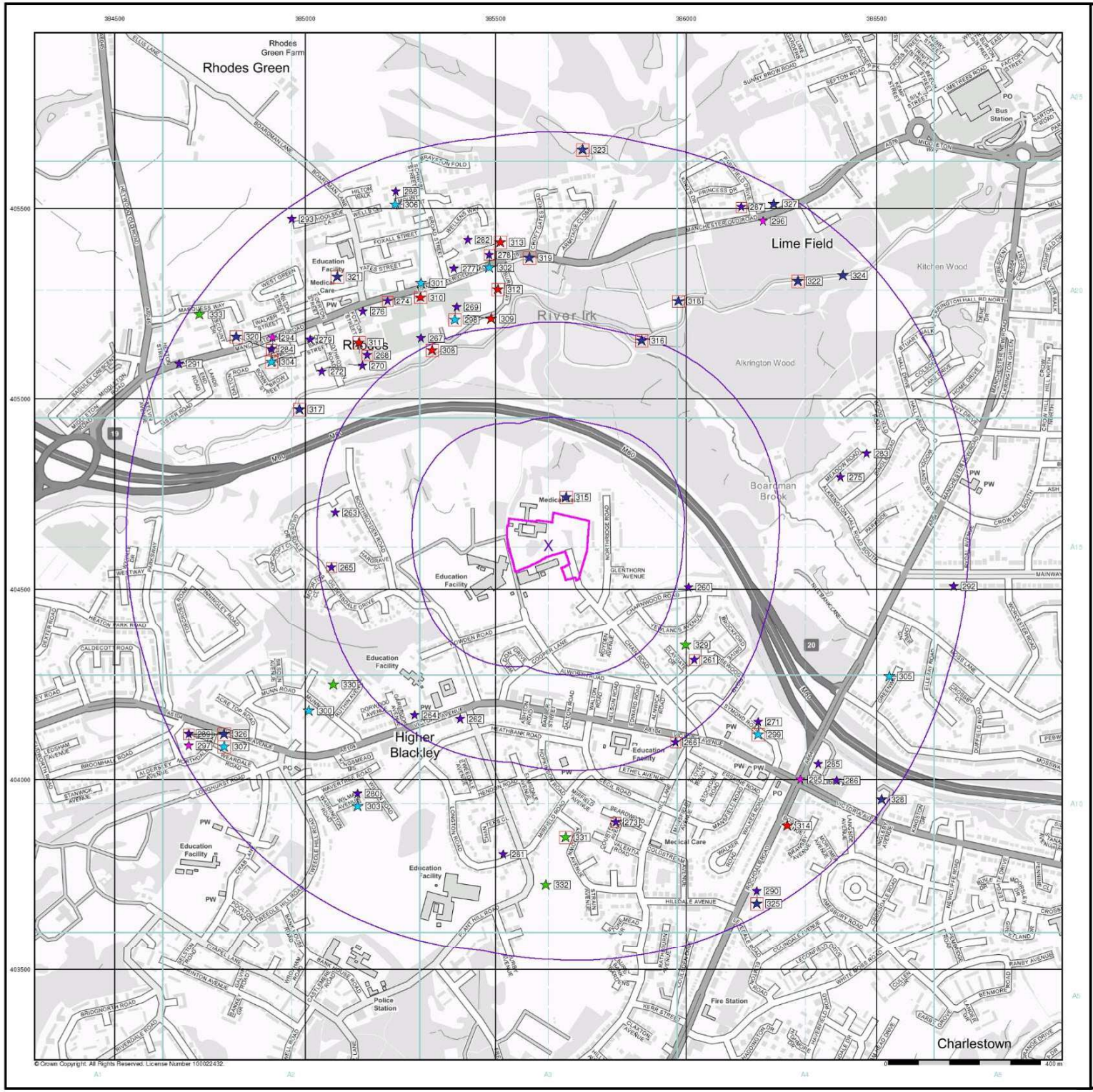


Industrial Land Use Map

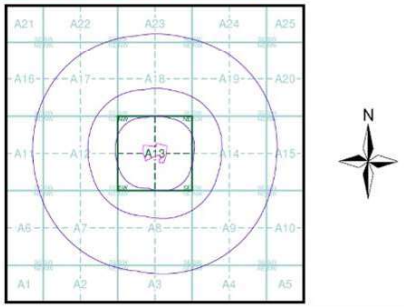
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



