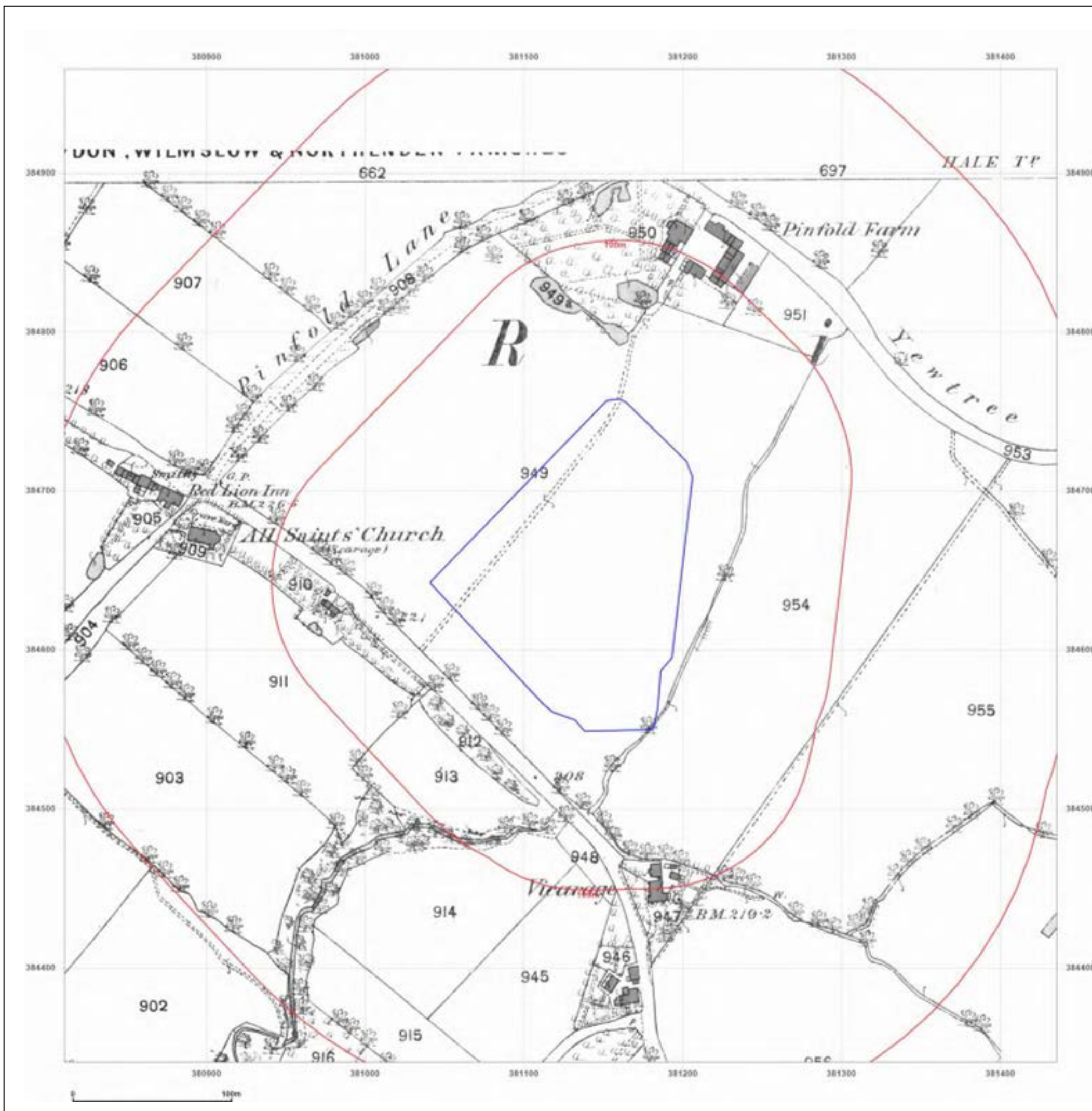


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Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: County Series

Map date: 1898

Scale: 1:2,500

Printed at: 1:2,500



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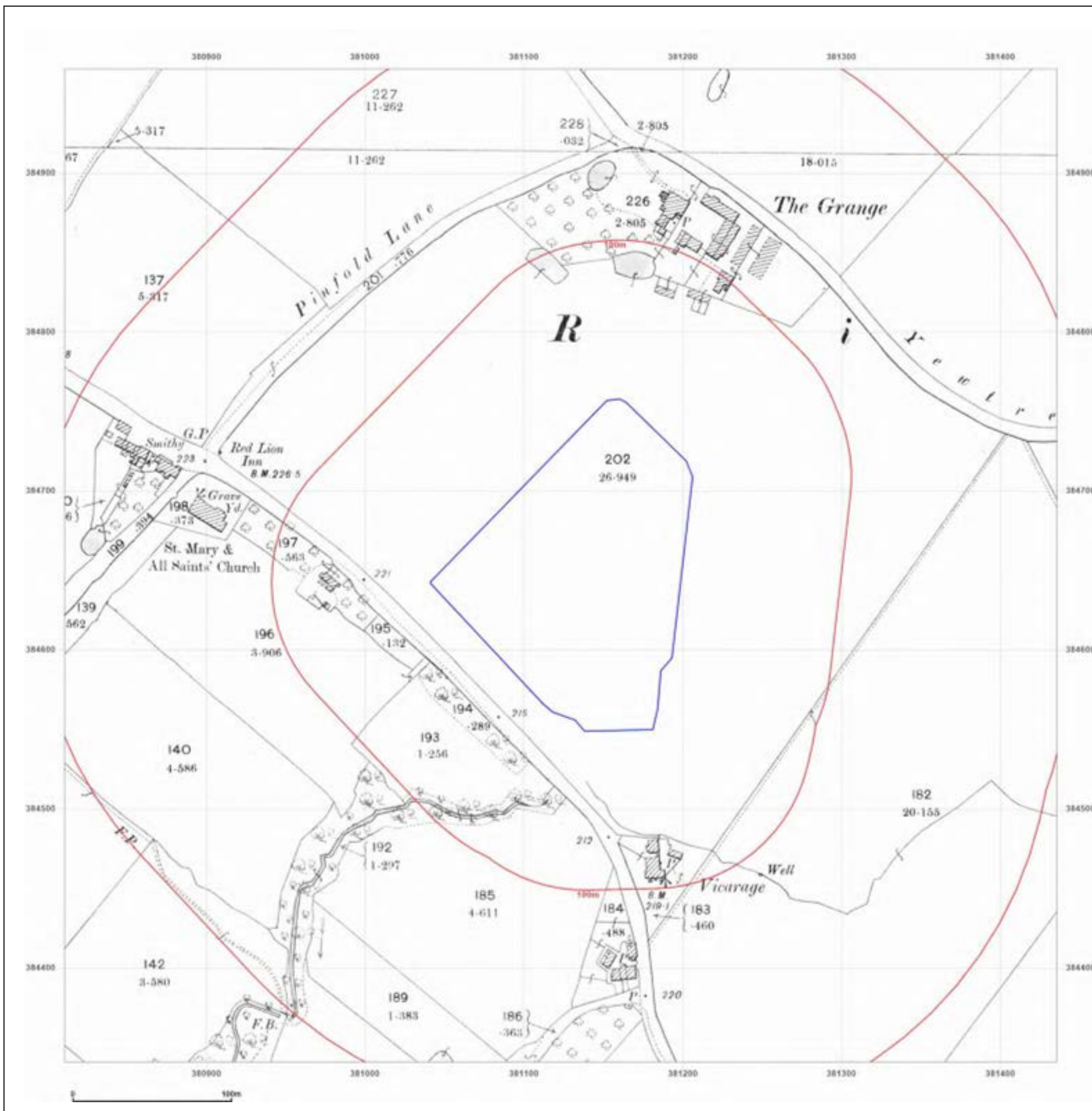


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Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: National Grid

Map date: 1968

Scale: 1:1,250

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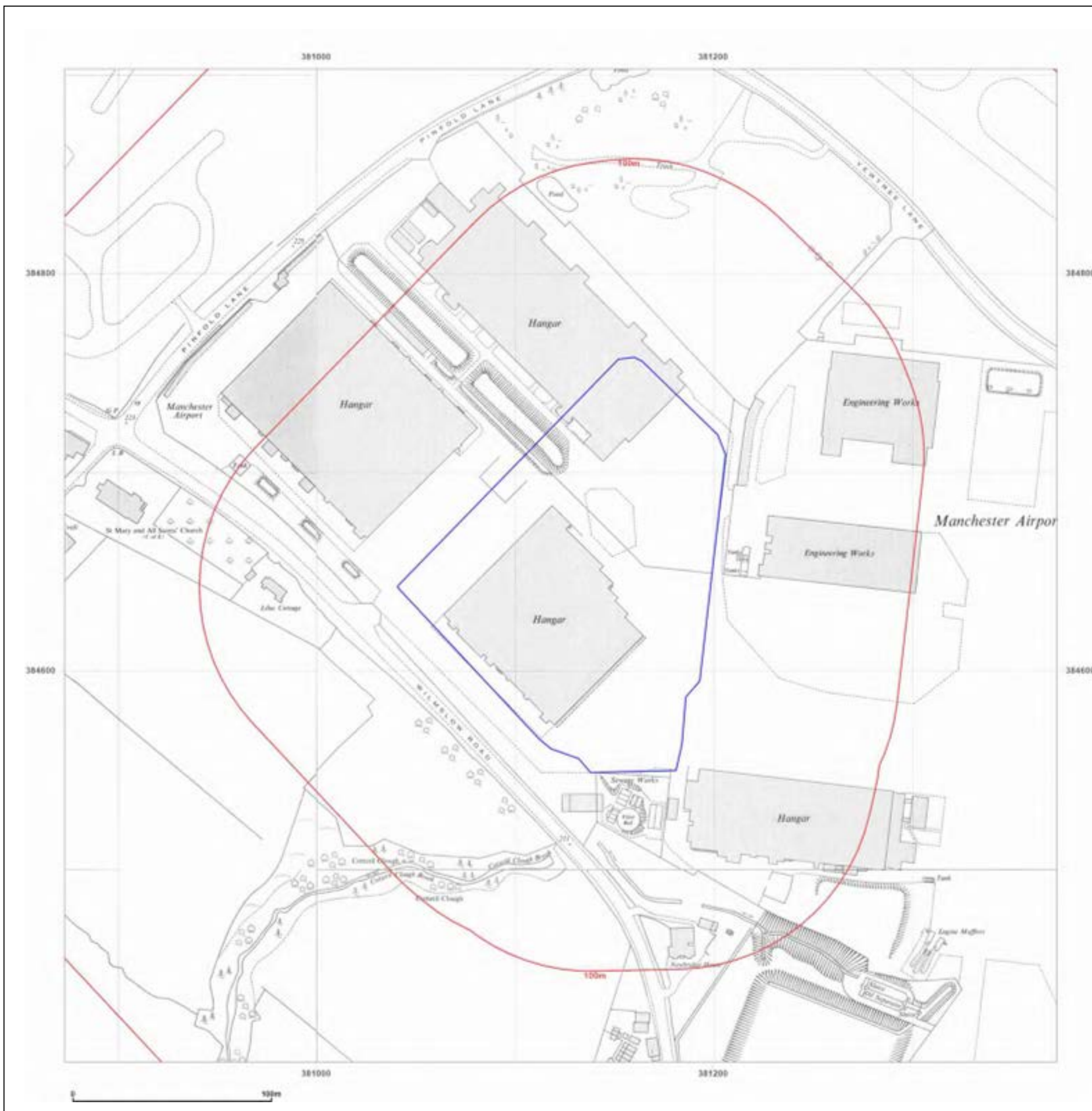


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Report Ref: GS-9274062
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Map Name: National Grid

Map date: 1969

Scale: 1:2,500

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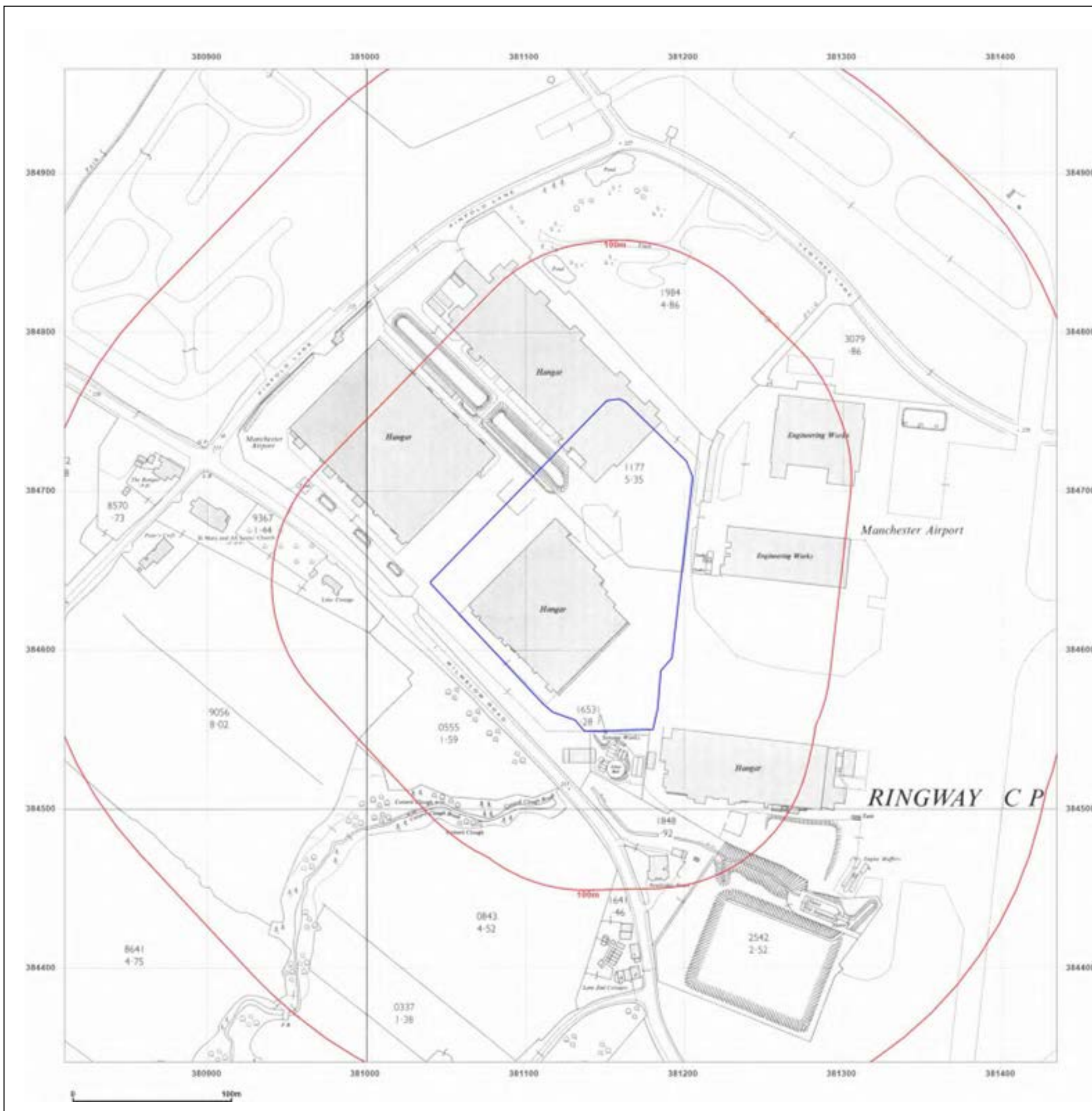


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Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: National Grid

Map date: 1973

Scale: 1:1,250

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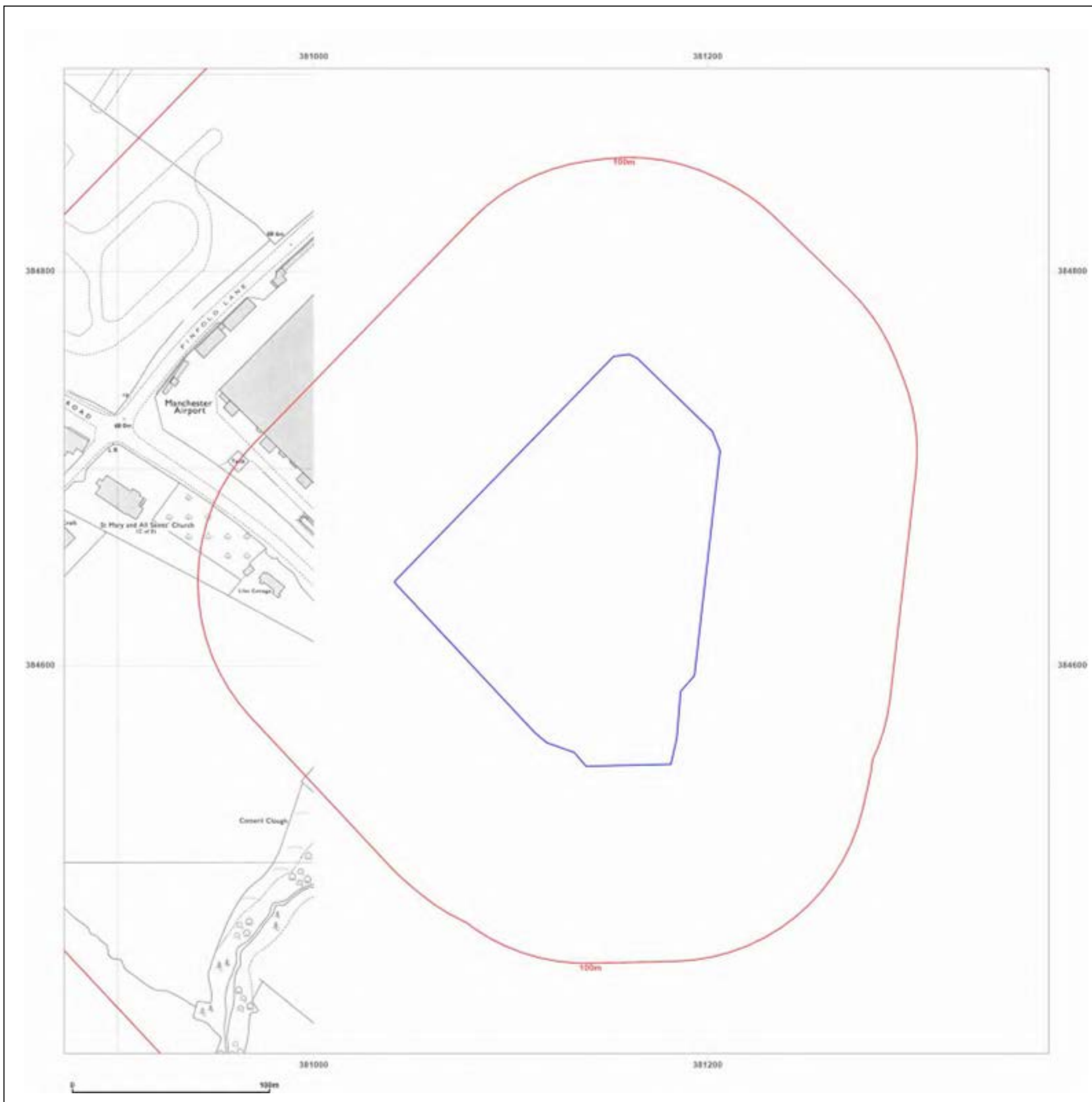


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Client Ref: B041631
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Grid Ref: 381123, 384653

Map Name: National Grid

Map date: 1987-1992

Scale: 1:1,250

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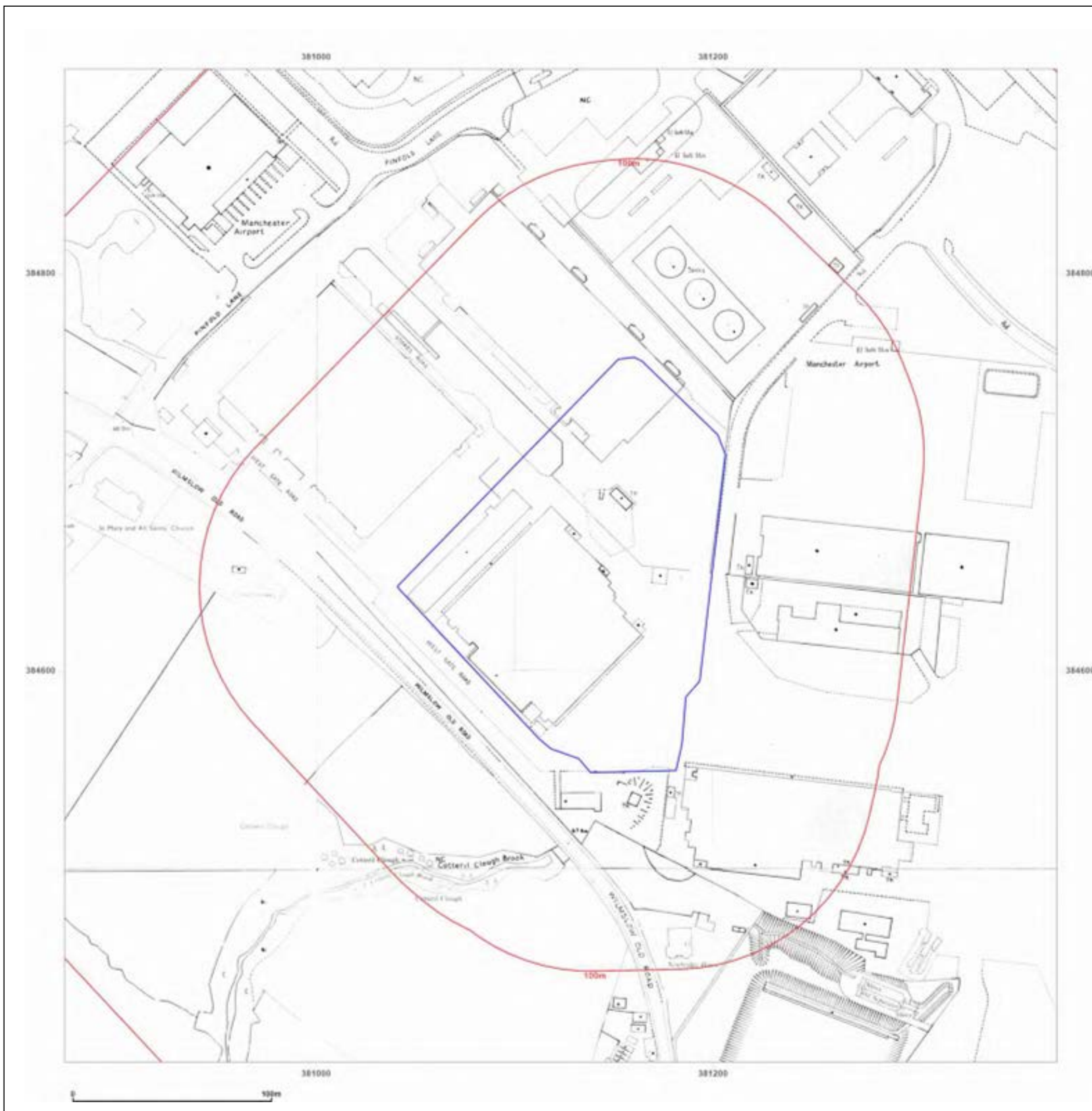