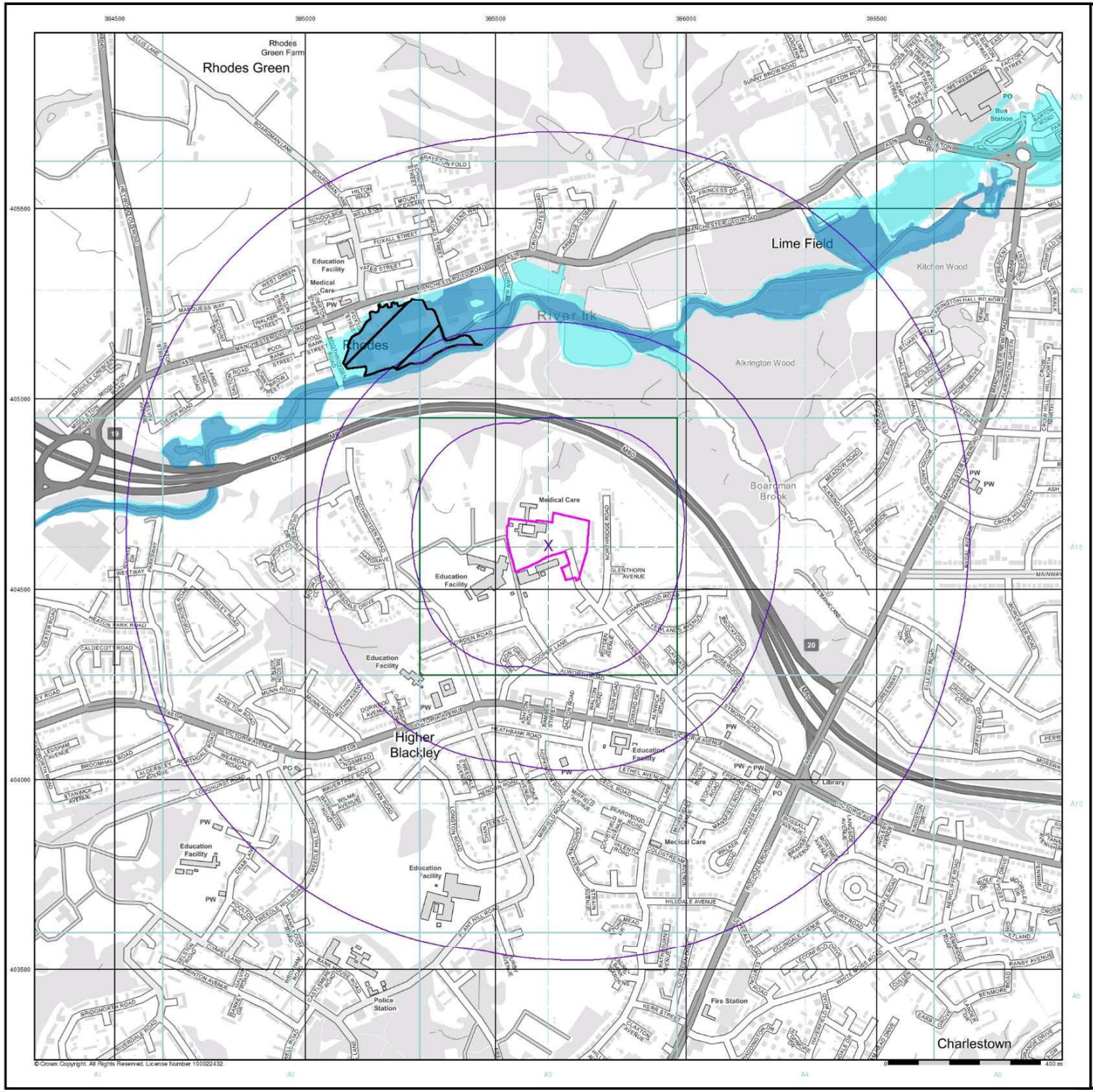
Order Details

Order Number:	357153984_1_1
Customer Ref:	7305
National Grid Reference:	385640, 404620
Slice:	A
Site Area (Ha):	2.5
Search Buffer (m):	1000

Site Details

Site at 385638,404612

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



calabrian

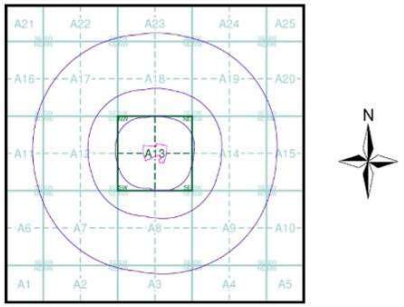
General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



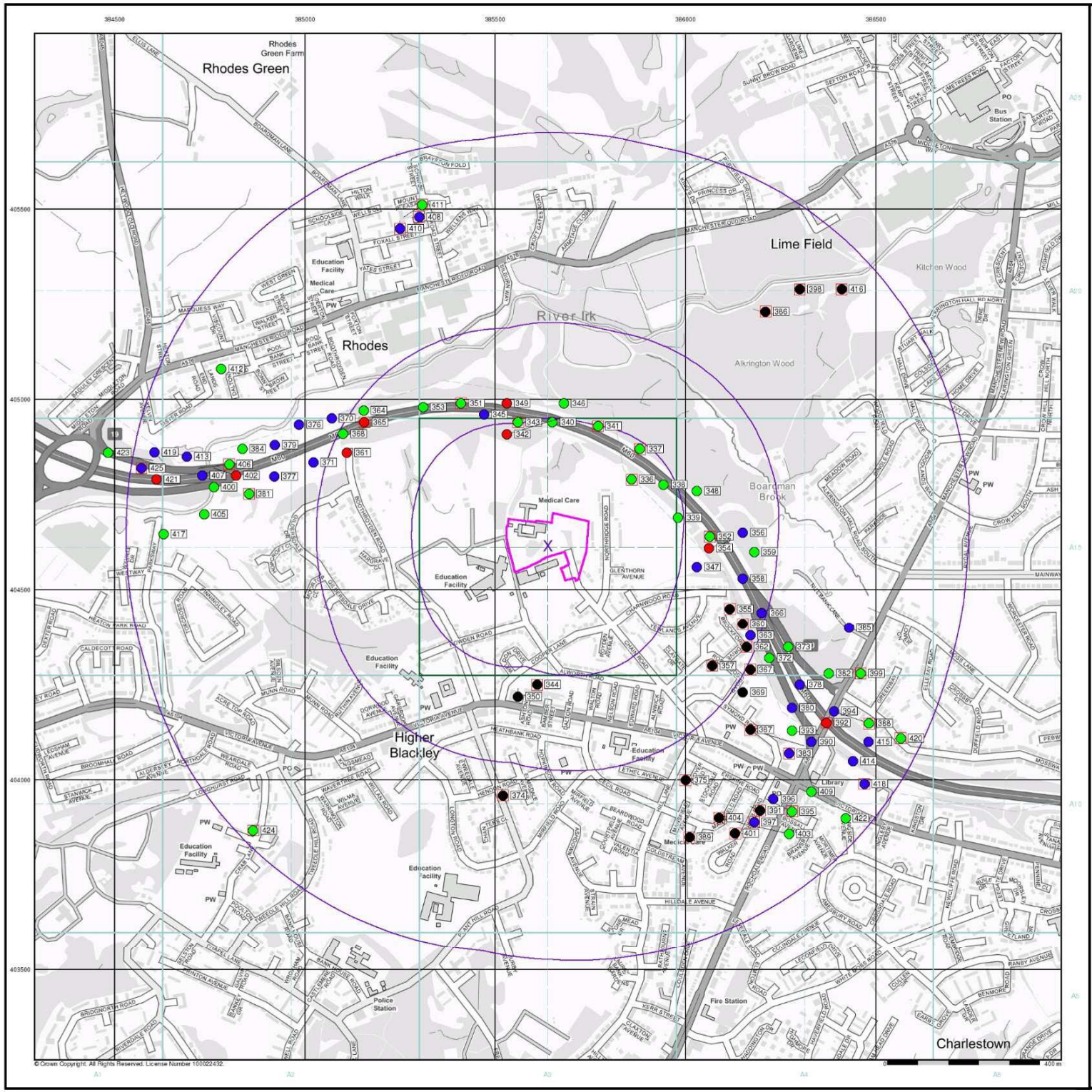
Order Details

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Customer Ref:	7305
National Grid Reference:	385640, 404620
Slice:	A
Site Area (Ha):	2.5
Search Buffer (m):	1000

Site Details

Site at 385638,404612

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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

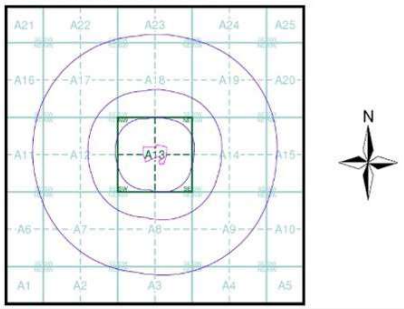
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