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Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: National Grid

Map date: 1990-1992

Scale: 1:1,250

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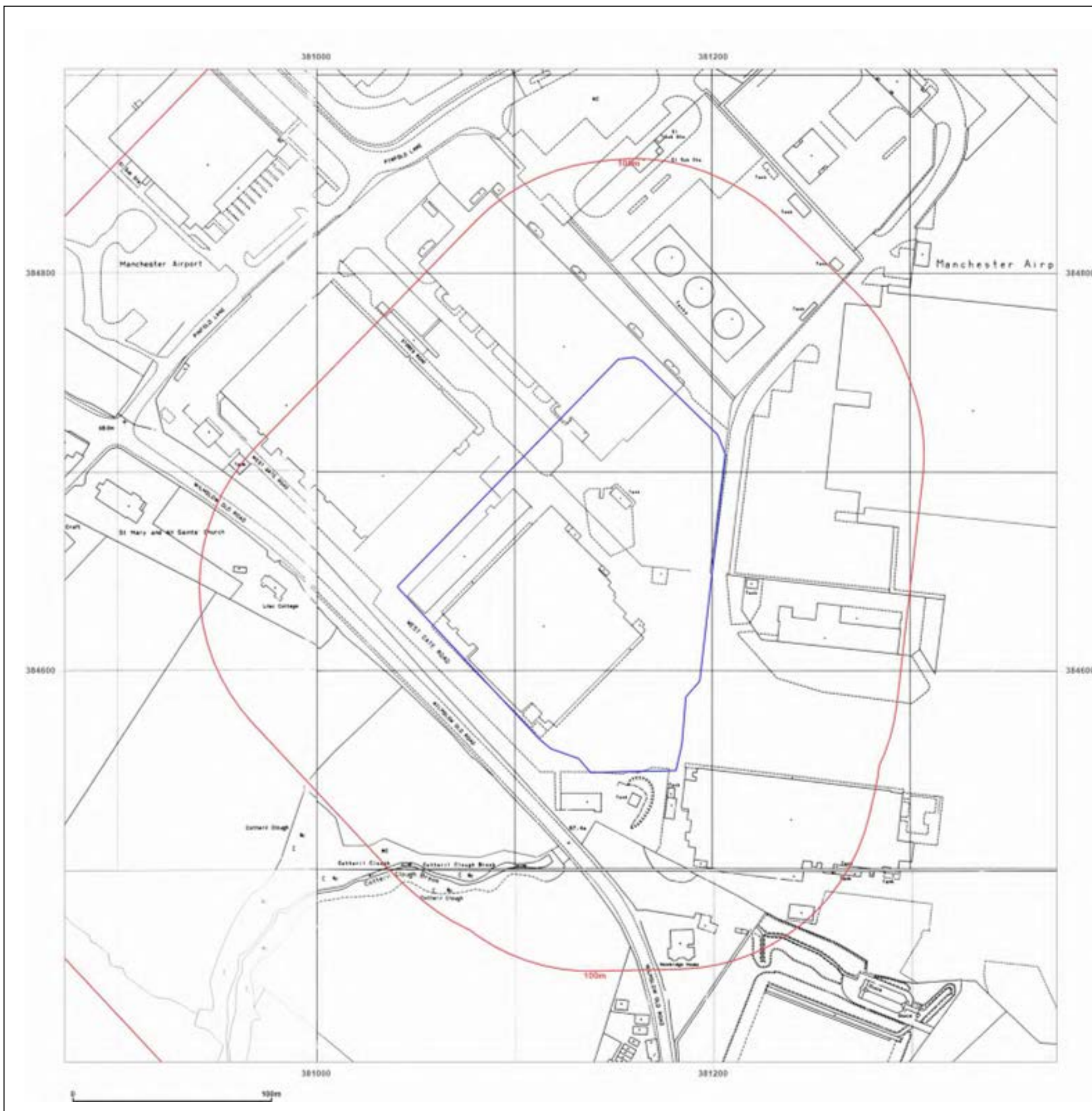


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Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: National Grid

Map date: 1992-1995

Scale: 1:1,250

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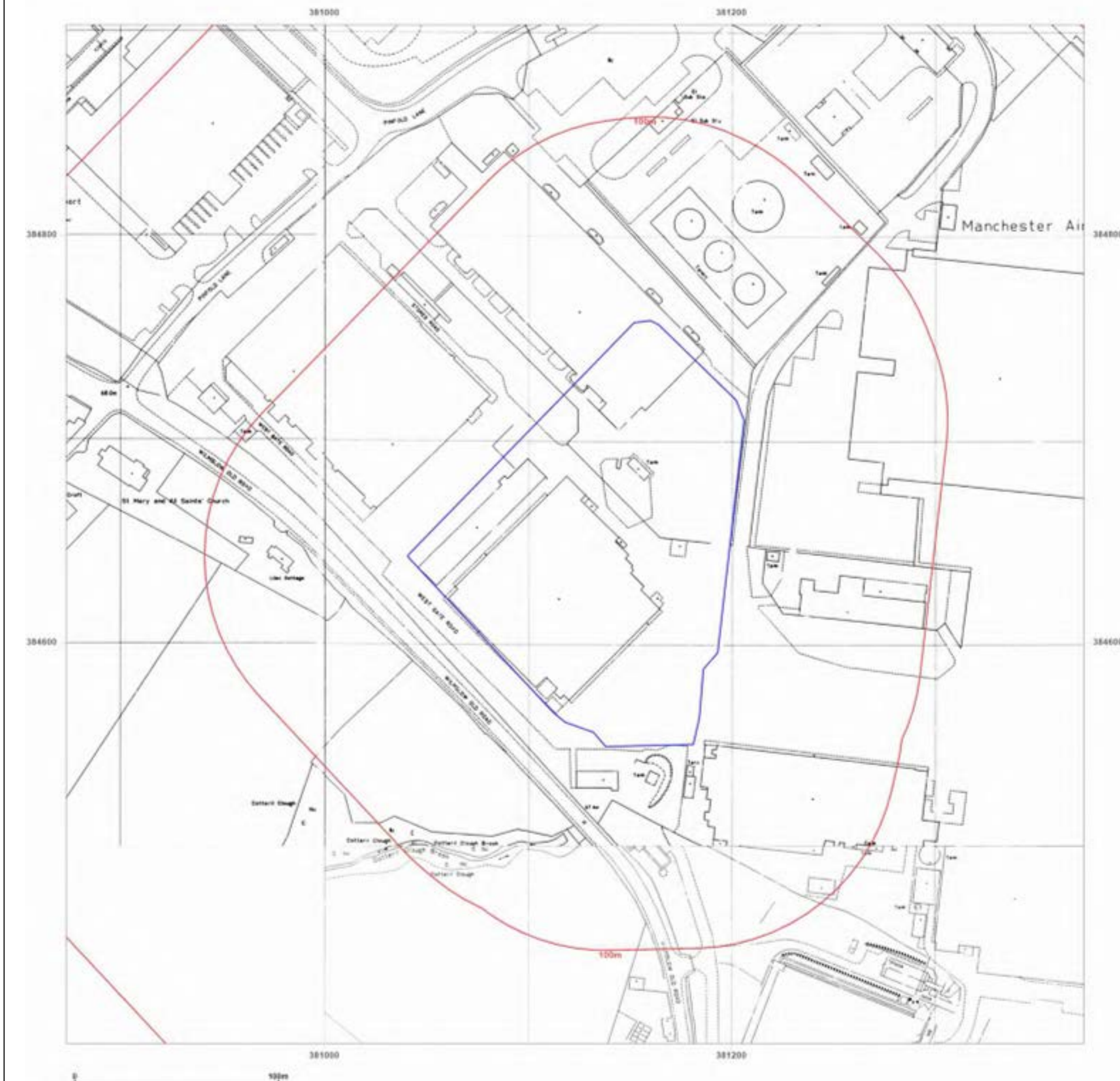


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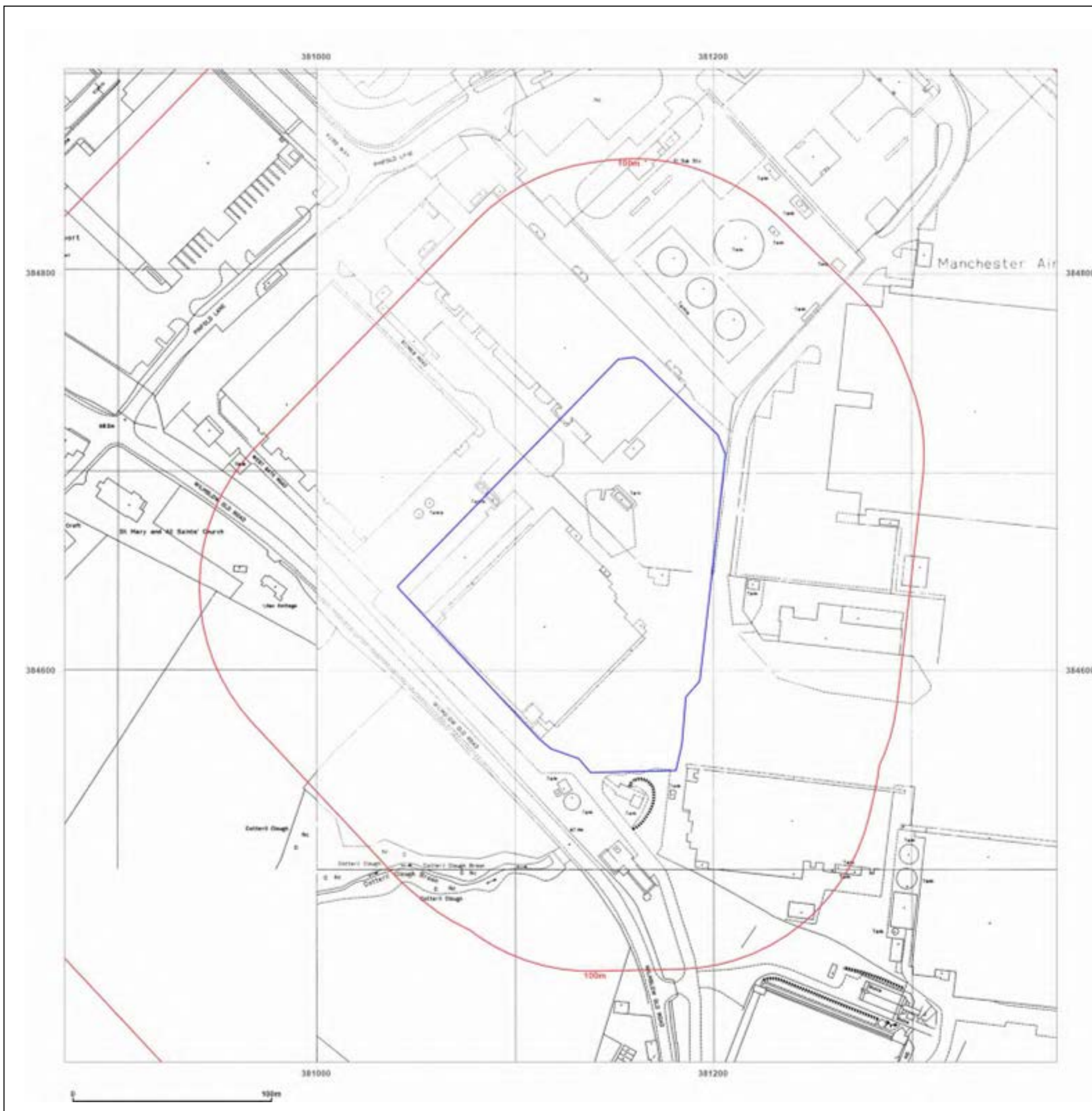


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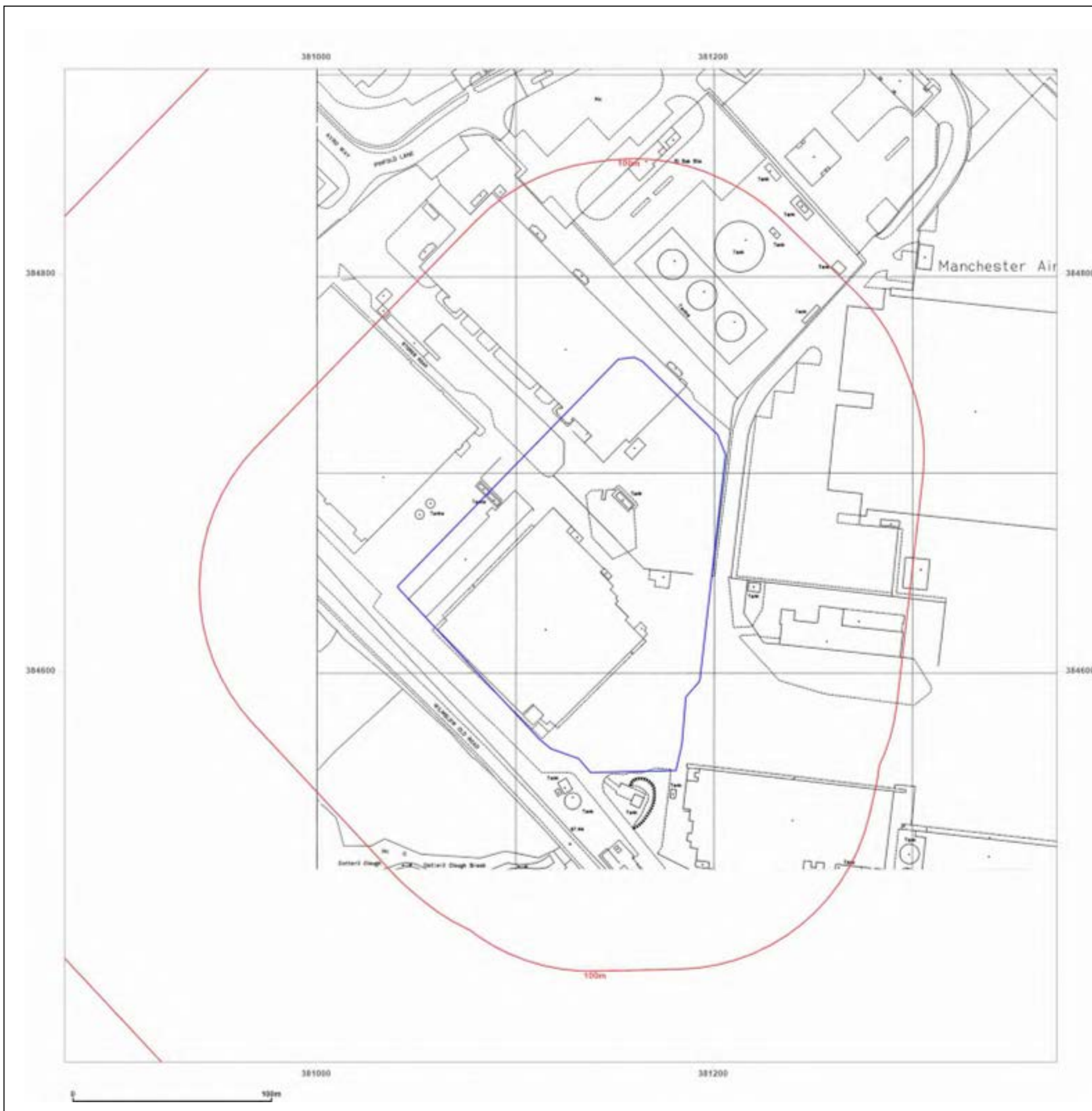


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Client Ref: B041631
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Grid Ref: 381123, 384653

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

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MANCHESTER, M90 5YF

Client Ref: B041631
Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: County Series

Map date: 1899

Scale: 1:10,560

Printed at: 1:10,560



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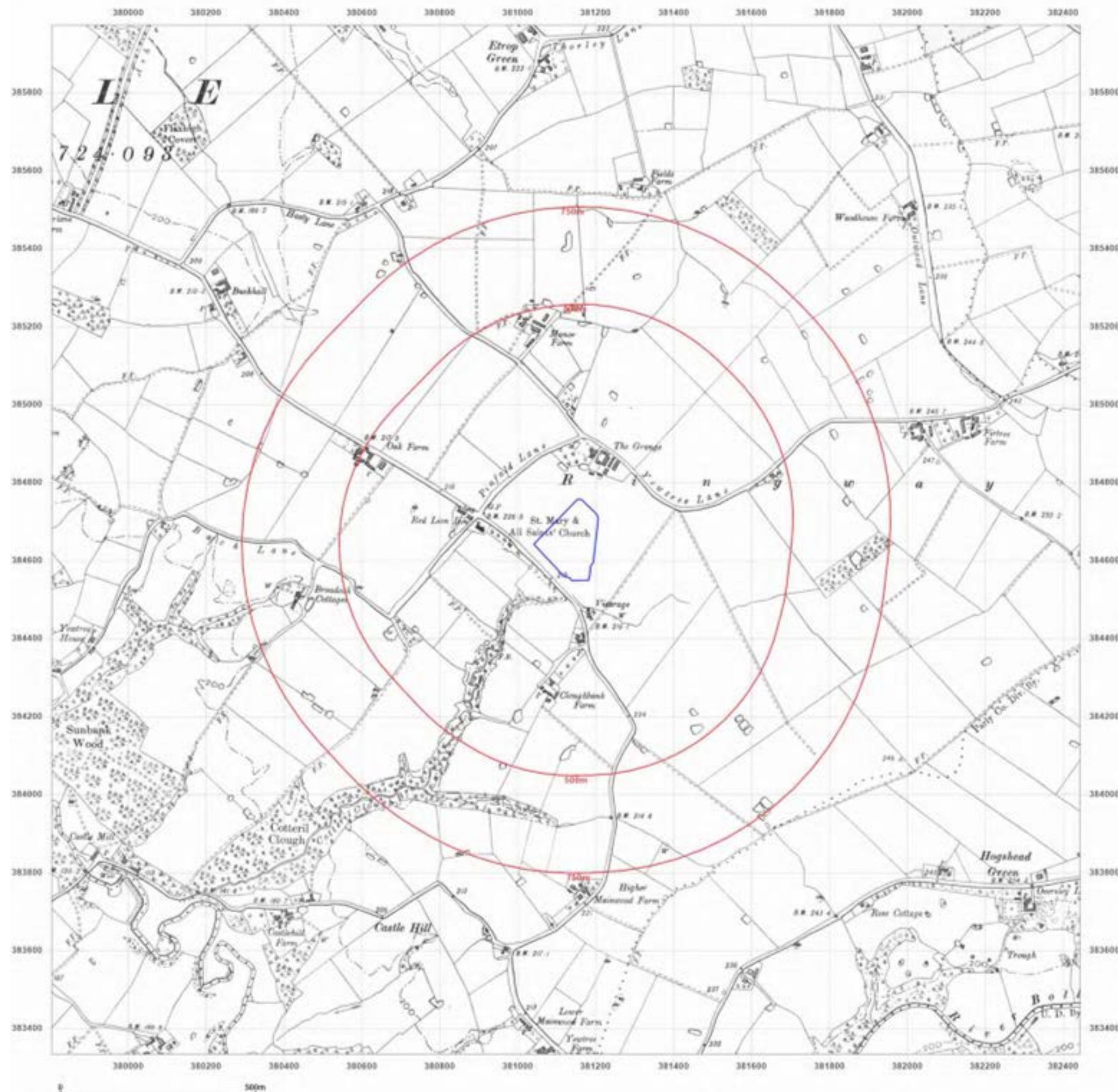


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MANCHESTER, M90 5YF

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Report Ref: GS-9274062
Grid Ref: 381123, 384653

Map Name: County Series

Map date: 1938

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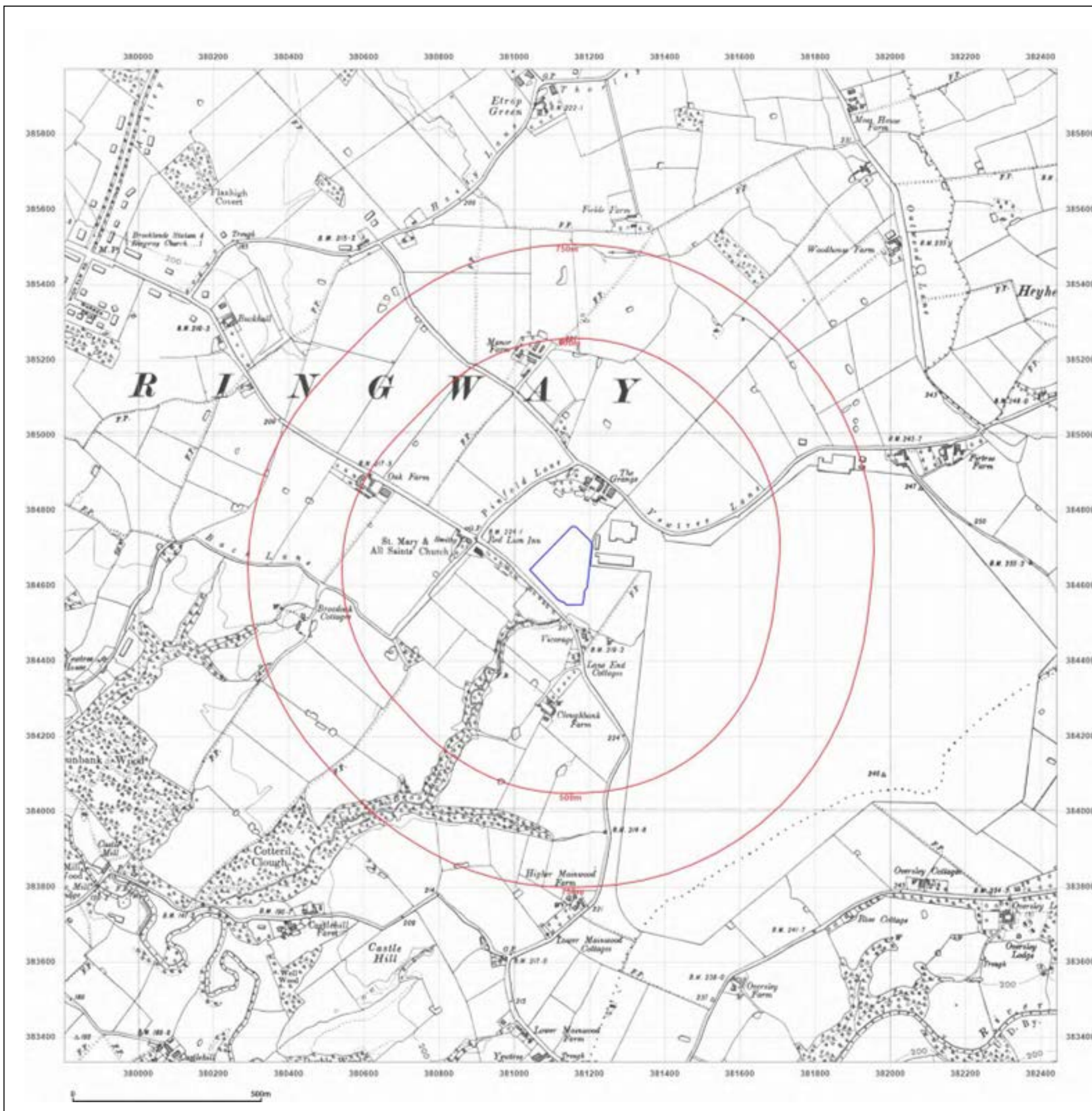


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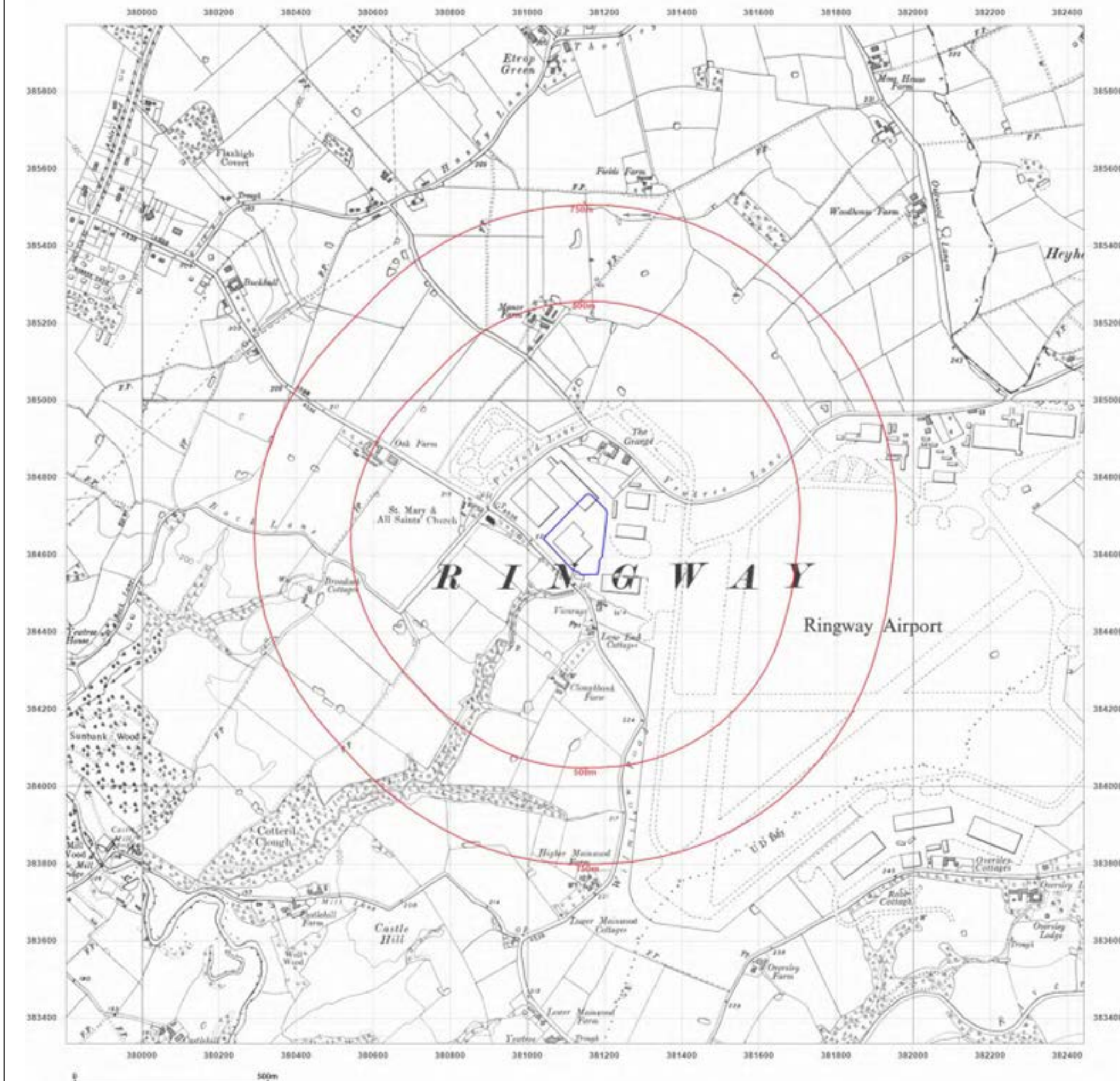


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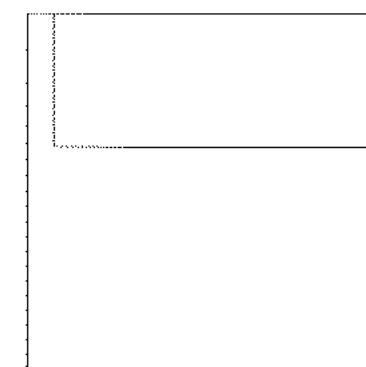
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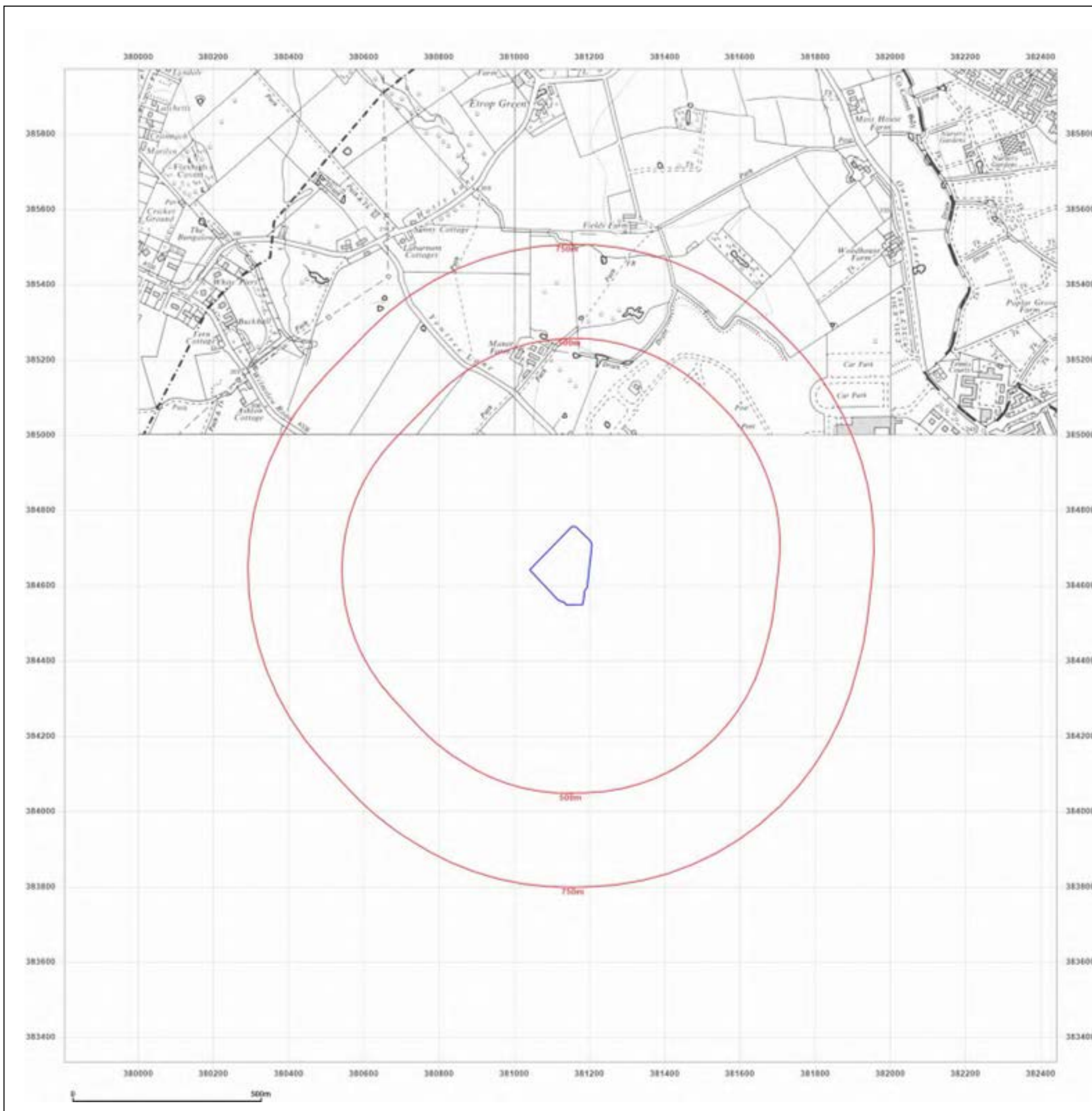


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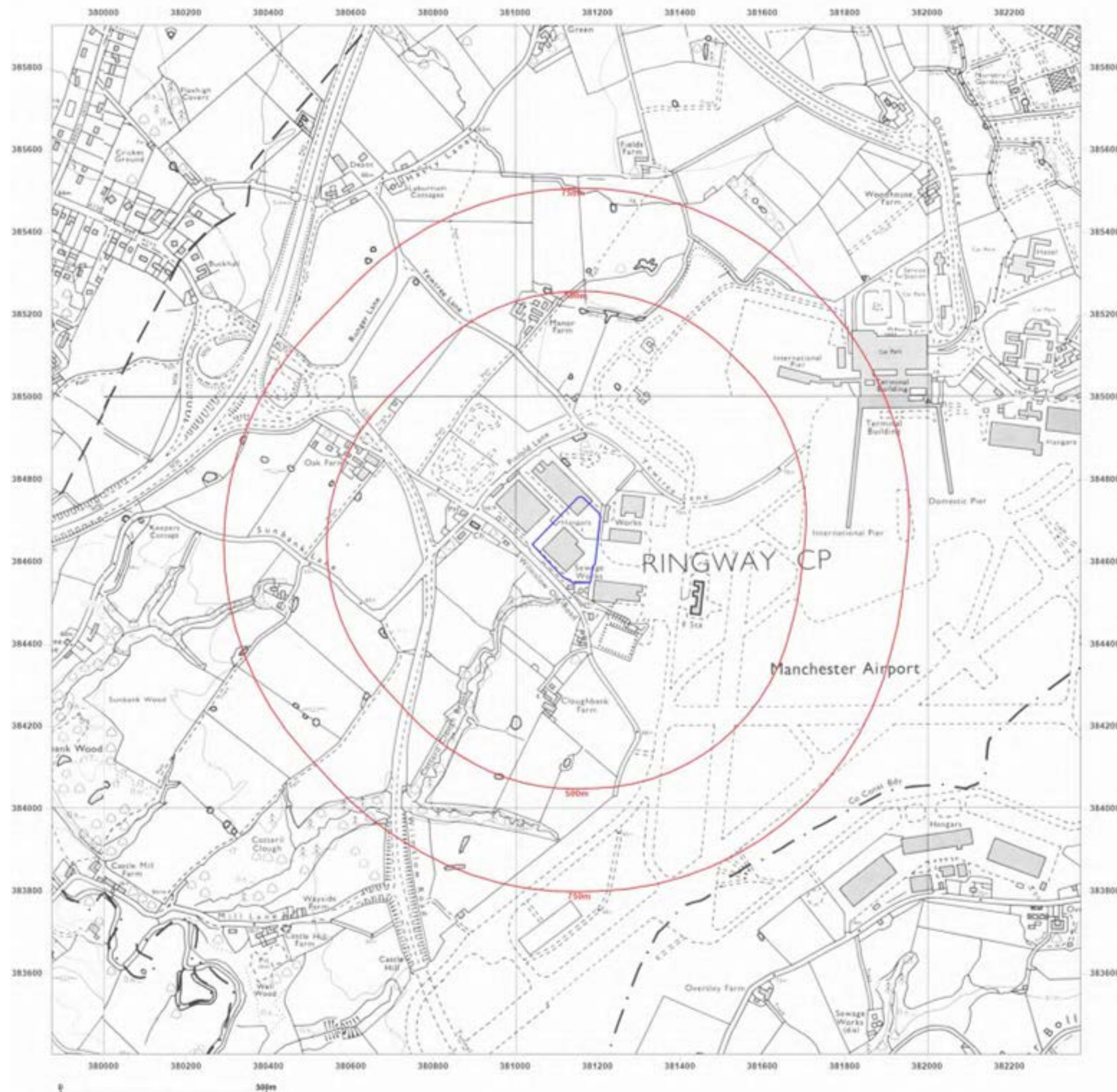


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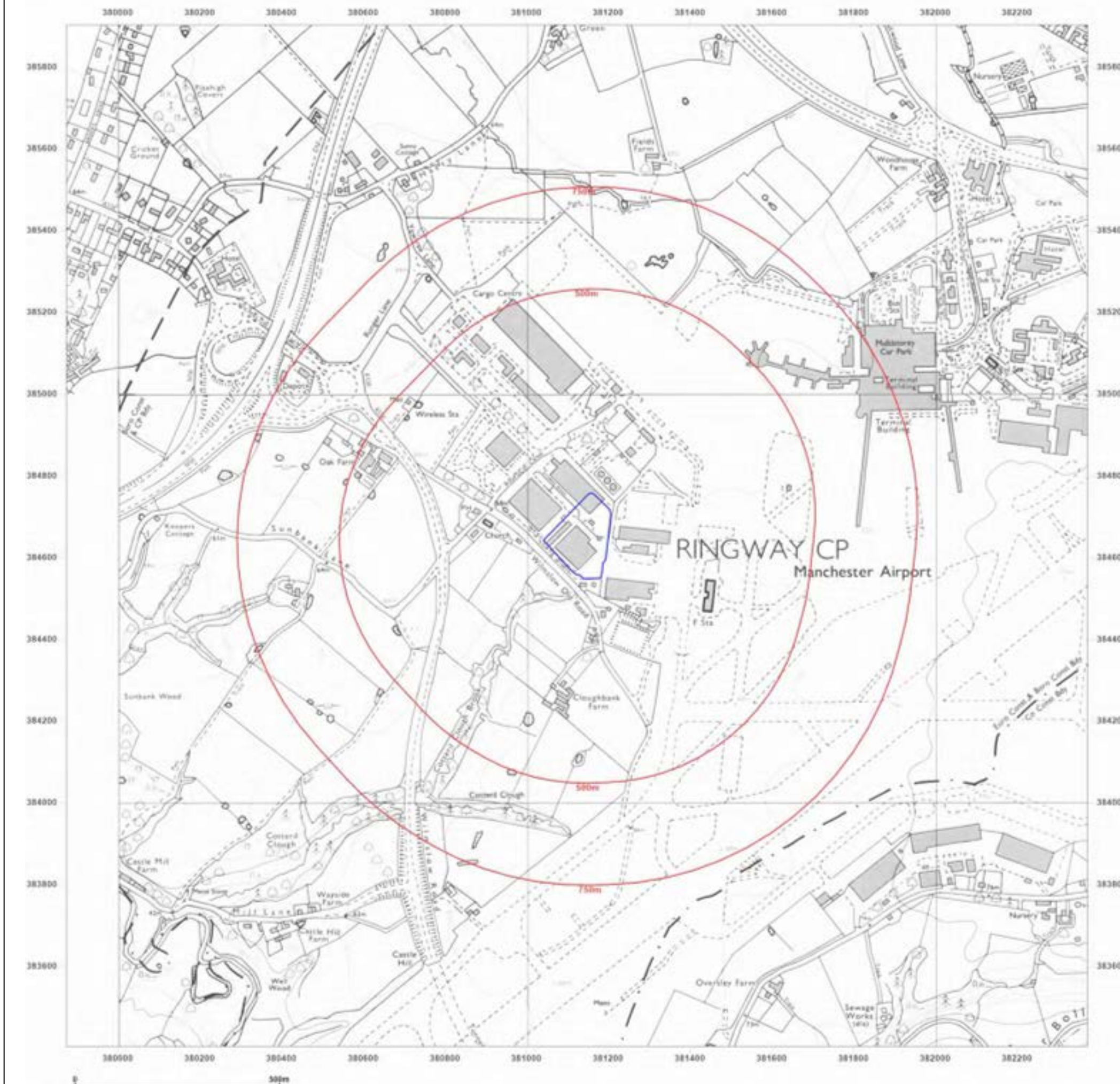


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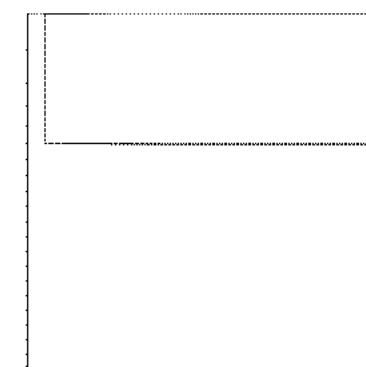
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Report Ref: GS-9274062
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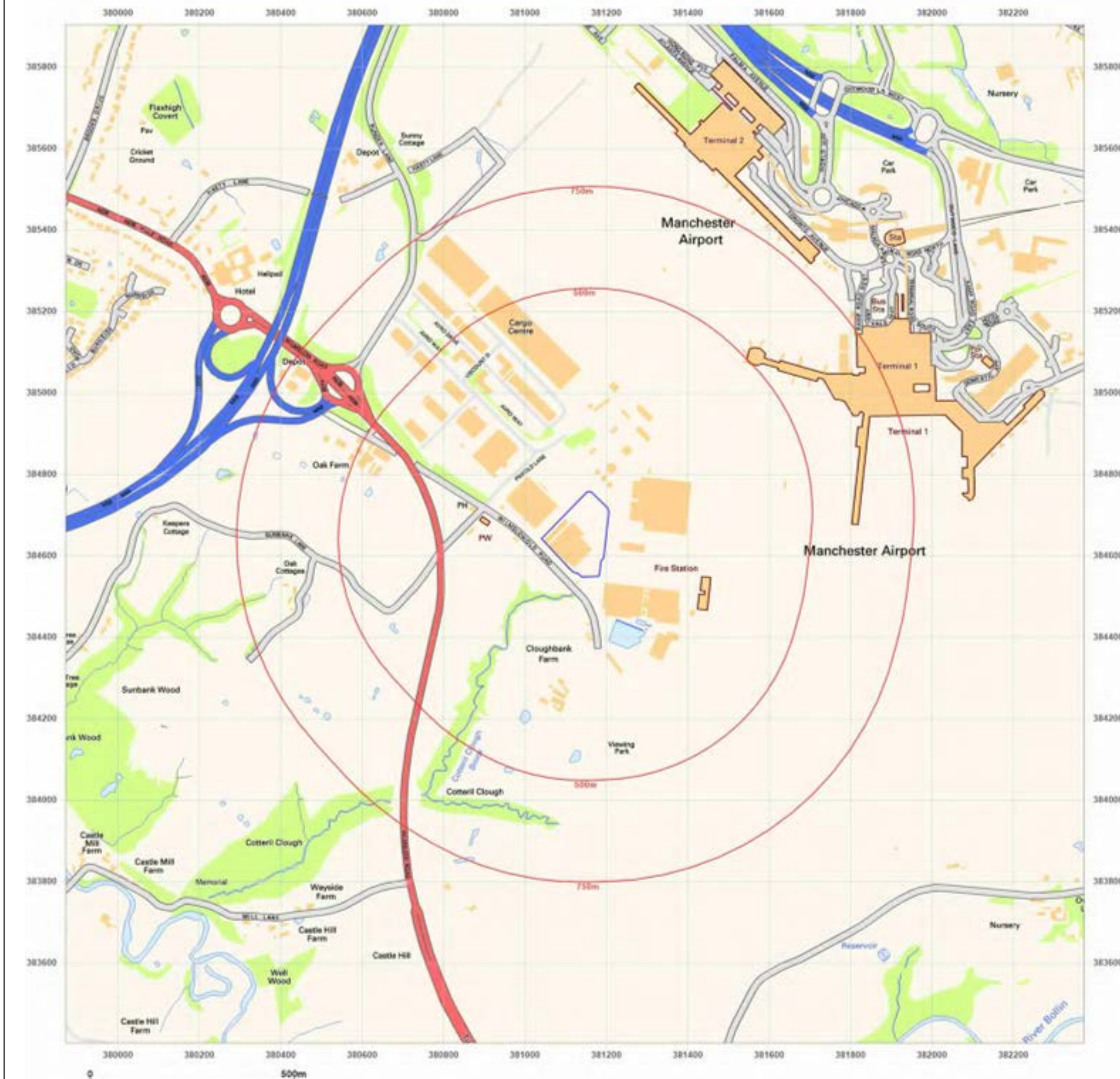