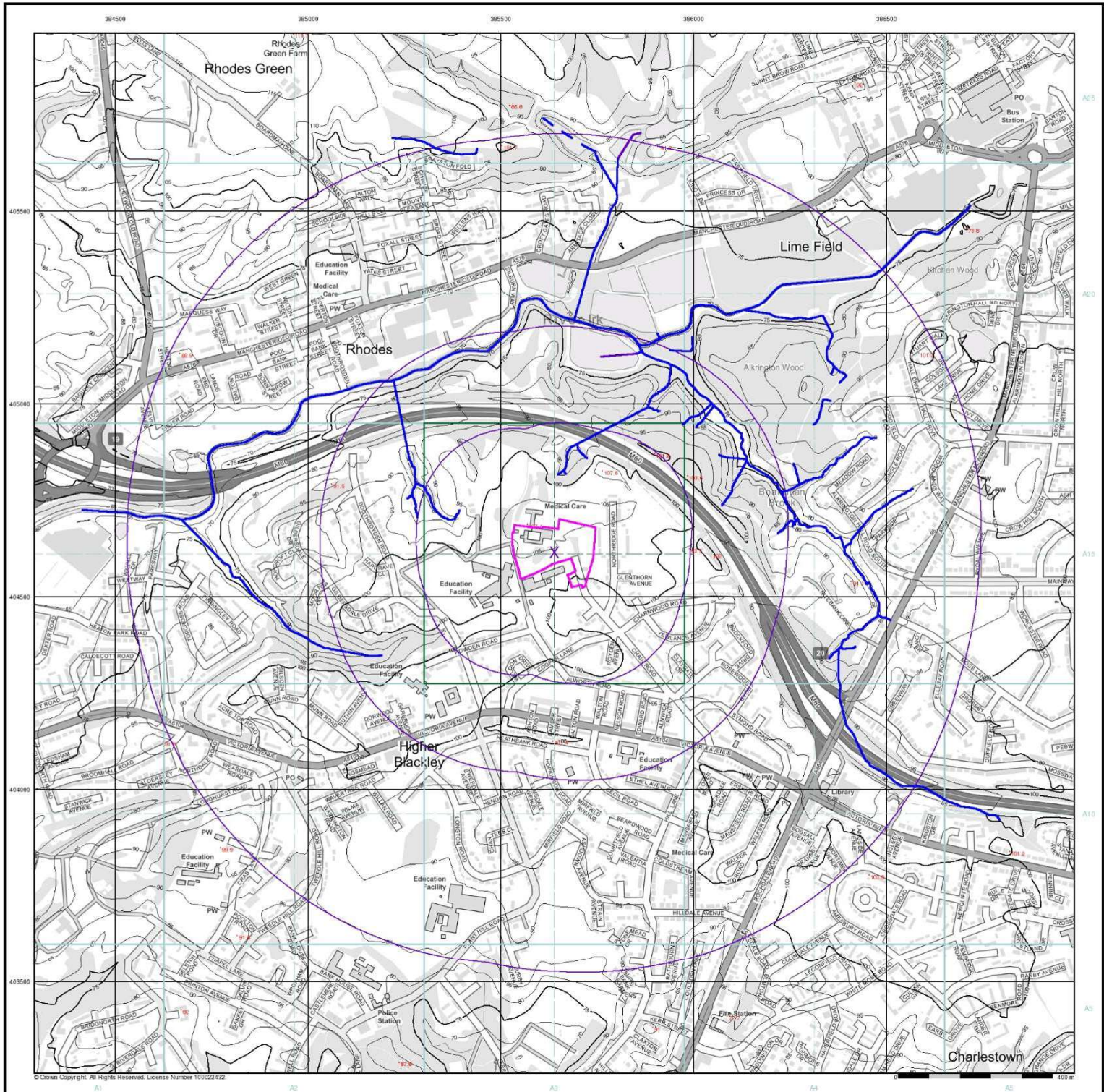
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Customer Ref:	7305
National Grid Reference:	385640, 404620
Slice:	A
Site Area (Ha):	2.5
Search Buffer (m):	1000

Site Details

Site at 385638,404612

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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

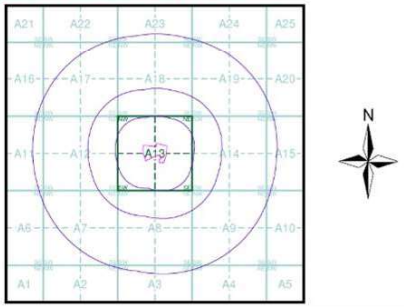
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea

Contours (height in meters)

- Standard Contour (105, 100, 95)
- Master Contour
- Spot Height (167.3)
- MLW — Mean Low Water
- MHW — Mean High Water