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Client Ref: B041631
Report Ref: GS-9274062
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Map date: 2010

Scale: 1:10,000

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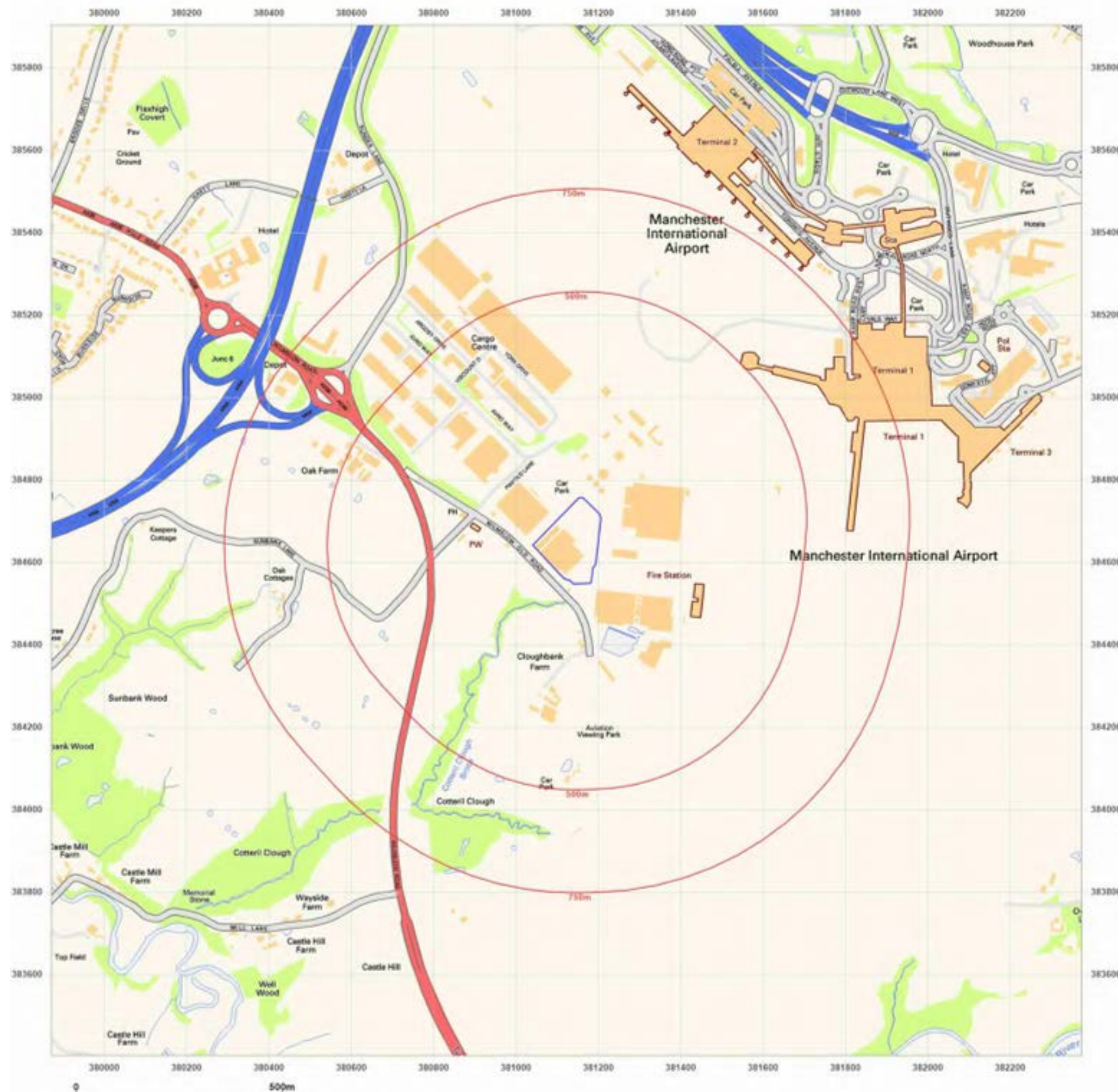


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Client Ref: B041631
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2022

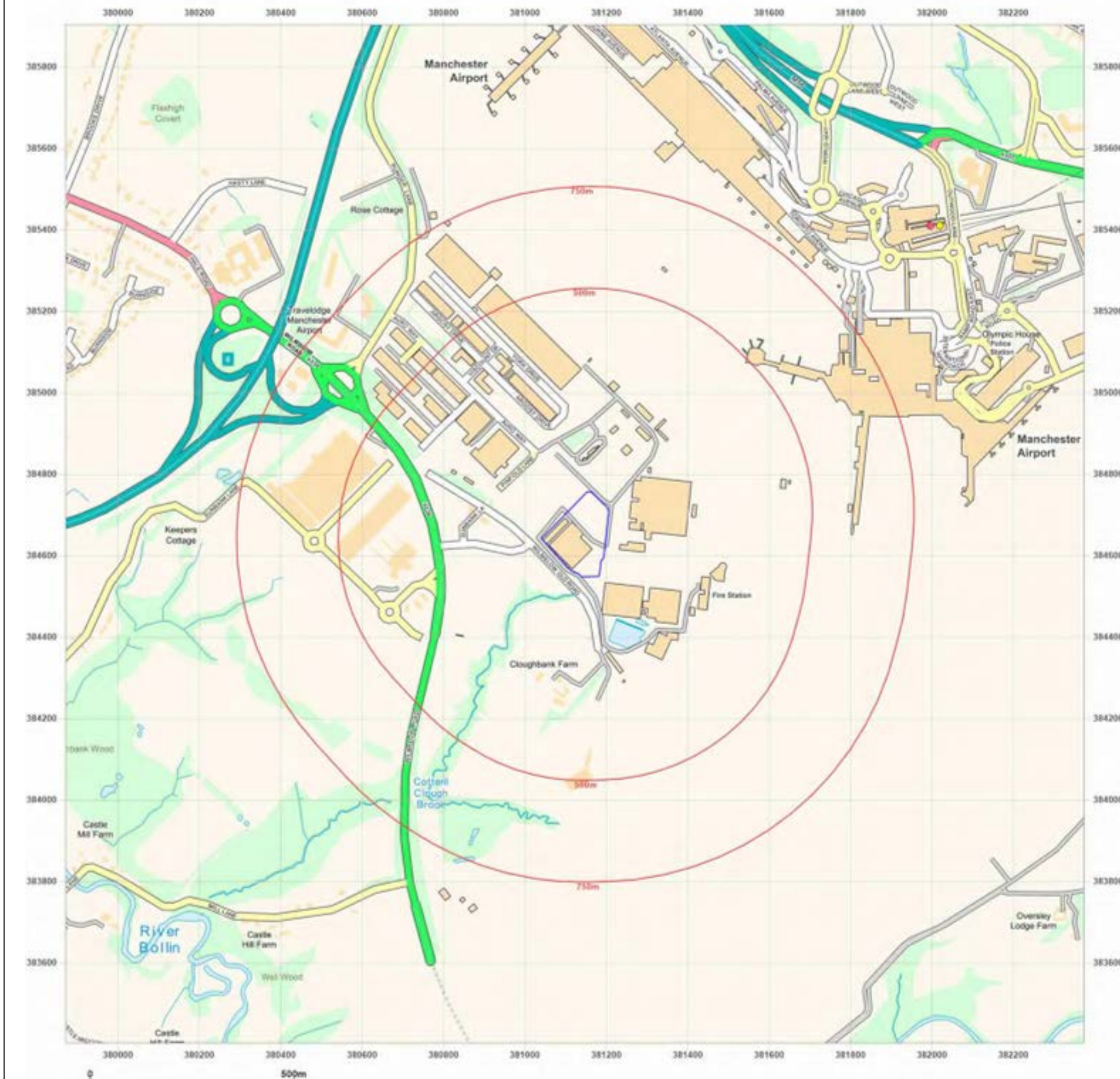


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APPENDIX D – PHOTO PLATES



Photo Plate No. 01: View of Hangar 4 building



Photo Plate No. 02: Gas Inlet housing along side of Hangar 4 building

**Quay West at MediaCityUK,
Trafford Wharf Road,
Trafford Park,
Manchester M17 1HH**

**Tel: 0161 872 3223
Fax: 0161 872 3192
E-mail enquiries @wyg.com**

**Environmental Consultancy
Ground Technologies & Investigation**



Project: Hangar 4, Manchester Airport

Client: Threadneedle Curtis Limited

Site Photo Plates

Project No.: B041631

Date: February 2023



Photo Plate No. 03: View of inside Hangar 4



Photo Plate No. 04: Outside view of Hangar 4 from Pinfold Lane

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Ground Technologies & Investigation**



Project: Hangar 4, Manchester Airport

Client: Threadneedle Curtis Limited

Site Photo Plates

Project No.: B041631

Date: February 2023



Photo Plate No. 05: View of inside Hangar 4



Photo Plate No. 06: Electricity Substation nearby to Hangar 4 unit

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Site Photo Plates

Project No.: B041631

Date: February 2023

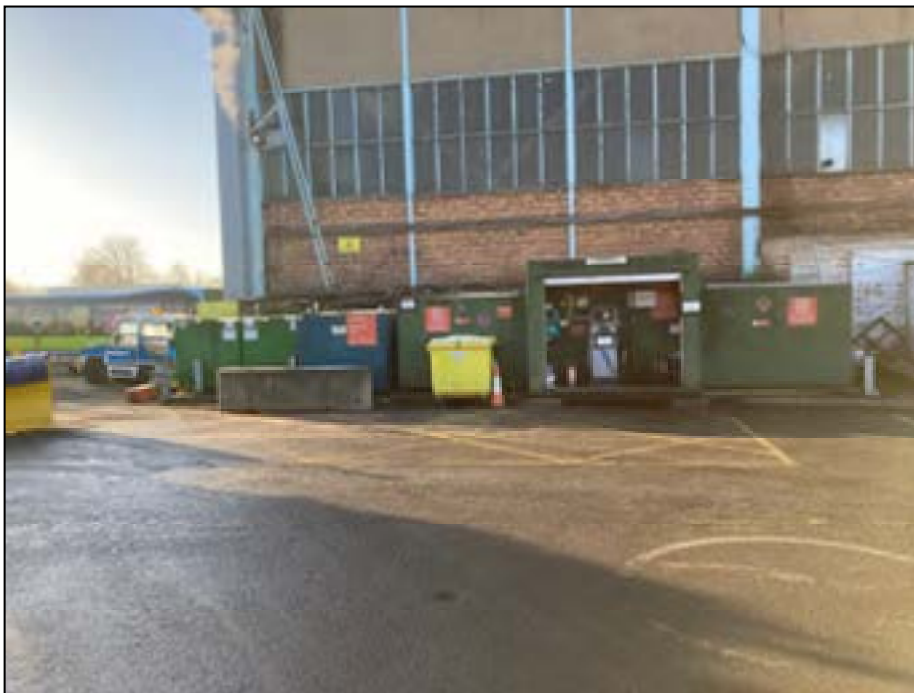


Photo Plate No. 07: Fuel pump on northern wall.



Photo Plate No. 08: General view looking north.

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Trafford Park,
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**Environmental Consultancy
Ground Technologies & Investigation**



Project: Hangar 4, Manchester Airport

Client: Threadneedle Curtis Limited

Site Photo Plates

Project No.: B041631

Date: February 2023

APPENDIX E – UXO RISK

	
Pre-Desk Study Assessment	
Site:	Hangar 4, Manchester Airport, Greater Manchester
Client:	Tetra Tech
Contact:	Nicholas Brook
Date:	3 rd January 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.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	From 1937 Ringway airfield, encompassing the Site, was used by the Fairey Aircraft Company (FAC) for the assembly, modification, and testing of military aircraft.
WWII Military Activity on or Affecting the Site	In 1939 Ringway airfield came into military use as Royal Air Force (RAF) Ringway. It served as the country's primary parachute training centre. Aircraft production and modification by the FAC continued during this time.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ RAF Ringway. ■ Transport infrastructure and public utilities. ■ Industries important to the war effort, including aircraft manufacturing. ■ Military barracks, camps, and training areas. ■ Anti-Aircraft (AA) and anti-invasion defences.
WWII Bombing Decoys (within 5km of Site)	None.
WWII Bombing	During WWII the Site was located in the Rural District (RD) of Bucklow, which officially recorded 258No. High Explosive (HE) bombs with a bombing density of 5.6 bombs per 405 hectares (ha). It should be noted that these statistics do not typically include records of bombs falling on military establishments, such as airfields, which were recorded separately. No readily available records have been found to indicate that the Site was bombed.
Post-WWII Military Activity on or Affecting the Site	RAF Ringway continued in military use until 1957 when the last resident squadron was disbanded. In 1977 the FAC ceased operations and by 2000 the Site had been redeveloped as Manchester Airport.
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



Unexploded Ordnance Risk Mitigation

Explosive Ordnance Desk Top Study for:
HANGAR 4 MANCHESTER AIRPORT, MANCHESTER
PROJECT 23011
On behalf of
Tetra Tech



www.eodcontractsLtd.com

Tel: 01386 578 405



EXPLOSIVE ORDNANCE DESK TOP STUDY

For

Hangar 4, Manchester Airport

Conducted by **EOD Contracts Limited**

On behalf of **TetraTech**

Document Control & Enquiries

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TERMS AND DEFINITIONS

Anti-Aircraft Shells (AA)

Small High Explosive Shells (HE) shells ranging up to 100mm in diameter.

Air Raid Precautions (ARP)

An organisation in the United Kingdom set up in 1937 dedicated to the protection of civilians from the danger of air raids. It included the Raid Wardens' Service that was to report on bombing incidents.

Battlefield Area Clearance (BAC)

The systematic clearance of munitions from military property or old battle sites e.g. ranges, airfields etc.

Borehole Search

The placing of boreholes in a set pattern, then using a magnetometer to take readings at specific depths along each borehole. When used with a geophysical survey system this will give a magnetic signature of the area. The depth of the borehole and the pattern will depend upon the type of Unexploded Bombs (UXB) and the geology of the ground.

Doodle Bug (See Pilotless Aircraft)

Explosive Ordnance (EO)

All munitions containing explosives, nuclear fission/fusion materials and or biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket, and Small Arms Ammunition (SAA); all mines, torpedoes and depth charges; pyrotechnics; clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices (IED); and all similar or related items or components explosive in nature.

Explosive Ordnance Clearance (EOC)

See BAC.

Explosive Ordnance Disposal (EOD)

The detection, identification, field evaluation, render safe, recovery and disposal of **UXO**.

Geophysical Survey

The survey of an area using a Magnetometer and geophysical gathering device, after interpretation, this will produce a geophysical map and an object list for any metallic anomalies.

High Explosive (HE)

High explosives burn/detonate at rates of up to 9,000 m/per second.

Incendiary Bomb (IB)

Incendiary bombs ranged from 1kg in size to 500kg the larger sizes were sometimes called Oil Bombs. Fills range from thermite mixtures, phosphorus to kerosene.

Intrusive Survey

The use of a cone penetrometer (MagCone) or drilled boreholes (MagDrill) to take magnetometer test in a set pattern (see borehole search), or to prove pile positions.

Land Service Ammunition (LSA)

LSA is defined as "All items containing explosives or pyrotechnic compounds which are placed, thrown or projected so as to cause damage to men and equipment during land warfare.

Long Range Rocket (LRR)

The long range rocket sometimes codenamed Big Ben is the V2 rocket designed to deliver an approximate payload of 1000 kg.

Oil Bomb (OB)

A bomb containing a flammable liquid, normally the KC 250 Flam or the C 500 flam.

Pilot less Aircraft (PAC)

A flying bomb (Fly) or doodlebug is the V1 rocket, or predecessors designed to deliver an explosive payload of approximately 500kg - 800kg.

Parachute Mine (PM)

Air dropped mine may have been used as a blast effect bomb maximum explosive content 1600lb always fitted with anti-handling and anti-stripping equipment.

Unexploded Bomb (UXB)

Any air dropped bomb that has failed to operate.

Unexploded Ordnance (UXO)

Explosive ordnance that has been primed, fused, armed, or otherwise prepared for use or used. It may have been fired, dropped, launched, or projected yet remains unexploded either through malfunction or design or for any other cause.

Vengeance Weapons (V)

V1 see Pilot Less Aircraft.

V2 see Long Range Rocket.

WWI

World War 1 (1914 – 1918)

WWII

World War 2 (1939 – 1945)

EXECUTIVE SUMMARY

INSTRUCTION

EOD Contracts Ltd, have been commissioned by Tetra Tech to undertake a desktop study for potential historic Unexploded Ordnance (UXO) contamination for the future works at Hangar 4, Manchester Airport, Manchester (The Site).

Scope of Work

The scope of this EO Risk Assessment/Desk Study is to assess the likelihood of buried EO/UXO within the environs of The Site (See Figure 1), in view of further development. A further aim was to evaluate the implication from UXO contamination during any future intrusive land use.

Figure 1: Clients Supplied Site Diagram, This DTS will be covering all areas shown within the Red Boundary.



LOCATION

The site is located within Manchester Airport, Greater Manchester, England. Historically part of Cheshire. During WWII the site was within the Air Raid Precautions reporting area Region (10) North Western Region HQ Manchester.

Table 1 Site Location

Title	Description (Centre of Site)
Address	Hangar 4 Manchester Airport, Manchester
Post Code	M905PQ
Grid Reference	SJ8114084674
what3words	pacemaker.factor.shells

SOURCES OF UXO CONTAMINATION

The main sources of UXO contamination that have been researched for the site are:

- Air delivered ordnance bombs and sub-munitions/incendiaries
- Anti-Aircraft Ammunition (AA)
- Explosive or Munition Factories
- Military Usage

KEY FINDINGS

Based on the information researched by EOD Contracts Ltd for the proposed scope of works being carried out within the given site area, the following conclusions have been reached:

Historical UXO Contamination

The indications of UXO contamination are:

Bomb Strikes	Bomb strikes were recorded on the airfield, no evidence indicates bombs on the site
Bomb Damage	No bomb damage was recorded, the buildings covered the majority of the site
Reconstruction	Limited reconstruction was noted; however, an original WWII building is still on site
Military Usage	Military usage was noted as the site was part of RAF Ringway
Explosive/Munition Factory	The site was not used in the production of explosives or munitions

Risk Level

The overall risk has been determined to apply to all ground works within the site footprint.

Risk Level	Therefore, so far as reasonably practicable the risk level on site is deemed as LOW .
Risk Depth	The expected bomb depth is not applicable.

RECOMMENDATIONS

It is recommended that no further risk mitigation strategy is required.

EOD Contracts Ltd can supply a turnkey solution to your UXO requirements. Therefore, the following mitigation strategies can be supplied for land or water based operations:

Intrusive survey using CPT (*Cone Pressure Testing*) or borehole equipment, *supplying risk mitigation to all Borehole and Pile locations, down to a maximum bomb penetration depth determined within this document.*

Non-Intrusive Survey using multiple array system with DGPS (*Differential Global Positioning System*).

Offshore, near-shore, estuarine and freshwater water environments magnetic, side scan and bathymetric supported by state of the art DGPS.

The aforementioned surveys are supported with post processing of data and intrusive investigations if required.

EOD Engineer over watch using Suitably Qualified and Experienced Personnel, normally former British Army, Navy or RAF Bomb Disposal specialists.

Explosive Ordnance Safety Presentations.

PART 1: INTRODUCTION

Instruction

EOD Contracts Ltd, have been commissioned by Tetra Tech to undertake a desktop study for potential historic Unexploded Ordnance (UXO) contamination for the future works at Hangar 4, Manchester Airport, Manchester (The Site).

Scope of Work

The scope of this EO Risk Assessment/Desk Study is to assess the likelihood of buried EO/UXO within the environs of The Site (See Figure 1.1), in view of further development. A further aim was to evaluate the implication from UXO contamination during any future intrusive land use.

Figure 1.1: Clients Supplied Site Diagram, This DTS will be covering all areas shown within the Red Boundary.



Restrictions

It must be emphasized that a desk study can only indicate the potential for UXO to be present on the site.

This study was written with the site conditions prevailing at the time of the study and no liability can be accepted for any change in the condition of the area.

Please note that our appraisal relies on the accuracy of the information contained in the documents consulted and that EOD Contracts Ltd will in no circumstances be held responsible for the accuracy of such information or data supplied.

Sensitive Documentation

Information may be classified, restricted or deemed to be confidential in nature to EOD Contracts Limited, where such material has been gained a summary of the documentation has been approved.

Objective

The objective of this document is to define the UXO contamination routes as defined in Unexploded ordnance (UXO) A guide for the construction industry (C681) dated July 2009 and offer remediation methodologies if required.

CIRIA Frame Work

The CIRIA report is intended to provide good practice guidance (code of practice) on how to identify whether a site is likely to be at significant risk of UXO encounter and, if so, to set-out a process that will allow this risk to be managed. To be effective this process must start early in the life of the project (usually before intrusive works commence) and have involved Clients, Advisors and Principle Contractors. Therefore, the ground contractor should be provided with a systematic appraisal of the UXO risk when they become involved. The CIRIA report recommends the following stages be undertaken as part of the risk management process:

- Phase 1 Preliminary Risk Assessment
- **Phase 2 Detailed Risk Assessment (Completed and updated in this document)**
- Phase 3 Risk Mitigation (The act of ameliorating the risk, the clearance methodology)
- Phase 4 The UXO Risk Management and Implementation Plan

PART 2: SOURCES OF INFORMATION

Research of the site's history, with regard to military usage, bombing raids and bomb impacts has been undertaken to establish the following:

- Frequency and intensity of enemy bombing raids for the site and immediate vicinity up to 500m.
- Bomb impacts and associated damage on the Site and in the immediate vicinity.
- The potential for UXO to remain on the Site and in the vicinity.
- Records of UXO removal activities for the Site and immediate vicinity.
- The main sources of information consulted include:
 - EOD Contracts Ltd company records
 - Ministry of Defence records
 - Central and Local Government Records
 - Public Records Office (Kew)
 - Historic Maps and Air Photography
 - Open-Source information (Internet)

Ministry of Defence (MOD) Records

33 Engineer Regiment (Explosive Ordnance Disposal) Royal Engineers is the unit responsible for maintaining the records concerning conventional Bomb incidents, reports, clearances and related UXO matters. These records are known to be incomplete and are no longer supplied. Based on in-house information released by the MOD previously, it is considered unlikely that any information released will have any significant impact on the findings of this study.

Attack Record Keeping

In general, the quality and accuracy of bombing and shelling records prior to 1942 varied greatly from one region to another. Records relating to the limited air attacks on the United Kingdom are considered to be sufficiently accurate in urban areas to provide a reasonable level of confidence in determining the likelihood that an area was or was not bombed during this period. Wartime records, maps etc held within the civil archives are considerably more comprehensive than those still in existence within the MOD, where it is acknowledged that large numbers of records have been disposed of since 1945. Records from some areas, particularly rural districts or near large bodies of water should still be regarded as an incomplete picture of the extent and effect of the bombing campaign.

Attack Record Accuracy

While an Air Raid was in progress it was inevitable that mistakes would be made in the transcription of rushed verbal reports into the written records. Discrepancies did occur between the total of bombs dropped against detonations witnessed. In some cases records were made several hours after the event and mistakes were inevitable. Some reports were drafted before the full extent of the raid had been

determined which has led to significant omissions in the records. Reports of raids on rural areas were often witnessed and submitted by untrained individuals and passed through third parties before being recorded. Suspect UXBs occasionally went unreported by local farmers and freeholders who saw the event as insignificant, or were reluctant to report their findings for fear of valuable land or crops being destroyed by the authorities in their attempts to find the UXB. It should also be noted that bomb strikes in water were notoriously difficult to spot, particularly if the bomb had failed to detonate. As a result bomb record accuracy in areas containing large bodies of water or marshland is considered to be questionable.

Errors and Omissions

The accuracy of bombing records has been shown to vary greatly; this may have been a result of the individual record keeper's expertise. Additionally, in some cases, errors occurred as a result of poor or incomplete transcription and copying. Some "errors and omissions" were intentional, designed to serve as dis-information to confuse German intelligence. So long after the event, official verification of such incidents has often proven to be impossible to obtain. At present, UXBs are found on construction sites and other locations where there had been no documentary evidence to suggest their presence. These events, although infrequent, do serve as confirmation that records cannot be considered definitive.

Bibliography

The significant published documents referred to during this study are listed below:

- HO 193 series from National Archives
- HO 198 series from National Archives
- The Blitz Then and Now Volumes 1 to 3
- AA Command Colin Dobinson
- German Air Raids on Britain 1914-1918
- Luftwaffe Over Manchester Peter Smith
- Our Blitz Red Skies Over Manchester
- Manchester at War
- Blitz Britain: Manchester and Salford
- English Heritage

PART 3: SITE DESCRIPTION AND DETAILS

Location

The site is located within Manchester Airport, Greater Manchester, England. Historically part of Cheshire. During WWII the site was within the Air Raid Precautions reporting area Region (10) North Western Region HQ Manchester.

Table 3.1 Site Location

Title	Description (Centre of Site)
Address	Hangar 4 Manchester Airport, Manchester
Post Code	M905PQ
Grid Reference	SJ8114084674
what3words	pacemaker.factor.shells

Description and Current Usage

The site boundaries are; to the north west is an unnamed road, to the north east and south east is Pinfold Lane, to the south west is Wilmslow Old Road. At present the site is mostly occupied by buildings in the south and parking areas across the remainder of the site.

Geology

BGS (British Geological Survey) nearest borehole see Figure 3.1 indicates the following geology:

Table 3.2 Geology

Geological Unit Description	Anticipated Thickness (m)	Anticipated Depth (m bgl)
Made Ground	1	1
Clay	3.2	4.2
Clay with Gravel	5	9.2
Silt and Sand	1.05	10.25

Figure 3.1 Borehole Location (www.bgs.co.uk)



Future Works

At the time of writing this report it is understood that the site will be redeveloped (the exact scope of works is not known at this time). Therefore, it is assumed that the following intrusive construction works will be carried out:

- Geotechnical investigations, percussive drilling/trial pits/window/samples
- Foundations with possible piling
- Services trenching
- Open Excavations

PART 4: HISTORICAL REVIEW

Historical Mapping and Aerial Photography

The air photograph and historical maps in Annex B have been reviewed and a brief synopsis is in Table 4.1:

Table 4.1 Aerial Photograph and Historical Map Synopsis

Date	Scale	Description/Remarks
1938	1:10,560	The site is open ground to the west of the airfield
1946	NA	AERIAL PHOTOGRAPH Oblique. The site is partly built upon as part of the Fairey Aviation and Avro factory for the construction of aircraft. (These can be seen in the aerial photograph) The buildings have obvious camouflage, the hard standings have a broken camouflage pattern
1954	1:10,000	The site is partly built upon as part of the Fairey Aviation and Avro factory for the construction of aircraft.
2022	1:10,000	Shows present configuration of buildings and usage, the building on the northern side of the site has been removed research notes this is in the early 1990s

Post WWII Construction

Post WWII the removal of buildings and the shallow construction of parking areas. The depth of these works is unknown.

WWI

Although many people associate wartime bombing with The Blitz during World War II, the first airborne terror campaign in Britain took place during the First World War. Air raids in World War One caused significant damage and took many lives. German raids on Britain, for example, caused 1,413 deaths and 3,409 injuries.

Site Specific Bombing Information

The map shown in Annex C indicates the Site was not the subject of bombardment throughout WWI.

WWII

Bombing started as early as October 1939, by the end of the WWII the Luftwaffe had dropped approximately 50,000 tonnes of high explosive bombs and 110,000 tonnes of incendiary bombs, this caused over 40,000 UXBs, killed 43,000 people and over 250,000 homes were destroyed.

Ringway in the Blitz

During WWII Ringway and Manchester Aerodrome were in Cheshire. Table 4.2 is the confirmed number of incidents on RAF Ringway, another 2 incidents were noted in the referenced documents, however these are unconfirmed.

Table 4.2 Bombing Incidents

Start Date	End Date	Time	Civil Defence Region	Location
27/09/1940	28/09/1940	Night	10: North Western	Ringway
07/10/1940	08/10/1940	Night	10: North Western	Ringway
20/12/1940	21/12/1940	Night	10: North Western	Ringway

Site Specific Bombing Information

Record of air raids on and in the vicinity of the site have been scrutinized, bomb impact locations are unknown, however reports indicate minimal damage to the airfield the nearest recorded bombing incident locations are attached in Annex D.

Abandoned Bombs/UXO

EOD Contracts records could find no evidence of any abandoned Bombs in or around the subject site.

Anti-Aircraft Artillery

The nearest recorded location of heavy anti-aircraft gun (HAA) position is on the airfield. The exact location is unknown, however this area was built upon.

Bomb Damage

Aerial Photographs show no obvious damage to the buildings or hard standing.

Explosive or Munition Factories

No explosive or munition factories were noted.

Military Usage

Military usage was recorded for the site in that the site was a Satellite RAF Station and the main training centre for parachute training. A brief history of airfields usage is:

RAF Ringway was a Royal Air Force station near Manchester, UK, situated in the parish of Ringway, Cheshire.

Originally, Barton Aerodrome, opened in January 1930 just west of Eccles, was planned to be the main airport for Manchester, but it became clear by 1934 that its small boggy grass airfield was inadequate for the larger airliners then coming into service including the Douglas DC-2 and DC-3.

A new airport site at Ringway, eight miles south of the city, was selected from several alternatives. Construction of the all-grass airfield commenced in late 1935 and the first (westerly) portion opened in

June 1937 for use by Fairey Aviation. The remaining airfield areas and the terminal building were opened for public use on 25th June 1938. Initially known as Manchester (Ringway) Airport, then Manchester International Airport, from 1986 it has been designated simply Manchester Airport.

Construction of a Royal Air Force station, including two large hangars, barrack blocks and ancillary accommodation, commenced in the NE corner of the airport during spring 1939, with phased completion during early 1940. One of the hangars was intended for use by No. 613 (City of Manchester) Squadron, but this unit had moved south at the outbreak of war. RAF Ringway was initially used by No. 1 OTU, Coastal Command.

From June 1940, Ringway became the wartime base for No.1 Parachute Training School, which was charged with the initial training of all allied paratroopers trained in Europe (60,000) and for development of para drops of equipment; also, the development of military gliding operations. Comedian, Frank Muir, spent several years at the school in the photographic section taking slow motion film of jumps on a project intended to decrease the frequency of parachutes failing (aka "Roman Candle"). He recalls the Special Operations Executive parachute training centre, housed in an Edwardian house on the outskirts of the airfield, where he was assigned to take pictures of the agents for identity documents. There was an additional SOE holding centre in a large house in nearby Bowdon.

No. 14 Ferry Pilot Pool of the Air Transport Auxiliary was based at Ringway between 1940 and 1945, the veteran crews delivering many thousands of military aircraft built, modified or repaired at Ringway, Woodford, Barton and at other northwest aircraft factories and airfields.

Over 4400 warplanes were built at Ringway by Fairey Aviation and Avro. These included the Fairey Battle, Fairey Fulmar, Fairey Barracuda, Bristol Beaufighter, Handley Page Halifax and Fairey Gannet. Avro's Ringway facility completed the prototype Avro Manchester, Avro Lancaster and Avro Lincoln bombers and produced the Avro York military transport aircraft). Two hangars built in the NW corner of the airfield during 1939/40 for use by Fairey Aviation remain in use, one for aircraft maintenance and the other for ground operations.

No. 613 (City of Manchester) Squadron had its home base at RAF Ringway during 1939 and again from 1946 to 1957 when it flew Spitfires and Vampire jet fighters. On the disbandment of 613 Squadron (and all other Royal Auxiliary Air Force Squadrons) in March 1957, RAF Ringway was closed, and its hangars and other buildings handed over for civil airline use.

Prior Clearance Operations

EOD Contracts could find no evidence to suggest that there have been any prior UXO clearance operations in or around the site footprint.

PART 5: SOURCES OF UXO CONTAMINATION

The main sources of UXO contamination that have been researched for the site are:

- Air delivered ordnance bombs and sub-munitions/incendiaries
- Anti-Aircraft Ammunition (AA)
- Explosive or Munition Factories
- Military Usage

General

There are no recorded UXO contamination pathways from:

- Air delivered ordnance bombs were noted on the airfield
- The nearest Anti-Aircraft Weapons (AA) is within 3km
- No recorded use as an Explosive or Munition Factory
- Has had Military Usage as an RAF Station

UXOs are essentially dangerous; therefore, further information on UXO and Safety is detailed in Annex F.

Bomb Penetration Depths

The weapon penetration depths have been assessed as part of the tables in Annex G, however as no bombs were recorded no further information on bomb penetration is required.

Further information on bomb depths and J Curves is in Annex F.

PART 6: RISK ASSESSMENT

Risk Assessment

Assessing both the likelihood of occurrence and the consequences of the encounter has derived the overall risk for the site from unexploded ordnance. Review of the site's history and geographic location can provide an overall likelihood of encounter factor, which is used in the subsequent determination of a risk level when a Figure can be determined for the consequence.

Likelihood of Encounter

Given the study findings and other criteria (See Annex G Tables) it is considered that there is a **LOW** risk of encountering UXO within the site footprint. This finding is based on assessment of all of the available information and taking account of the following factors:

- It is a matter of historic record that the airfield was subjected to enemy attack. For the most part, the records provide relatively accurate numbers of strikes however are limited in their precise locations
- The area has not been developed since WW2, however the site was covered in buildings with no recorded damage

Encounters of UXO are not uncommon, recent UXO finds are in Annex H.

Consequence of Encounter

The consequence see Annex F of an uncontrolled encounter with UXO, given its lethal design and its unpredictable nature could be catastrophic and warrants a high severity factor. With regards to the consequences, the following factors were considered:

The project works may make use of a number of common ground investigation and construction techniques in its methodology during the project. Any intrusive groundwork has the potential to encounter UXO.

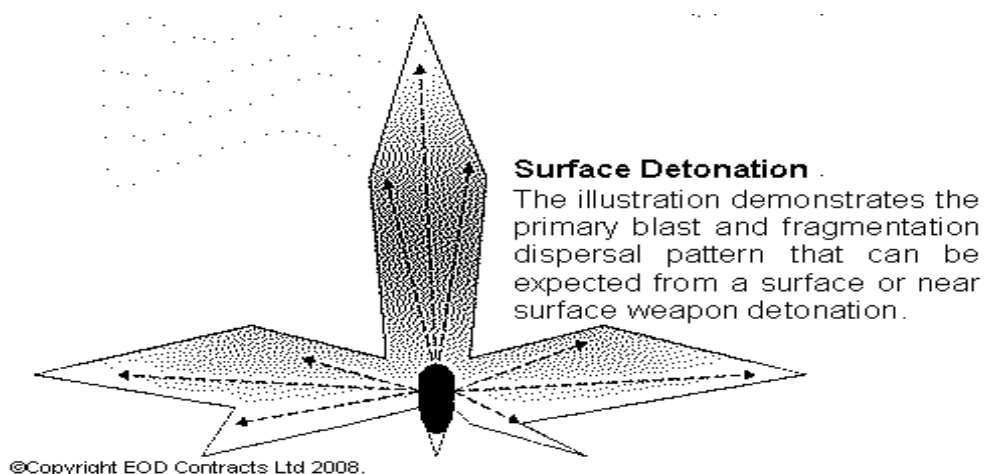
Intrusive earthwork, piling driving and dynamic ground compaction are by nature, aggressive, significant force (kN) is often required to achieve the desired results. As a precaution it is prudent to assume that any external stimulus, no matter how slight, may result in an unstable weapon detonating.

Records of encounters with UXO, particularly where plant machinery has been involved have resulted in detonations of the items with varying degrees of consequence; ranging from slight injuries sustained to piling contractors when a bomb detonated at 6.0m bgl to fatal injuries sustained to a construction worker while conducting near surface machine works on a motorway.

Detonation on land; the effects of a detonation at depth will be more localised and less destructive than one occurring on the surface. Figure 6.1 shows an illustration of the primary blast and fragmentation dispersal from explosive ordnance when it detonates on the surface. The weapon's design, and other key factors such as the ratio of explosive charge weight to total weapon weight (CWR) and the Net Explosive

Quantity (NEQ) will determine the size and effects of a blast. The effects will also be enhanced or reduced by a number of factors including, the presence of other energetic materials in close proximity to the blast or if the weapon is buried or exposed on the surface. As a guide Annex E Table 1 gives an indication of the likely blast radius for common types of UXO.

Figure 6.1: Primary Blast & Fragmentation on Land



In addition to the dangers of explosion, many common chemicals used in the manufacture of explosive ordnance fillings are; in sufficient quantity, and level of exposure, toxic or poisonous. Although it is unlikely that such chemicals would be encountered in significant quantity to represent a significant risk to personnel, leakage or venting could pose a risk to the local marine environment. In addition to heavy metals; copper, lead, zinc etc used in the weapon body and fuze, hydrocarbon propellants such as Kerosene may also be present.

Risk Level

The overall risk has been determined to apply to all of the ground within the site footprint. The prevailing risk level has been determined to be **LOW**.

PART 7: CONCLUSIONS

Based on the information researched by EOD Contracts Ltd for the proposed scope of works being carried out within the given site area, the following conclusions have been reached:

Historical UXO Contamination

The indicators for UXO contamination are:

Bomb Strikes	Bomb strikes were recorded on the airfield, no evidence indicates bombs on the site
Bomb Damage	No bomb damage was recorded, the buildings covered the majority of the site
Reconstruction	Limited reconstruction was noted; however, an original WWII building is still on site
Military Usage	Military usage was noted as the site was part of RAF Ringway
Explosive/Munition Factory	The site was not used in the production of explosives or munitions

Risk Level

The overall risk has been determined to apply to all ground works within the site footprint.

Risk Level	Therefore, so far as reasonably practicable the risk level on site is deemed as LOW .
Risk Depth	The expected bomb depth is not applicable.

PART 8: RECOMMENDATIONS

It is recommended that no further risk mitigation strategy is required.

SITE LOCATION



HISTORIC AERIAL PHOTOGRAPHS AND MAPS

Index of Historical Maps

Page No.	Date	Scale	Description/Remarks
B-2	NA	1:10,000 and 1:10,560	Historical Mapping Legends
B-3	1938	1:10,560	The site is open ground to the west of the airfield
B-4	1946	NA	AERIAL PHOTOGRAPH Oblique. The site is partly built upon as part of the Fairey Aviation and Avro factory for the construction of aircraft. (These can be seen in the aerial photograph) The buildings have obvious camouflage, the hard standings have a broken camouflage pattern
B-5	1954	1:10,000	The site is partly built upon as part of the Fairey Aviation and Avro factory for the construction of aircraft.
B-6	2022	1:10,000	Shows present configuration of buildings and usage, the building on the northern side of the site has been removed research notes this is in the early 1990s

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	•285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Fenced Minor Roads		Un-Fenced
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		Shown alternately when coincidence of boundaries occurs
	Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

1:10,000 Raster Mapping

	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building

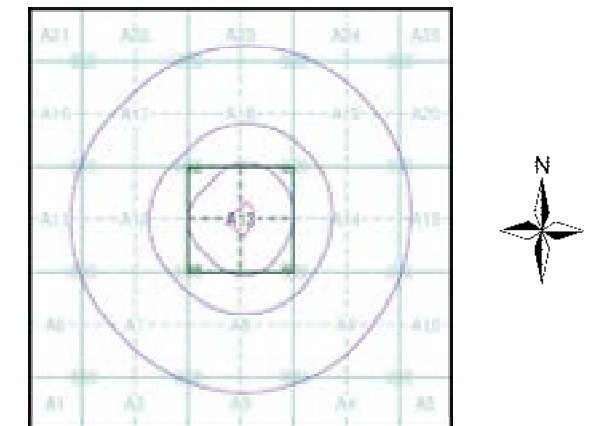


EOD Contracts Ltd

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Cheshire	1:10,560	1882	3
Cheshire	1:10,560	1899	4
Cheshire	1:10,560	1910 - 1911	5
Cheshire	1:10,560	1936	6
Cheshire	1:10,560	1938	7
Cheshire	1:10,560	1938	8
Ordnance Survey Plan	1:10,000	1954	9
Ordnance Survey Plan	1:10,000	1967	10
Ordnance Survey Plan	1:10,000	1971 - 1977	11
Manchester	1:25,000	1975	12
Ordnance Survey Plan	1:10,000	1980 - 1982	13
Ordnance Survey Plan	1:10,000	1990 - 1991	14
Ordnance Survey Plan	1:10,000	1996	15
10K Raster Mapping	1:10,000	1999	16
10K Raster Mapping	1:10,000	2006	17
VectorMap Local	1:10,000	2022	18

Historical Map - Slice A



Order Details

Order Number: 305593415_1_1
Customer Ref: 230011 Hangar 4 Manchester
TETRATECH
National Grid Reference: 381130, 384650
Slice: A
Site Area (Ha): 2.04
Search Buffer (m): 1000

Site Details

, Hangar 4, Manchester Airport, Ringway Road, Manchester, M90 5YP

Landmark
INFORMATION GROUP

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



EOD Contracts Ltd

Cheshire

Published 1938

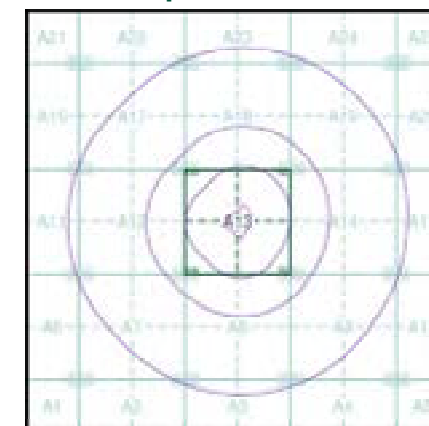
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