OS Water Network Map - Slice A



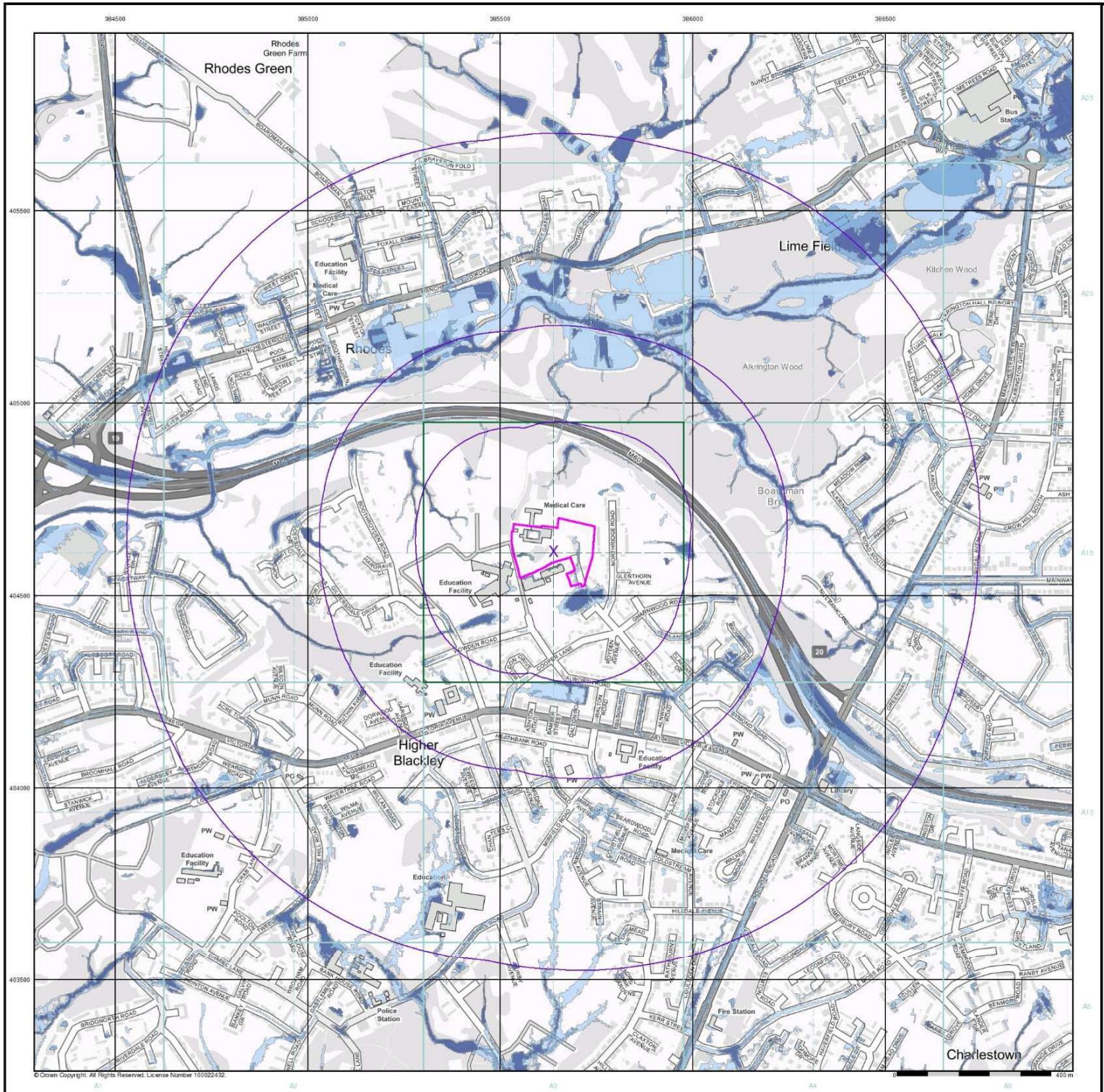
Order Details

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Customer Ref:	7305
National Grid Reference:	385640, 404620
Slice:	A
Site Area (Ha):	2.5
Search Buffer (m):	1000

Site Details

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Web: www.envirocheck.co.uk



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General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Risk of Flooding from Surface Water

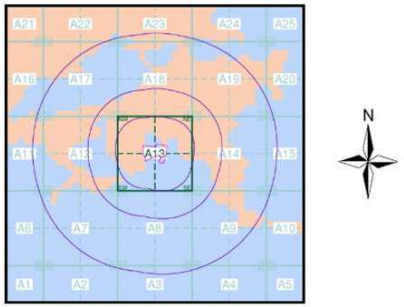
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	357153984_1_1
Customer Ref:	7305
National Grid Reference:	385640, 404620
Slice:	A
Site Area (Ha):	2.5
Search Buffer (m):	1000

Site Details

Site at 385638,404612

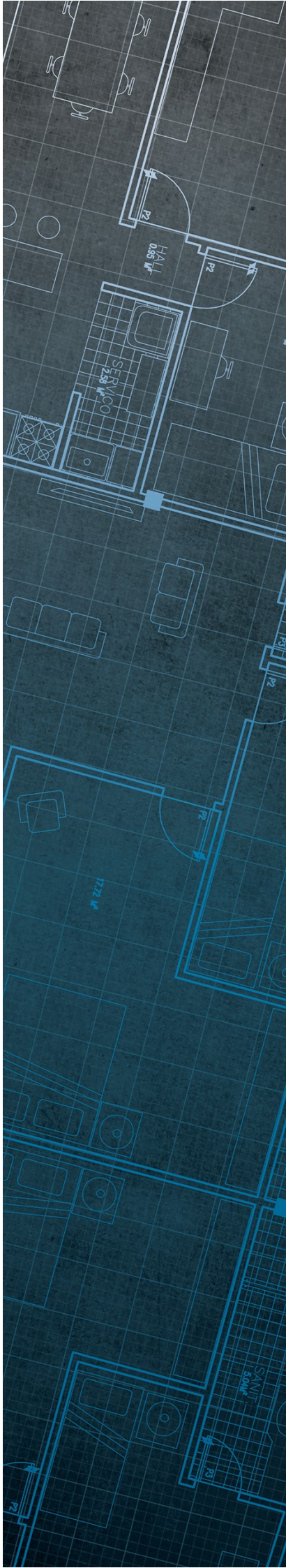
Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

The Coal Authority

Consultants

Coal Mining Report

Site At 385638,404612
Greater Manchester



Date of enquiry:	3 September 2024
Date enquiry received:	3 September 2024
Issue date:	3 September 2024
Our reference:	51003447751001
Your reference:	357153984_3

Consultants

Coal Mining Report

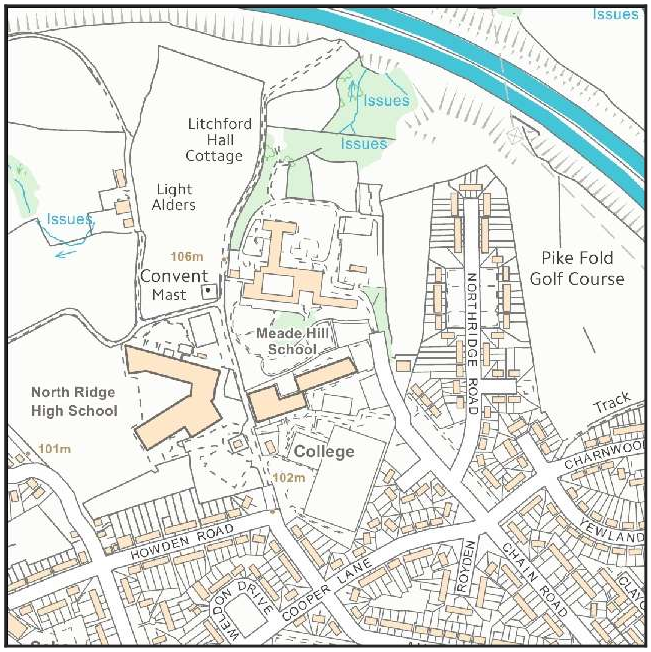
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

NLIS Hub

Enquiry address

Site At 385638,404612
Greater Manchester



Approximate position of property

Map data

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200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

Section 1 – Mining activity and geology

Past underground mining
No past mining recorded.

Probable unrecorded shallow workings
None.

Spine roadways at shallow depth
No spine roadway recorded at shallow depth.

Mine entries
None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers
The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

16820		

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops
No outcrops recorded.

Geological faults, fissures and breaklines
Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Fault under or close to the property recorded.

Opencast mines
None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips
None recorded within 500 metres of the enquiry boundary.

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Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

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Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

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Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

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Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

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Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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The Coal Authority

Summary of findings

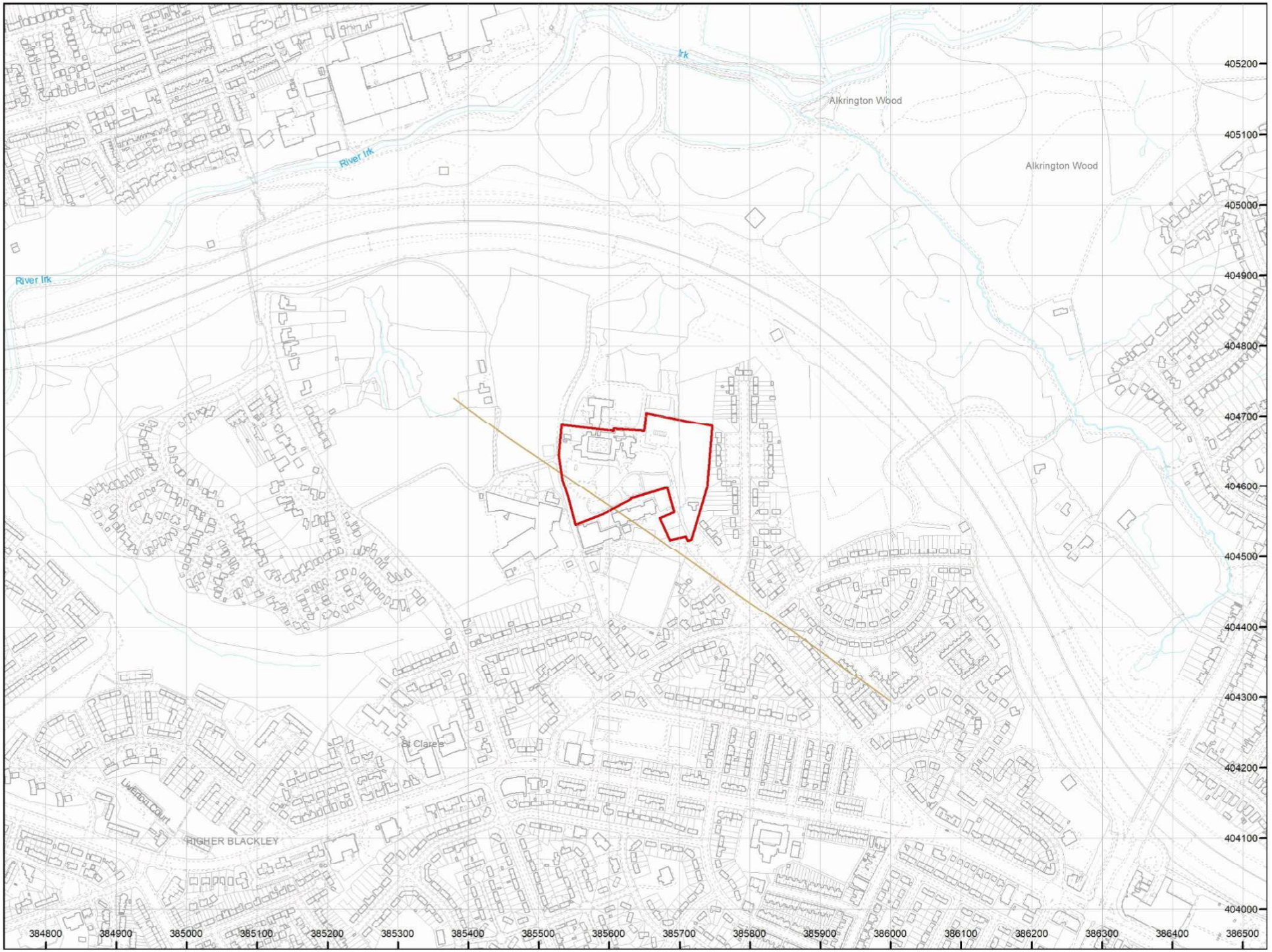
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The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown

Geological faults



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

Landmark Information

alpha ASSOCIATES



Chain Road

Landmark Order No: 357153984_2

Client Reference: 7305

Detailed Unexploded Ordnance (UXO) Threat and Risk Assessment with Risk Mitigation Strategy

Meeting the requirements of the United Kingdom's
Construction Industry Research and Information Association's
Unexploded Ordnance Risk Management Framework:
"Unexploded Ordnance (UXO) – A Guide for the Construction Industry" (C681)
and in compliance with the Construction (Design and Management) Regulations 2015

6 Alpha Associates Ltd

Project No.: 11451

11th September 2024

V1.0

Achilles UVDB SILVER PLUS · BUILDER'S PROFILE · Constructionline Gold Member Verified Member · SafeContractor APPROVED · Institute of Explosives Engineers · bmtrada · UKAS

Using This Report

This Detailed UXO Threat and Risk Assessment with Risk Mitigation Strategy is designed to inform the reader whether military related Unexploded Ordnance (UXO) is likely to pose a hazard at the Study Site and if so, calculate the level of risk generated by proposed or likely ground intrusive operations at the Site. The assessment is intended to meet with the requirement of Stages 2 and 3 of the *Health and Safety Executive* endorsed *CIRIA C681 UXO Risk Management Framework* – for which *6 Alpha* were the lead technical author.

There are two prospective outcomes of this report; either the risk level requires a Risk Mitigation Strategy (Stage 3 of the *CIRIA C681* framework) aimed at reducing UXO risks As Low As Reasonably Practicable (ALARP) in accordance with the Project's minimum legal responsibility; or that no further action is required. In the former instance *6 Alpha* will provide a Risk Mitigation Strategy consisting of proactive and/or reactive risk mitigation measures aimed at reducing the identified risks to ALARP.

Document Control

Version	Author(s)	Reviewed By	Recipient
1.0	Beth Skoulding	Laurence Gregory	Client Reference: 7305

6 Alpha Associates Limited

2A Woolpit Business Park

Woolpit, Bury St. Edmunds, Suffolk

IP30 9UP

Tel: +44(0) 203 371 3900

Web: www.6alpha.com

Executive Summary

Document Scope

6 Alpha Associates Limited (6 Alpha) has been commissioned in partnership with the *Landmark Information Group* to provide a UXO Threat and Risk Assessment with Risk Mitigation Strategy, for the Site described as "Site at 385638, 404612". The Study Site is centred on *British National Grid Reference* 385641, 404624.

UXO Threat Assessment Summary

The output of *6 Alpha*'s UXO Threat Assessment is summarised at Table I:

UXO Threat Assessment Summary			
Threat Source		**Result**	**Comments**
	Was the Site or its vicinity considered a primary bombing target during WWII?	✗	*Luftwaffe* aerial photography did not identify any primary bombing targets on-site nor within a 1,000m radius.
	Was the Site or its vicinity bombed during WWII?	✗	There is no evidence that the Site or its immediate vicinity was subject to bombing during WWII. The closest recorded bomb strike was documented 290m to the north-west.
	Was the Site or its vicinity damaged by bombing during WWII?	✗	
	Has any *British* military activity been identified in the area?	✗	There is no evidence to suggest that the Site or its immediate vicinity has previously been requisitioned for military use.
	Has ordnance been manufactured and/or stored at the Site or its vicinity?	✗	
	Does UXO contamination pose a potential hazard at the Study Site?	✗	Given that there is no evidence of bombing, bomb damage or military activity at the Site previously, it is unlikely that UXO will be encountered.

Table I: UXO Threat Assessment Summary

UXO Threat Items

Given the evidence presented at Table I, *6 Alpha* consider it highly unlikely (but not impossible) that a UXO encounter could occur at this Site. Nonetheless, a residual threat is posed by *German* HE bombs and IBs. *British* AAA projectiles may also pose a residual threat.

Potential UXO Burial Depth

Given the likely ground conditions at the Study Site, the average WWII bomb penetration depth has been calculated as 7m below WWII ground level at this Study Site. Although larger UXBs could be present below this depth (potentially up to 16m), they were deployed infrequently during WWII and are highly unlikely to be encountered.

UXO Risk Pathways

The Study Site has undergone some post-WWII development, with additional structures developed in the northern and south-eastern sectors of the Study Site by 1956. Similarly, further structural changes had also occurred in the northern sector of the Study Site by 1978. Consequently, it is considered likely that any UXO contamination within ground that has been disturbed since WWII would likely have been discovered and removed.

Nonetheless, the remainder of the Study Site has not undergone any obvious post-wartime developments and as such, a limited UXO risk pathway could be generated by intrusive works within any remaining area(s) of ground that has not been disturbed **since the time it might have been contaminated with UXO.**

UXO Risk Assessment

A Semi-Quantitative UXO Risk Assessment has been undertaken and the UXO risk rating is assessed to be:

LOW

Whilst the UXO risks associated is not considered to be “zero”, the ***LOW*** level of residual UXO risk posed by the proposed intrusive works are considered to be tolerable under the auspices of the As Low As Reasonably Practicable (ALARP) risk reduction principle.