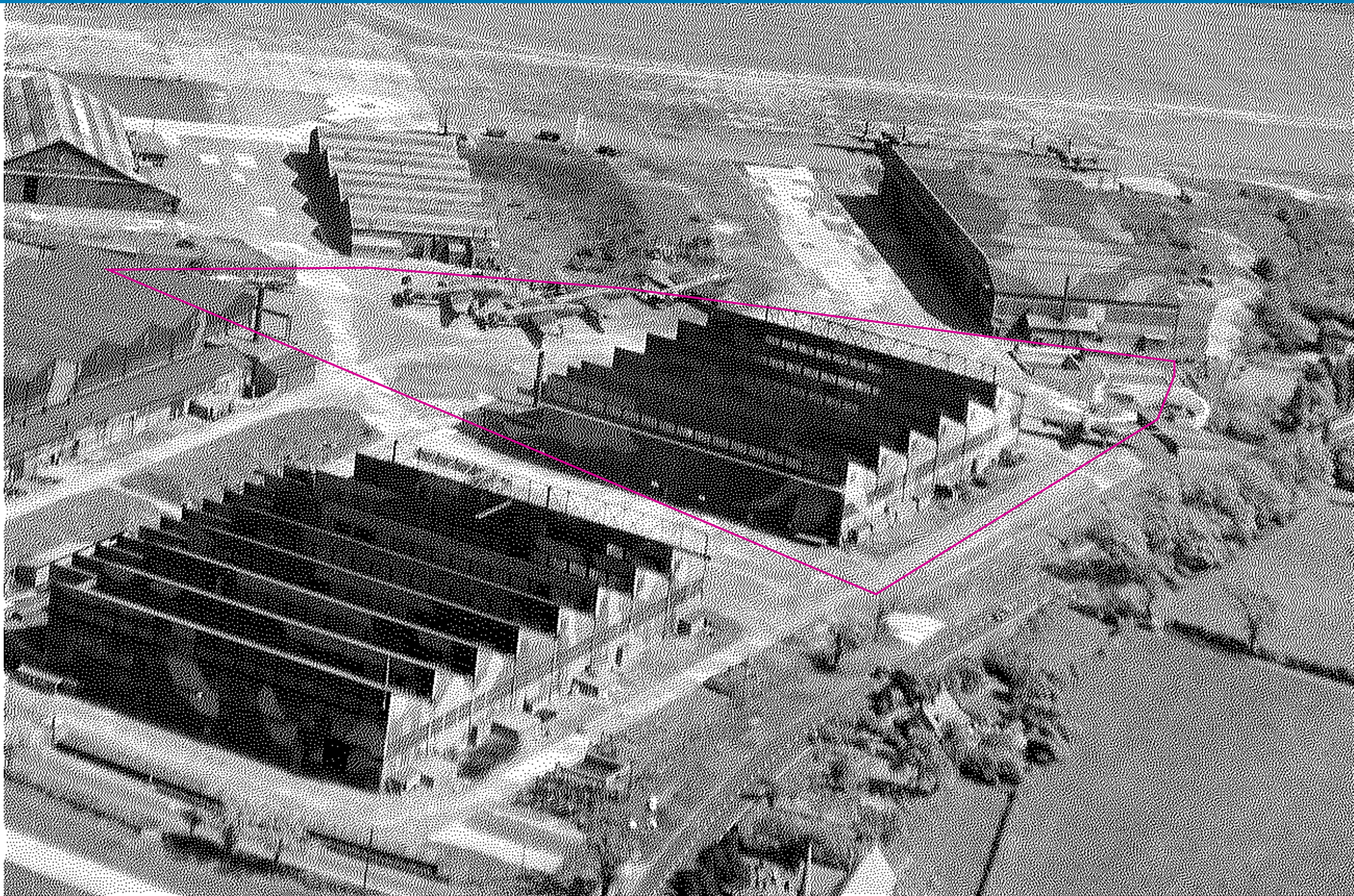
Order Number: 305593415_1_1
Customer Ref: 230011 Hangar 4 Manchester
TETRATECH
National Grid Reference: 381130, 384650
Slice: A
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M90 5YP



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



Description/Remarks

AERIAL PHOTOGRAPH
Oblique

Date

1946



EOD Contracts Ltd

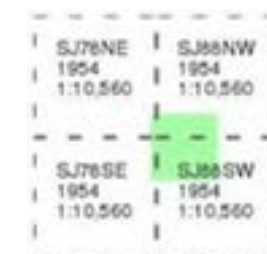
Ordnance Survey Plan

Published 1954

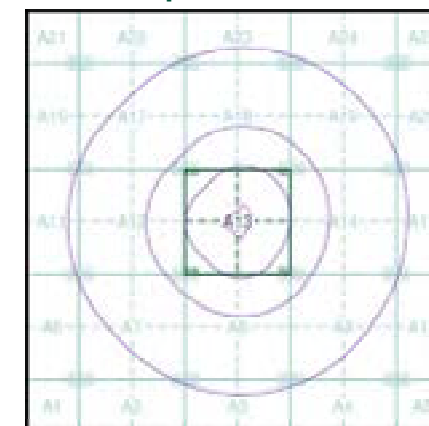
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

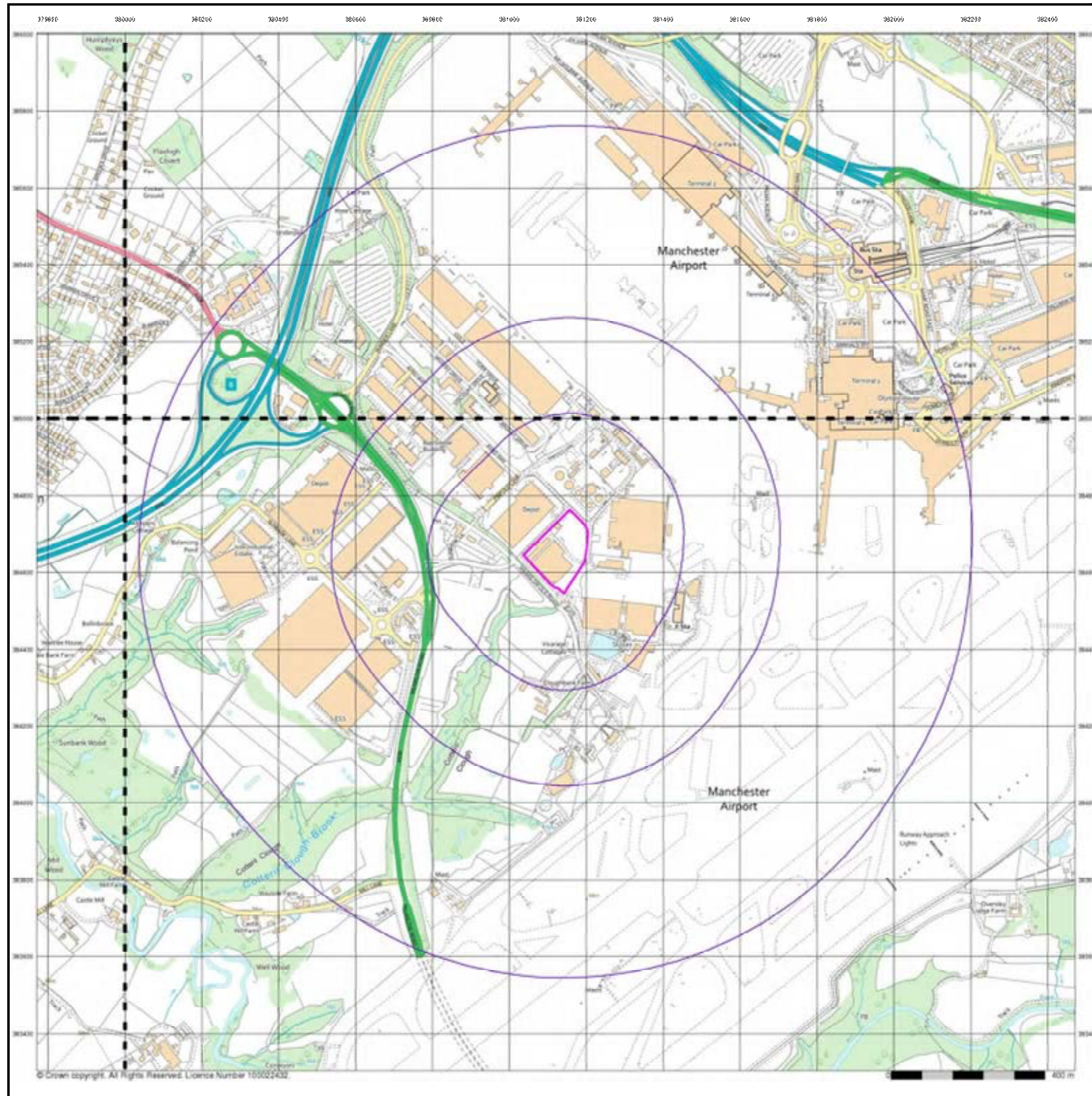
Order Number: 305593415_1_1
Customer Ref: 230011 Hangar 4 Manchester
TETRATECH
National Grid Reference: 381130, 384650
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Site Area (Ha): 2.04
Search Buffer (m): 1000

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M90 5YP



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VectorMap Local

Published 2022

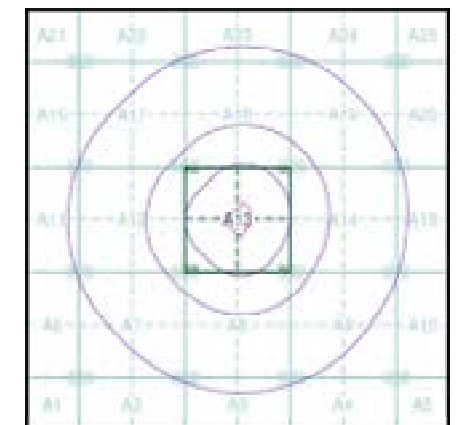
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities), 1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

SJ78NE 2022 Variable	SJ88NW 2022 Variable
SJ78SE 2022 Variable	SJ88SW 2022 Variable

Historical Map - Slice A



Order Details

Order Number: 305593415_1_1
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Landmark
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AIR RAIDS & NAVAL BOMBARDMENTS

Between December 1914, 1914, and June 17th, 1918, there were 21 air raids on Great Britain, 27 torpedoes, 14 bombs, and 12 bombs dropped from the sea by war vessels. The total casualties were 1,011, as follows:

January 1918: 108 killed, 1,200 injured; total, 1,308 including 10 killed and 1,200 injured and 121 injured.

January 1918: 108 killed, 1,200 injured; total, 1,308 including 10 killed and 1,200 injured and 121 injured.

February 1918: 112 killed, 411 injured; total, 523 including 14 killed and 409 injured and 100 injured.

An example of the official returns of casualties shows that 217 men, 172 women, 17 children were killed in air raids; 282 men, 282 women, 100 children in torpedoes; 10 men, 11 women, 10 children in bombs.

English Miles
0 5 10 15 20 40 60

Bombs dropped from Aeroplanes
Torpedoes
Bombardment from Sea

Site

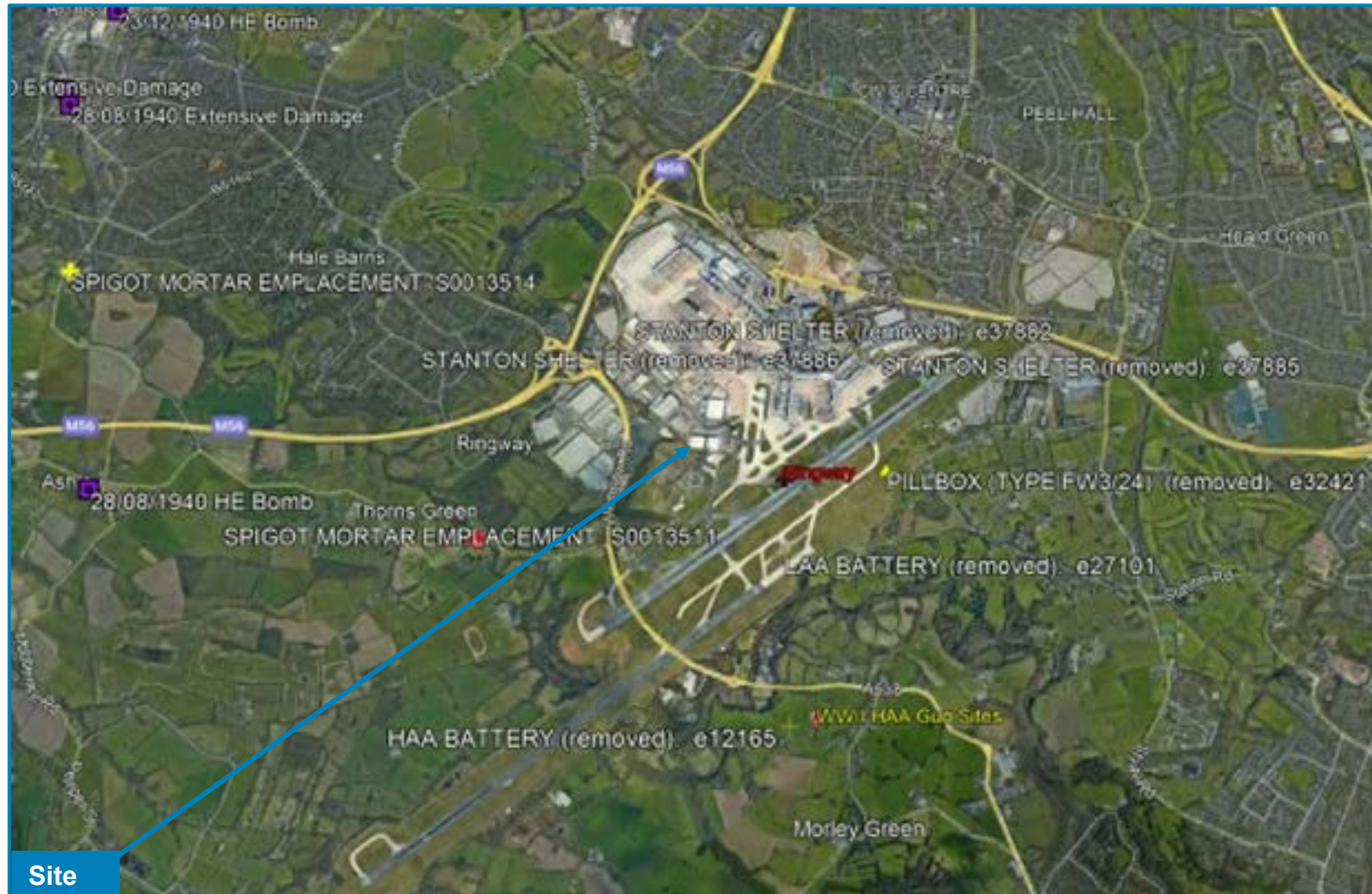
EAST KENT on Enlarged Scale

English Miles
0 5 10 15

THE GREAT WAR

CHART SHOWING THE EXACT LOCALITIES IN ENGLAND AND SCOTLAND THAT SUFFERED FROM HOSTILE AIR RAIDS AND BOMBARDMENTS FROM DECEMBER 16th, 1914, TO JUNE 17th, 1918.

EXPLOSIVE ORDNANCE CONTAMINATION ROUTES



EXPLOSIVE ORDNANCE SAFETY AND INFORMATION

UNEXPLODED ORDNANCE

Since the end of WWII, there have been a limited number of recorded incidents in the UK where bombs have detonated during engineering works, though a significant number of bombs have been discovered.

The threat to any proposed investigation or development on the site may arise from the effects of a partial or full detonation of a bomb or ordnance item. The major effects usually being shock, blast, heat and shrapnel damage. It should be noted that the detonation of a 50kg buried bomb could damage brick/concrete structures up to 16m away and unprotected personnel on the surface up to 70m away from the blast. Larger ordnance is obviously more destructive. Table 1 denotes recommended safe distance for UXO.

Table 1: Safety Distances for Personnel

UXO (Kg)	Safety Distances (m)			
	Surface UXO		Buried UXO	
	Protected	Unprotected	Protected	Unprotected
2	20	200	10	20
10	50	400	20	50
50	70	900	40	70
250	185	1100	120	185
500	200	1250	140	200
1000	275	1375	185	275
3000	450	1750	300	450
5000	575	1850	400	575

Explosives rarely become inert or lose effectiveness with age. Over time, fuzing mechanisms can become more sensitive and therefore more prone to detonation.

This applies equally to items that have been submersed in water or embedded in silt, clay, peat or similar materials.

Once initiated, the effects of the detonation of the explosive ordnance such as shells or bombs are usually extremely fast, often catastrophic and invariably traumatic to the personnel involved.

The degradation of a shell or bomb may also offer a source of explosive contamination into the underlying soils. Although this contamination may still present an explosion hazard, it is not generally recognised that explosives offer a significant toxicological risk at concentrations well below that at which a detonation risk exists.

BOMB PENETRATION DEPTHS

Weapons penetrate a significant depth into the ground and other types of ammunition are designed to permit the weapon time to penetrate deeply into the target before detonating a short time after coming to rest or a considerable number of hours afterwards. The second reason is where the weapon has failed to function as designed becoming a UXB. A number of studies have been carried out into weapon penetration and it is an inevitable consequence of a number of variable factors acting on the bombs trajectory that figures can and do

differ significantly. Careful consideration must be given to the weapon's velocity, trajectory and shape. Also surface conditions and subsurface geology. The largest of the common German bombs, (500kg) can penetrate to significant depths given favourable conditions for penetration. In the case of projectiles and shells, the potential for deep penetration is significantly less.

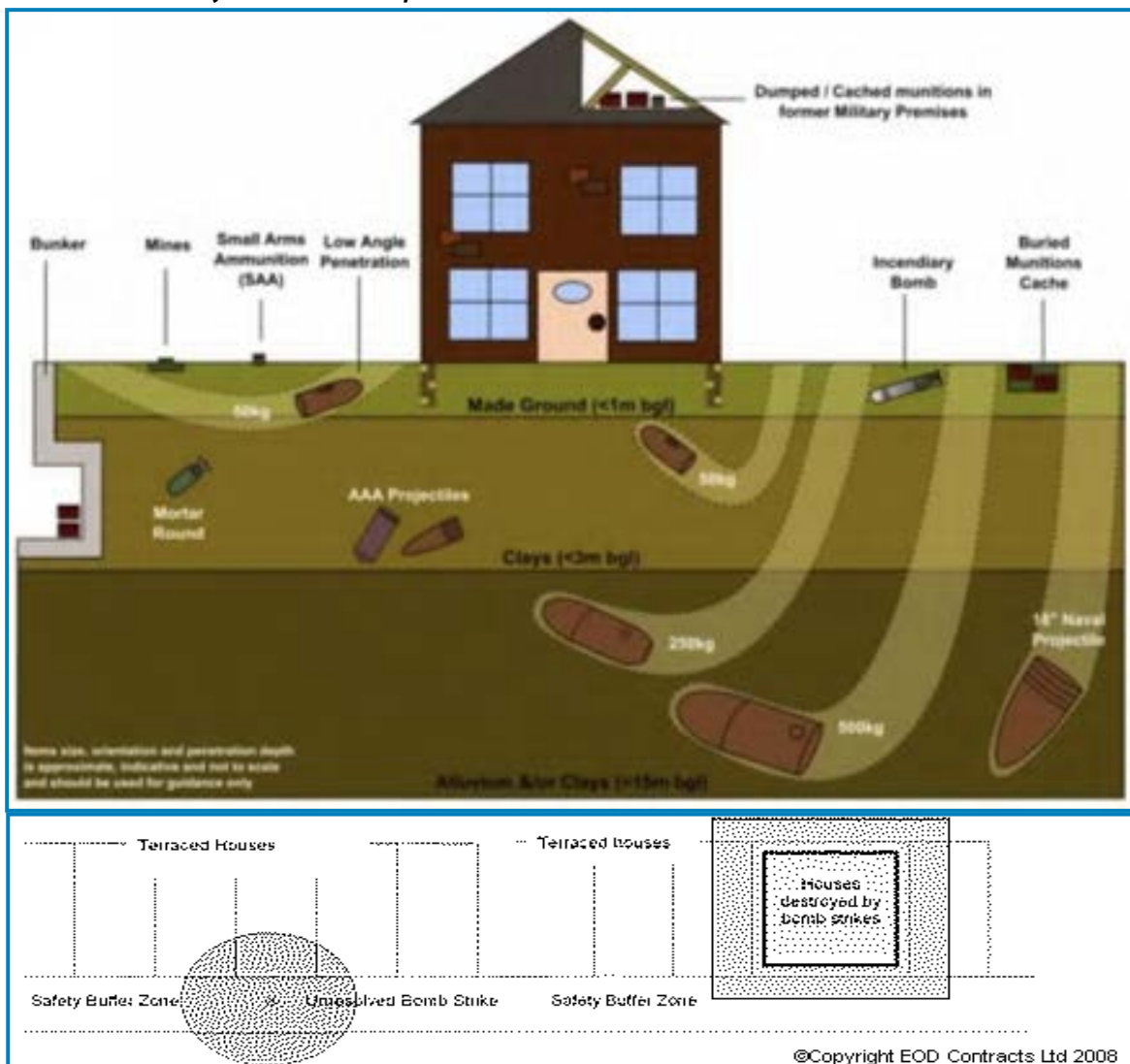
A number of assumptions were used in determining the maximum threat depth within the project footprint, which were;

The penetration of sub-surface bombs will be affected by the following:

- Height of release
- Weight, shape and design of bomb
- Aerodynamic qualities
- Angle of flight and impact
- Nature of impact surface
- Nature of sub soil

Bombs on penetration of the surface do not follow a straight-line trajectory they can and do curve; this is called a "J" curve where the bomb's path bends back towards the surface. This gives what is known as the Offset, which may place a bomb under a structure and at a shallow depth.

Figure 1: Sub-Surface Trajectories & Safety Buffers



Note; the common sub-surface trajectory will follow a path best described as a 'J' curve. The curve can result in a weapon coming to rest some distance from its impact point. The distance from impact point to resting place is referred to as the "Off set Distance and is normally considered to be 1/3 of the depth. This mechanism can permit a weapon to strike outside a building and travel below ground finally coming to rest within the building footprint. Where a strike is known to have occurred close to a building or structure such as a dock wall, a danger zone should be considered to exist around the area of the strike of sufficient size to accommodate the likely sub-surface travel distance for the weapon.

Note; the typical offset distance is shown as the shaded area, on rare occasions a near surface deflection of the weapon can occur and the offset distance can be substantially increased up to 5/4 of the penetration depth. This mechanism does however reduce the penetration depth considerably with the net result that while the offset is increased the overall travel distance is for the most part unaffected.

Note; scenario 1 shown top left shows a hypothetical bomb strike outside a structure or building. The strike location has been accurately identified and as a consequence; a potential danger zone (circular shaded area) can be placed around the point of impact. Scenario 2 shown top right; depicts a direct HE bomb or Incendiary strike within a building which totally destroyed the building. In circumstances such as this UXB entry the building rubble may have concealed hole and the weapon may still be present within the building footprint or it may have travelled sub-surface and come to rest outside the footprint. Here the danger zone (square shaded Area) extends outwards on all sides of the original building footprint.

TYPES OF ORDNANCE

German Air Delivered Ordnance. Technical information on the nature and characteristics of the ordnance used by the German Air Force during both world wars has been available for a number of years. Assessment that began during the 1930's has continued to the present day. Experts have conducted research in many countries as part of national research programmes and as individual research projects. Consequently a well-informed assessment of the threat posed by unexploded ordnance, and the hazards that they represent, can be made with a high degree of confidence.

Terminology. It should be noted that two terms used in bomb records can lead to some confusion as to their meaning and therefore significance. The term Unexploded Bomb (UXB) refers to a bomb that has fallen, failed to function and has been subsequently dealt with and removed from the site. The term Abandoned Bomb (A/UXB) refers to a UXB that could not be found or recovered, or the decision was taken not to pursue the matter further. Consequently the unexploded bomb remains where it came to rest when it was dropped or fell to the present day. It should also be noted the word 'bomb' can be used to describe an airdropped bomb or a shell as in some cases no differentiation was made and the term was interchangeable.

Abandoned Bombs. The records of known abandoned unexploded bomb locations in the London area were released in response to a written Parliamentary Question from Simon Hughes. (Hansard: Volume; 282. Dated 15th October 1996). The information was provided by the Ministry of Defence (MOD) and supplied under an indemnity.

Explosive Ordnance Failure Rates. Over the course of both World Wars a considerable quantity of ordnance dropped on UK targets failed to function as designed and subsequently penetrated the ground without exploding. Information gathered during the war by the MOD and its research partners provide typical failure rates for different types of ordnance. Figures significant to this study are:

- 10% of all German airdropped bombs failed to function as intended.
- 30% of all anti-aircraft and other types of shells failed to function as intended.

Deductions & Considerations. The following points were considered as part of the assessment and have been given due consideration:

Records were found that indicated that the general area was subjected to heavy bombing.

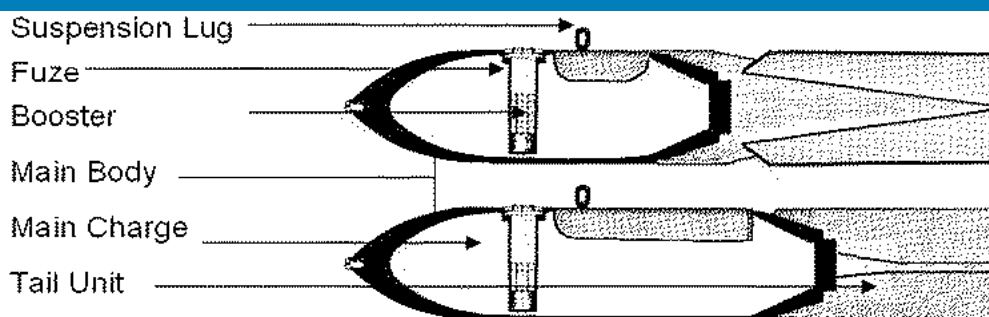
Bombs, which struck previously, hit or burned out targets and did not function; consequently their impact was unseen and therefore no report was ever made.

In all likelihood, the local anti-aircraft battery would have fired a far higher number of shells than the bombers dropped HE bombs. Contamination by anti aircraft shells can not be ruled out.

Generic German Bomb Types. The majority of German bombs dropped were 50kg in weight, accounting for approximately 16% of the total bombs dropped. The range of common bombs increased in weight to a maximum of 1700kg. Regardless of size, German bombs were fitted with one or more Electrical Condenser Resistance (ECR) fuzes many of which included a mechanical component. The fuzes were mounted transversely in the bomb body with the booster directly below, and in contact with, the fuze. The booster; sometimes referred to as the Gaine, is composed of a sensitive explosive material (Picric Acid). Picric Acid is known to deteriorate over time becoming increasingly unstable. The internal layout of two common German bombs and a German fuze is shown in Figures 2 & 3.

Figure 2: Generic German Bomb Design

Graphic Cross Section through the most common German bombs (50kg)



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Note; the diagram shows that there can be a significant difference in the quantity of High Explosive contained within bombs of similar size and shape; the Grade 1 bomb on the bottom having 30% more HE than the Grade 2 shown at the top. This serves to demonstrate the importance of an accurate identification of any item of UXO.

Figure 3: Generic German Bomb Fuze Design.

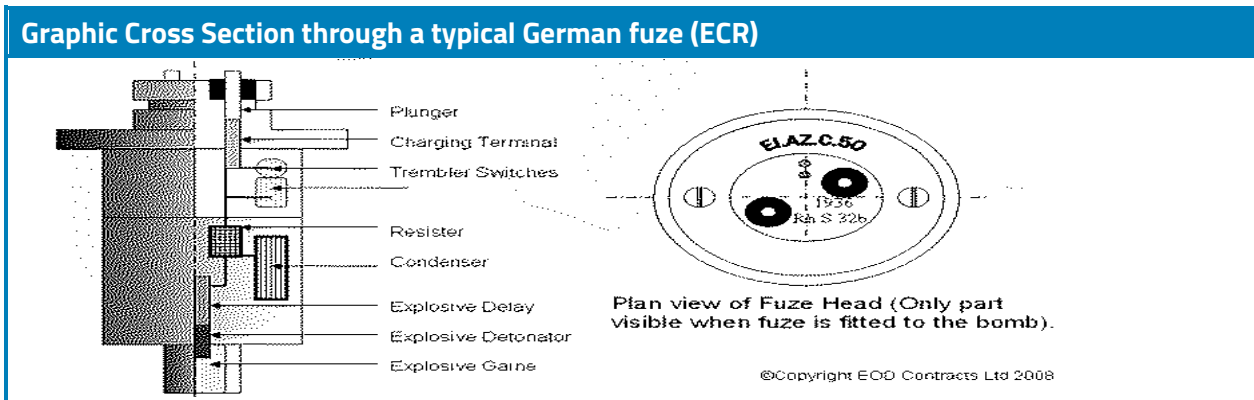
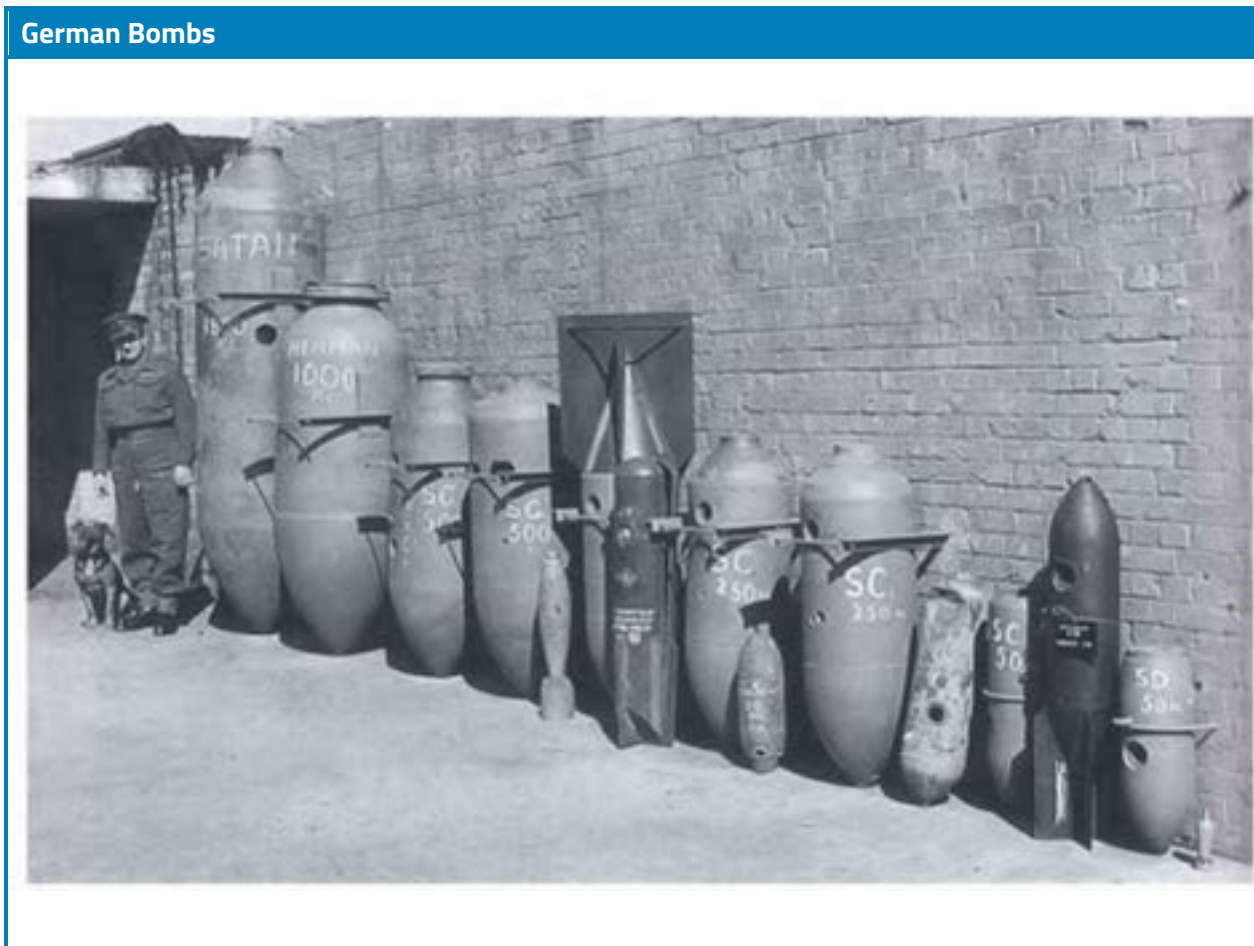


Figure 4: Range of HE bombs dropped on the United Kingdom.



NOTE: The smaller sub-munitions (Bomblets) seen to the right, ranged in size between 1 and 3kg, were dropped in large numbers and were intended as incendiary bombs, anti-personnel bombs or as bombs filling both roles. The smaller bomblets were dropped in larger container bombs designed to hold between 360 and 620 of the bomblets. The containers were designed to burst open at a predetermined height above ground level, dispersing the bomblets over a wide area. Air raid damage was far greater by using both incendiary, and HE bombs on a single raid. The fires started by the incendiaries being rapidly spread by the blast waves from the HE bomb. This scenario was shown to devastating effect on the 14th February

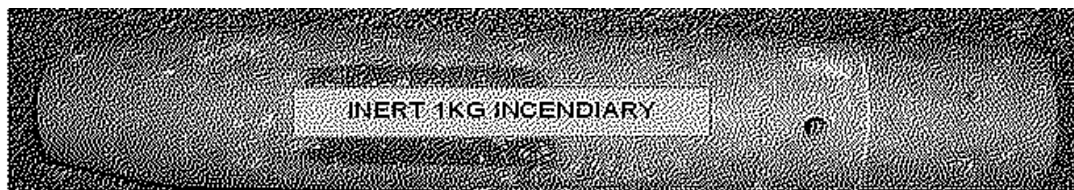
1945 in the German city of Dresden. Where fires started and spread by the bombing increased to a point where the oxygen was being sucked into the flames at such a high speed that the fire became a "Fire Storm". At the time the city's population had increased due to a high number of refugees fleeing the Russian advance to the east, the exact civilian death toll from fire and suffocation will never be known, but is considered to be somewhere between 25,000 and 100,000.

High Explosive (HE) Bomb. Some of the most common type of ordnance to be dropped on the United Kingdom, HE bombs are often the type encountered as UXBs. Relatively thick cased, they are still recovered in remarkably good condition. Ranging in size from 50 to 1700 kg, their typical release height (1,500m) allowed them to penetrate deep into the ground as a result of design or flaw. Towards the end of the bombing campaign, as steel became scarce the German Engineers produced a range of bombs that used steel reinforced concrete as the bomb body. Figure 4 shows the range of steel HE bombs dropped on the UK.

Incendiary Bomb. The larger incendiary bombs, containing bottles of white phosphorus and an incendiary mixture contained within a thin steel case were designed to burst on contact with the ground. A fixed dispenser on the aircraft delivered the smaller type of bomb or 'Bomblet' to the target area in container bombs or; both types of container would open dispersing the smaller Incendiary bombs. Relatively small and light they were unlikely to penetrate the ground to any significant depth. However, once concealed in bomb damage rubble or below water they were easily missed and are still unearthed today from in-fill and drained land. Later versions of the incendiary bomb contained an additional explosive charge used as a short delay "Booby Trap" device that contained a significant amount of high explosive. The Booby Trap component was designed to kill or injure fire fighters and hinder the damage control. See Figure 5.

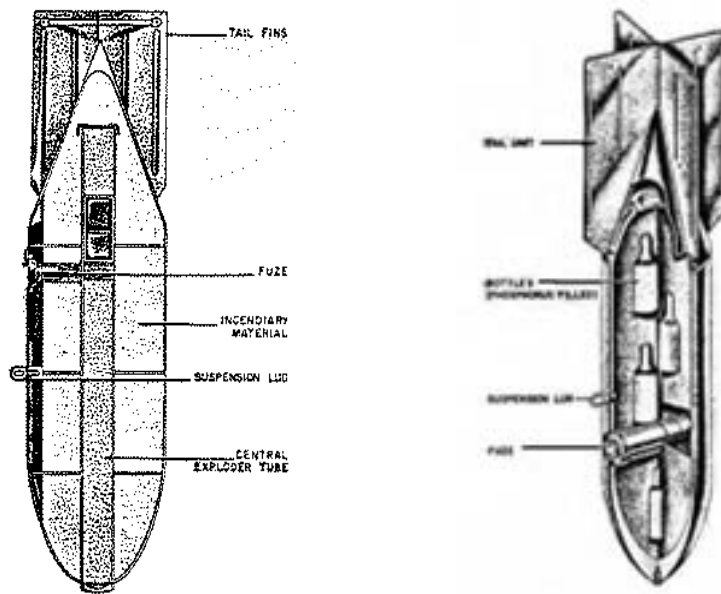
Figure 5: Incendiary Bombs.

Common German Incendiary Bombs



250 mm

Above 1kg incendiary bomblet, below left the larger 500kg incendiary bomb Below right a 50kg incendiary bomb containing bottles of white phosphorus.

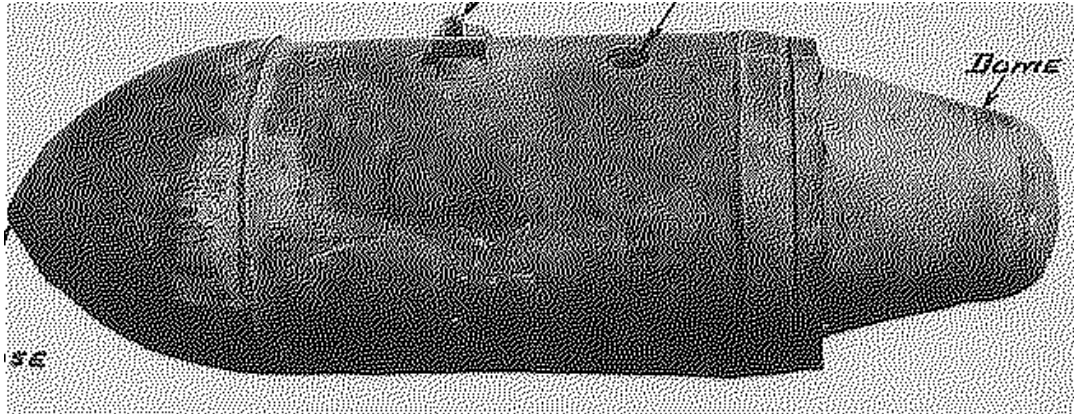


Note; Incendiary bomblets were made of a flammable alloy similar in appearance to aluminium, which resists corrosion well. The tail unit was made of thin tin-plate steel and is more prone to have rusted away. Some incendiary models were fitted with a High Explosive (HE) steel nose. With the tail and explosive nose attached the bomb was 480mm long.

Blast Bomb / Parachute Mine. The parachute mine was extensively used on land and at sea and was fitted with specialist fuzes designed to trigger the weapon at a predetermined altitude, water depth or to switch on other magnetic influence mechanisms to trigger the weapon when a ship approached (Magnetic or Acoustic influence). While early versions were based on the standard 1000kg SD Bomb case others were specially designed and manufactured with an aluminium body, making them extremely difficult to detect using magnetometers. The thin cased versions would normally disintegrate on impact on land and are normally considered to pose little threat to work on land based projects, but the risk increases significantly on projects over water or in marshland. Thicker cased versions however will survive impact and pose a significant risk regardless of the local ground conditions. (See Figure 6)

Figure 6: Common Airdropped Mines.

Parachute & Ground Mines



Note; all mine fuzes were designed to arm after deployment from the ship, submarine or aircraft, some fuze designs incorporated anti-removal booby traps. Unexploded mines found today are the result of a failure within the arming mechanism or procedure whereby the mine never fully armed. Sudden shock or jarring of a weapon in this state has the potential to complete the arming sequence and could result in the mine detonating with lethal consequences.

Non-Steel Cased Bombs. Used primarily in the construction of training or practice bombs, some high explosive variants were introduced towards the end of the war. With resources running scarce, German Engineers produced a small number of blast bombs with a concrete body. The design utilised a steel framework onto which concrete was cast. The explosive filling was also contained within a thin steel container within the bomb body. Very few “concrete” bombs were dropped on the UK. In common with standard steel cased weapons, this type of bomb can be detected using standard magnetometer detection techniques (albeit; providing a smaller ferromagnetic signature than its all steel counterparts). This type of bomb represents a very small percentage of the total number of bombs dropped worldwide and are not considered a significant threat, particularly when viewed from an overall bomb threat in the UK.

Anti-Personnel Bomb. Generally these were small weapons of 1-3 kilograms in weight and are often referred to as ‘Bomblets’ and possessing similar ground penetration ability as the Incendiary Bomblets. They were often located during the post-raid searches. This type of bomb has been recovered within the bomb rubble being cleared or used as in-fill on construction projects and poses the same potential to function as the Incendiary bomb with a greater potential to cause localised casualties.

Specialist Bomb. These types of bombs were designed to meet a specific mission requirement. Typically, this would be a design modification or special fusing to enable the bomb to destroy hardened/armoured targets or deep buried and sub-marine targets. Similar to the more common HE bombs, they differ in that they rarely contain large amounts of high explosive. Therefore the consequence of a detonation is reduced but remains a significant risk, particularly when the detonation occurs on or near the surface.

Depth Bombs & Depth Charges. These types of weapons were designed to meet a specific mission requirement. Typically, the modifications would include the type of explosive filling and special fusing to enable the bomb to penetrate to a significant depth into the ground or water before detonating. Depth bombs intended for maritime attack and sub-marine targets would be fitted with one or more fuzes, one of which would be a hydrostatic fuze designed to detonate the bomb at a predetermined depth. The bomb would be fitted with an anti skip ring to reduce the deflection of the bomb as it entered the water. Similar in many ways to Depth Bombs, Depth Charges were exclusively designed to detonate at a predetermined depth. This was achieved by fitting the Charge with a short time delay or hydrostatic fuze. Depth bombs; having a similar configuration to general purpose bombs had the potential to penetrate deeply into the sea bed where an attack occurred in the relatively shallower water of a dock.

Unmanned Rocket Bombs & Missiles. The most famous in this category of weapons were the V1 (Fi103 flying bomb) commonly known as the Doodlebug and the Larger V2 (A4 missile). Both V1 & V2 with high explosive warheads containing 850kg & 1000kg (respectively) represent some of the largest weapons to land in the United Kingdom. Both types were built in a similar manner to an aircraft and would generally disintegrate on impact even if the warhead failed to detonate. The impact would spread debris over a wide area which was difficult to miss and any resulting unexploded 'V' weapons were comprehensively dealt with at the time. For this reason they are rarely encountered on land. However, where a 'V' weapon landed in water the opportunity for the event to have been missed and/or follow-up action abandoned was greater and they continue to pose a significant risk. Other, less well known rocket bombs were also produced by the Luftwaffe to attack maritime targets. Some were equipped with TV/Radio guidance from the parent bomber. Two of the most common were the Fritz X which consisted of an adapted SD1400kg bomb and the Henschel Hs293 which was based on a smaller 500kg bomb. No record of one having been recovered on land as a UXB can be found but these large HE bombs are considered to pose a significant risk, particularly to maritime projects. No records were found to indicate this type of bomb was ever used on targets in the area.

Photoflash Bomb. This type of bomb was dropped by specialist "Pathfinder" aircraft and although this type of bomb can be included with the category of specialist bombs, it is worthy of specific comment due to the danger it may still pose. Photoflash bombs were designed to explode with a blinding flash, rather like a camera flashbulb. They were used to enable photographs to be taken of targets at night and also served to identify ground targets for other aircraft to attack. The speed at which the highly energetic filling detonated, and energy it produced in doing so, was significant. Although these bombs were thin skinned and are prone to corrosion the functioning of one can be compared to a high explosive bomb detonation.

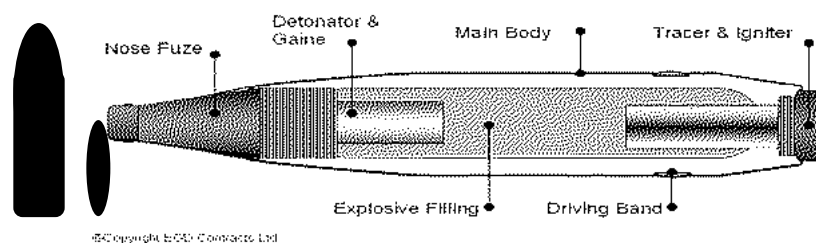
High Explosive Shells & Projectiles. As mentioned previously, one of the most common sources of UXO contamination encountered in the United Kingdom is High Explosive Shells and Projectiles. This is most commonly found to be as the result of firing practice ranges, bombardment and anti-aircraft defence, the latter often positioned to defend Major cities and Strategic installations and ports from German Bombing. Anti Aircraft Shells and projectiles are generally smaller (Up to 4.7" inch diameter) than the airdropped bombs and as a consequence were more easily missed amongst the bomb rubble. However, coastal bombardment guns could fire a shell weighing 1000kg, (larger than most common airdropped bombs) and capable of significant ground

penetration. The generic layout of a projectile can be found at Figure 7. It should be noted that the fatal incident on the German autobahn in 2006 was thought to be the result of a shell or projectile detonating, not an airdropped bomb as first reported.

The Fuzes used in Anti-Aircraft Ammunition were designed to ensure the projectile would detonate in contact with the target, or at a pre-set altitude, or in close proximity to the target. The fuzes employed different means to achieve this, including: direct impact, or indirect impact, Barometric, Delay and Electro-magnetic influence. Some were fitted with more than one fuze, which served to reduce the chance of the projectile falling to earth and detonating. Artillery fuzes are activated during the firing process, using the projectile's acceleration or spin within the gun barrel to switch off the safety mechanisms. For this reason, fired projectiles are considered more dangerous than unfired ones.

Figure 7: Generic Shell Design

Scale & Graphic Cross Section of a typical High Explosive (HE) Shell



Approximate size of a large shell used by battleships and coastal bombardment guns (Left) and Anti-aircraft shell (Right)

Other Types of Ordnance

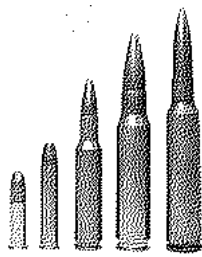
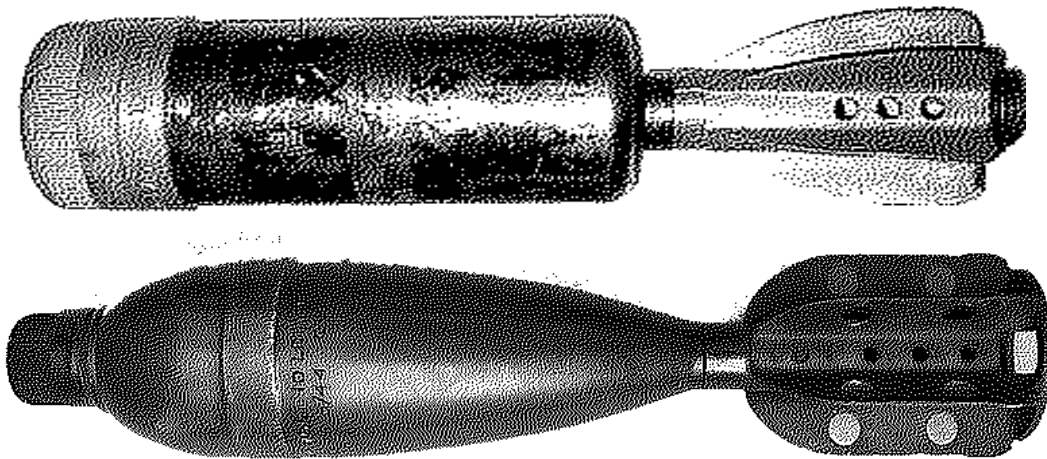
The following additional sources of ordnance types have been considered, and inherent risks taken account of:

Flares and Pyrotechnics. Flares and pyrotechnics were used for a variety of reasons throughout the war and continue to be found today in the most unlikely places. However, due to the thin casings of these weapons a high level of corrosion is likely to have occurred since manufacture. Depending on the specific nature of the weapon, this effectively renders them inert with the exception of any white phosphorous content or explosive gain.

Land Service Ammunition (LSA). While as the name implies this type of ammunition was designed for use on land, it was also issued to naval personnel for close protection of vessels and their crew and to provide a limited offensive capability even to relatively small craft. This type of ammunition includes some shells and projectiles such as those covered previously. Other natures of LSA range from Small Arms Ammunition (SAA), having little or no high explosive content to Grenades, Mortars and Rockets which may pose a risk of detonation due to their explosive content and the design of their fuzes (impact) which; if subjected to sufficient shock or friction may result in the weapon functioning. (See Figure 8).

Figure 8: Common Categories of Land Service Ammunition

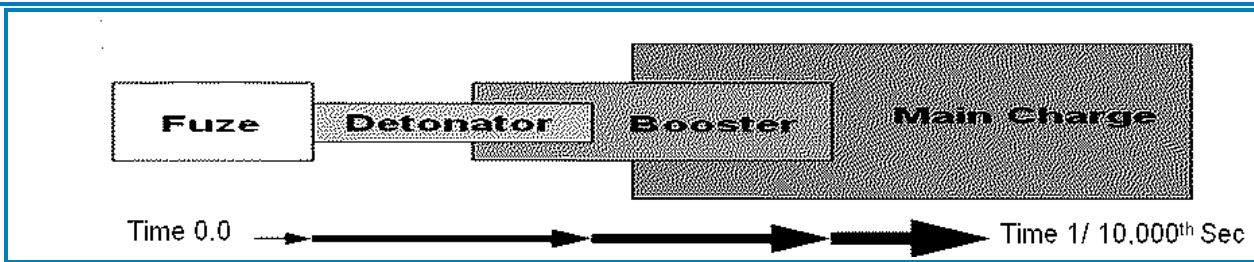
Land Service Ammunition

Small Arms Ammunition**Grenades****Mortar Bombs**

Initiation of Unexploded Ordnance. Explosive Ordnance is highly unlikely to spontaneously explode. The energetic chemical compounds, (Explosives) used in weapon manufacture are chosen to be as stable as possible and they all require a significant application of additional energy to create the right conditions for detonation to occur. If stored correctly, most explosive materials are designed to remain stable for the duration of their expected lifespan (typically 20 years). During this time, the correct functioning of the weapon is achieved by means of the 'Initiation Train' (See Figure 9).

Figure 9: Explosive Ordnance Initiation Train

Sequence of Initiation



Initiation Train. This is a means by which, once the safety features have been switched off or removed, a chain reaction occurs through the weapon. Starting within the fusing system as a small ignition or spark, causing a detonator to explode, which in turn causes the booster charge to detonate with a greater energy and ending in the full detonation of the main explosive filling. Each part of the process has in-built safety features to prevent an unintended detonation. A failure in any of the components within the Initiation Train can result in a UXO. In the case of a UXB; the chain reaction has broken down and the Initiation Train is brought to a halt, albeit, a temporary one. There are a number of ways that sufficient energy could be introduced to the otherwise stable UXB / UXO that may allow the Initiation Train to set off once more, overcoming the initial reason for failure. In addition to subjecting the weapon to excessive heat, such as a fire, the most common methods to bring about an explosive detonation in such items are considered to be:

Direct impact onto the main body of the bomb by mechanical excavation or pile driving: Such an occurrence can cause the bomb to detonate, should the point of impact be on the bomb fuze; less force would be required to bring about a full or partial explosive detonation.

Re-starting the clock timer in the bomb fuze. Only a small percentage of bombs were fitted with clockwork fuzes. It is likely that corrosion has taken place within the fuze that may prevent the clockwork mechanism from functioning. However, the restarting of the clock is by no means a scenario that can be completely ruled out. This is considered to be one of the two most credible mechanisms by which sufficient energy could be introduced to the bomb and result in a detonation.

Induction of a static charge or exposure to an external power source (Electrical Services), causing a current in an electrical fuze. The majority of German bombs employed an electrical component within the fuzes, it is likely that corrosion would have taken place within the fuze mechanism and that it would no longer contain, or conduct sufficient electrical charge to initiate the bomb.

Friction initiating the sensitive fuze explosive. Some chemical constituents may have deteriorated, due to oxidation. Components designed with a high degree of stability at the time of manufacture may no longer be as safe. This is considered to be the most likely mechanism by which sufficient energy could be introduced to the bomb and result in a detonation.

Risk Assessment Tables

Table 1: Summary of Potential Contamination Sources

Source	Applicable	Not Applicable
Enemy Attack & Counter Measures		
Bombing WW1		☒
Manned Aircraft Bombing WW2	☒	
Unmanned V1 & V2 Rocket Attack		☒
Shelling		☒
Anti-Shipping Mines & Depth Charges		☒
Anti-Aircraft Shells & Rockets		☒
Beach Mines & Coastal Defences.		☒
Airfield/Key Point Defensive Mines/Charges		☒
Abandoned Unexploded Bomb (A/UXB)		☒
Migration of UXO		
UXO Migration in Rubble & Infill		☒
UXO Migration by Tide & River Current		☒
UXO Migration by Marine Dredging		☒
Ship Wrecks		☒
Dispersal by Explosion, Fire & Accident		☒
Aeroplane Crash		☒
Private Collections		☒
MOD Facilities		
Bombing Range		☒
Artillery, Mortar & Tank Range		☒
Grenade Range		☒
Small Arms Firing Range		☒
Weapon Research & Development Facilities		☒
Ammunition Burial Grounds		☒
Docks & Harbour Facilities		☒
Offshore Ammunition Dumping Grounds		☒
Ammunition Storage & Manufacture Sites		☒
Airfields & Air Stations	☒	
Bombing Decoy Site		☒
Army Barracks & Camps		☒
MOD Training / Concentration Areas		☒
Home Guard & SOE Weapon Caches		☒

Table 2: Baseline Bomb Penetration Assessment

Sub Soil Type	Bomb Weights			
	50kg	250kg	500kg	1000kg
Soft Rock	2.442	5.016	6.006	7.062
Gravel	2.442	5.016	6.006	7.062
Sand	2.442	5.016	6.006	7.062
Chalk	3.7	7.6	9.1	10.7
Shingle	3.7	7.6	9.1	10.7
Dry Clay	3.7	7.6	9.1	10.7
Wet Sand	5.55	11.4	13.65	16.05
Wet Clay	5.55	11.4	13.65	16.05
Average Offset (m)	0.8-1.6	1.6-3.7	3-4.5	3.4-5.3

Table 3: Site Specific Bomb Penetration Assessment

Input Figures			
Bomb Weight	Release Height	Velocity on Impact	Angle of Strike
500 kg	5000 m	340 m.s ⁻¹	10° to vertical
Geological Unit Description		Anticipated Thickness (m)	Anticipated Depth (m bgl)
Made Ground		1	1
Clay		3.2	4.2
Clay with Gravel		5	9.2
Silt and Sand		1.05	10.25
Output Figures			
Maximum Penetration Depth		Maximum Offset	
10m		5.3m	
The maximum threat depth from airdropped weapons is considered to be:		Bombs 10m	
The maximum threat depth for smaller shells is considered to be:		AA Shells 3m	
Input figures based on the most common bombing methods and largest common bomb type Figures derived from computer simulation. All depths based on 1939 levels.			

Table 4: Airdropped Weapon Strike Indicators (UK)

Item	Increasing Potential level ⇒			
Site Location	Rural	Small Town	Brown Field Large Towns	Cities
Site Description and Use	Greenfield or Agricultural Land	Near Strategic Target	Adjacent to Strategic Target	Strategic Target
Site History	No history of Attack	Near area of Attack	Immediate Area Attacked	Direct Attack
Strategic Target: Military Installation, Industrial or Munitions Manufacturer, Power Station, Gas or Water Works, Port, Dock, Railway Yard, Decoy Site.				

Table 5: Weapon Strike Records (UK)

Source	Availability			
Archive	None	Non specific	Specific	Extensive
In-house	None	Non specific	Specific	Extensive
Anecdotal	None	Non specific	Specific	Confirmed

Table 6: Anti-Aircraft Weapon Strike Indicators (UK)

Item	Increasing Potential level ⇒			
Site Location	Rural	Town	City	Military Site
Fixed Battery Location	None	General Area	Nearby	Onsite
Mobile Battery	Rural	Town	City	Military Site
Military Site: Airfield, Port, Radar, Barracks, Depots, Arsenal or Similar.				

Table 7: Abandoned Bomb Records (UK)

Item	Increasing Potential level →		
	None	Yes	On-site
In-house	None	Yes	On-site
Other	None	Yes	On-site

Table 8: Bomb Strike Density Assessment

Bombs & Mines	Bomb density placed at LOW.
---------------	-----------------------------

Table 9: Opportunity to have detected Bomb or Shell Strikes (UK)

Increasing Potential level	
No recorded bombs or damage	
Good ARP cover	
Significant development	
No significant ground cover	
Light bombing or damage	
Moderate ARP cover	
Moderate development	
Frequent public access	
Little ground cover	
Significant bombing or damage	
Poor ARP cover	
Minimal development limited to shallow excavations	
Infrequent public access	
Moderate ground cover	
Heavy bombing or damage	
No ARP cover	
Development limited	
Controlled private access	
Heavy ground cover, vegetation, ploughing or body of water	

Table 10: Post Contamination Development Indicators (UK)

Nature of Post Contamination Development	Increasing Potential level	
	100% excavations of the entire site to below contamination depth.	
	Significant development	
	Moderate development	
	Minimal development	
	No development	

Table 11: Construction Activities Encounter Indicators

Activities	Increasing Potential level	
	Borehole Drilling	
	Dynamic Sampling	
	Shallow Trial Pit	
	Services Trenching	
	Bored (CFA) Piling	
	Sheet Piling	
	Shallow Excavations over extended area	
	Deep Excavations over a limited area	
	High Density Piles	
	Deep Excavations over extended area	
	Bulk Excavations	



Source:	BBC
Date:	24 July 2021
Description:	A live World War Two bomb unearthed by builders on a housing development has been destroyed in a controlled explosion. The 500lb (227kg) device was found on the new-build estate in Goole, East Yorkshire, on Thursday. Eight homes were evacuated and the M62 was shut between junctions 35 and 37 as a safety precaution. Humberside Police said the device was successfully detonated at 16:22 BST on Saturday. All residents have been able to return to their homes and local business are no longer being asked to remain closed. The force also said a no-fly zone and the closures of the M62 and other roads nearby had since been lifted. John Sharpe, site manager of the Beal Homes development, said he received a call from workers just after midday on Thursday. "They didn't know what they'd dug up at first and a guy went down into the hole because we thought it was a metal pipe. "As he uncovered it he realised it was a bomb and got out pretty quickly," he said.



Source:	The Sun
Date:	27 February 2021
Description:	A WORLD War II bomb which sparked a mass evacuation in Exeter has been detonated by army experts leaving a crater the "size of a double decker bus." The noise from the huge blast - which sent debris flying more than 250 metres - could be heard five miles away with some residents claiming the aftershock rattled their windows. Personnel from the Army's Royal Logistics Corps took over from Royal Navy bomb disposal experts this morning. They used 400 tonnes of sand to create an enclosing "box" before it was "made safe" at around 6.10pm. He added: "Around 400-tonnes of sand was transported to the site of the device, which is at a building site on private land, and walls were erected... to mitigate the impact of the detonation. "Trenches were also dug to prevent ground shock. Despite these mitigation measures, the impact of the blast has been significant and debris has been thrown at least 250-metres away. "The crater is around the size of a double decker bus.



Source: UKNIP

Date: 04 May 2020

Description:

Officers from Kent Police are working with Army Bomb Disposal officers after the discovery of two unexploded WW2 bombs were located in Kings Hill, Kent.

Police were called just after 4:30pm Monday afternoon to Warwick Way after the discovery of an unexploded ordnance. The Army Bomb disposal service were called in to action to attend the scene to evaluate the discovery and make it safe.

Shortly after a second ordnance was found in the adjacent road Gibson Drive. Officers have placed a cordon on the area whilst the Army investigate and decide if a controlled explosion is needed.



Source: The Bolton News

Date: 10 February 2020

Description:

A worker who found an unexploded bomb in a back garden has spoken about the discovery. Aram Mahmoud found the item while putting fence posts in for a house on Bradford Road, and said he recognised the explosive instantly due to growing up in Iraq. Mr Mahmoud said: "We were putting up concrete posts and we were digging and we found a rocket. "We called the police immediately and they came round.

The bomb disposal team told Mr Mahmoud that the device was "very very dangerous". Bradford Road was closed between Green Lane and Bishops Road, and Oakleigh Avenue was also shut off with residents evacuated.

Both roads have now reopened and the police have left the scene.



Source: Sky News

Date: 4 February 2020

Description:

London's Soho Evacuated as World War Two Bomb Discovered

A large part of central London's busy Soho area was evacuated after an unexploded Second World War bomb was found at a building site.

Police were called at 1.42pm on Monday to Dean Street, connecting Oxford Street to Shaftesbury Avenue, which they cordoned off after the device was discovered near the Soho Hotel.

A Royal Engineers bomb disposal unit was called in and removed the half-tonne device.

The Metropolitan Police's Soho team said the cordons in Oxford Street, Charing Cross Road, Shaftesbury Avenue, Lexington Street and Poland Street had been lifted shortly after 8:30pm.



Source: Express and Star

Date: May 17, 2019

Description:

Second World War Bomb Detonated in Bilston.

A Second World War bomb was detonated by the army in Bilston last night following a discovery by a workman.

The detonation took place on what appeared to be a building site at around 8.30pm.

A West Midlands Police spokesman said: "We were called to reports of an unexploded World War 2 bomb at a building site on Coseley Road, Bilston, at 3.40pm. A controlled explosion was carried out."

Sip Grenades



Aftermath of Demolition

**Source:**

The Beach <https://www.thebeach.co.uk/news/local-news/bomb-squad-called-after-dozens-of-second-world-war-grenades-discovered/>

Date:

28 May 2019

Description:

Army bomb disposal teams have detonated 24 grenades found in a field in East Suffolk.

The 'SIP grenades' - which stands for 'self-igniting phosphorus' - were discovered in the village of Sibton, which is near Yoxford, yesterday.

The bombs, which were designed during the 1940s, were glass bottles filled with phosphorus and petrol. Unlike traditional Molotov cocktails, they would ignite spontaneously when the glass shattered, and the phosphorus became exposed to air.

The grenades were issued to Home Guard units in the event of a German invasion; as that never happened crates of them have been left buried in unregistered hiding places.



Source:	BBC News https://www.bbc.com/news/uk-england-hampshire-48327618
Date:	19 May 2019
Description:	A suspected German wartime bomb which was caught in a fishing net off the coast of the Isle of Wight has been detonated. A fishing vessel reported picking up the 7ft-long sea mine, which was “most likely an old German wartime sea mine”, about a mile from the Needles at around 8am on Saturday, the Maritime and Coastguard Agency (MCA) said. Bomb disposal experts from the Royal Navy’s Portsmouth base were called in to detonate the device, while warnings were issued to ships and public in the area. Divers placed the mine back on the sea bed and blew up the bomb – found to contain 2,000lb of explosives – at 10.51am on Sunday, the Ministry of Defence said.



Source: Birmingham Live

Date: 25th March 2019

Description: Stechford Retail Park and homes evacuated after 'unexploded bomb' found.

Police have cordoned off the area at the Retail Park, off Flaxley Road, following reports an unexploded bomb. The discovery was made Stechford Retail Park just after midday.

A number of homes have been evacuated along with part of the retail park. West Midlands Police say they believe it's from World War Two.

A section of the A4040 closed, with bus routes also affected.



Source: The Guardian

Date: 3 March 2017

Description: A second world war bomb that forced schools and homes in London to be evacuated has been defused.

The device, weighing 500lb (227kg), was found by builders working on a development in Brondesbury Park, north-west London, late on Thursday morning, on The Avenue, near the junction of Willesden Lane.

The Metropolitan police, London fire brigade and an army bomb-disposal team were scrambled to the scene, where a cordon was erected and homes were evacuated.



Source:	BBC
Date:	16 th May 2017
Description:	Bomb disposal experts in Birmingham are taking part in a "major, delicate operation" to make a wartime bomb safe. A major route into the city remains closed for a second day, rail services are affected and people have been evacuated from their homes. The bomb disposal team said 13 lorry loads of sand had been brought in to create a "sizeable igloo" around the 250kg (551lb) bomb. Junctions four to seven of the M6 have been closed ahead of detonation. West Midlands Police, who has praised the bravery of the team at the scene, said the motorway between junction four near Coleshill and seven at Great Barr will shut in both directions while a controlled explosion is carried out.

UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: M90 5XR,
Map Centre: 380933,384854



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

Similarly, if your site is near to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

If I have any questions, who do I contact?

tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

web: **www.zeticauxo.com**

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: (<https://zeticauxo.com/downloads-and-resources/risk-maps/>)

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It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

APPENDIX F – CIRIA C552 RISK METHODOLOGY

The following tables are derived from CIRIA C552 and have been used to define the risk rating presented in the Qualitative Risk Assessment matrix.

Classification of consequence

Classification	Definition
Severe	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note; Water Resources Act contains no scope for considering significant pollution) of sensitive water resource. Catastrophic damage to building/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Medium	Chronic damage to human health ('significant harm', as defined In DETR, 2000). Pollution of sensitive water resources (note; Water Resources Act contains no scope for considering significant pollution). A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm', as defined In DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures, and services.

Classification of probability

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage, and all the elements are present and in the right place, which means that 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 pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period that such an event would take place and is even less likely in the shorter term.
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

Matrix of consequence against probability to gain a risk classification

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/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