Recommended Next Steps

No further action is recommended ahead of the proposed works at this Study Site.

Envirocheck

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APPENDICES 18

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Appendix 2 – Site Boundary

Appendix 3 – Modern Aerial Photography

Appendix 4 – WWII High Explosive Bomb Density

Appendix 5 – WWII Bomb Strikes

Acronyms and Abbreviations

AAA	Anti-Aircraft Artillery	**NEQ**	Net Explosive Quantity
ALARP	As Low As Reasonably Practicable	**NGR**	National Grid Reference
ARP	Air Raid Precaution	**OS**	Ordnance Survey
AXO	Abandoned Explosive Ordnance	**PoW**	Prisoner of War
BDO	Bomb Disposal Officer	**RAF**	Royal Air Force
bgl	Below Ground Level	**RMS**	Risk Mitigation Strategy
BGS	British Geological Survey	**RN**	Royal Navy
BH	Borehole	**SAA**	Small Arms Ammunition
BPD	Bomb Penetration Depth	**SQRA**	Semi-Quantitative Risk Assessment
CIRIA	Construction Industry Research and Information Association	**TA**	Territorial Army
CS	County Series	**TARA**	Threat and Risk Assessment
EOD	Explosive Ordnance Disposal	**TNT**	Trinitrotoluene
HE	High Explosive	**UK**	United Kingdom
HSE	Health and Safety Executive	**UN**	United Nations
IB	Incendiary Bomb	**USAAF**	United States Army Air Force
kg	Kilogram	**UXB**	Unexploded Bomb
km	Kilometre	**UXO**	Unexploded Ordnance
LCC	London County Council	**V Weapons**	*Vergeltungswaffen* – Vengeance Weapons
LSA	Land Service Ammunition	**WWI**	World War One
m	Metre	**WWII**	World War Two

Part I: Introduction

1 Document Overview

1.1 Scope of Work

6 Alpha Associates Limited (6 Alpha) has been commissioned in partnership with the *Landmark Information Group* to provide an Unexploded Ordnance (UXO) Threat and Risk Assessment with Risk Mitigation Strategy, for the Site described as "Site at 385638, 404612".

1.2 Study Site Location

The Study Site is situated within *Higher Blackley*, an electoral district located in the north of the *City of Manchester* and totals an area of approximately 2.5 hectares (ha). The Study Site is centred on *British National Grid Reference* 385641, 404624 and predominantly consists of undeveloped greenspace, although some structures are visible in the northern and south-eastern sectors of the Study Site.

The Site's Location and Site Boundary is depicted at Appendices 1 and 2, with aerial photography of the Study Site presented at Appendix 3.

1.3 Aims and Objectives

This document has the following aims and objectives:

1.3.1 Aims

The document aims to assess and evidence the nature and scope of the UXO risks to people, plant, equipment and/or the environment at this Study Site. In the event that an intolerable UXO risk is identified, a recommended UXO risk mitigation strategy will also be articulated.

1.3.2 Objectives

The document has the following objectives:

- To assess the nature and scope of potential UXO contamination at the Study Site;
- To assess whether any UXO contamination generated at the Site is likely to remain extant;
- To consider whether the proposed intrusive works will generate a viable UXO risk pathway;
- To identify those sensitive receptors likely to be impacted by an inadvertent UXO encounter during the proposed intrusive works;
- To assess the UXO risk to those sensitive risk receptors during intrusive works;
- To outline proportional risk mitigation measures that are consistent with a coherent overarching risk mitigation strategy, in order to effectively manage the UXO risk ALARP.

2 Introduction to UXO Risk Management

2.1 Definition of UXO

For the purposes of this risk assessment, *6 Alpha* have adopted the definition of UXO outlined in the undermentioned *CIRIA C681* guide, as follows:

"Explosive ordnance that has been primed, fuzed, armed, or otherwise prepared for use and used in an armed conflict. It may have been fired, dropped, launched or projected and should have exploded but failed to do so…UXO also refers to explosive ordnance that has not been used during an armed conflict, that has been left behind or dumped by a party to an armed conflict, and which is no longer under control of the party that left it behind or dumped it..."

2.2 Generic UXO Threats

There are multiple factors which may have contributed to the UXO contamination of a construction site in the *UK* but generally, UXO contamination is likely to result from the warfighting activity associated with WWI and WWII, the military occupation and use of land such as airfields, camps and training areas; and the manufacture of munitions to support the armed forces.

For example, *WWII Bomb Census* data from the *Ministry of Home Security* calculated that approximately 10% of bombs dropped on *Britain* during WWII failed to function as designed. If the bomb did not detonate when it was dropped, the force of impact enabled the Unexploded Bomb (UXB) to penetrate the ground. Whilst efforts were made to locate and render safe those UXBs that were observed entering the ground (or left behind clear evidence of having done so) during WWII, evidence of such UXBs was readily obscured by bomb damage debris, vegetation and a lack of footfall in some settings – thus, ensuring that an unquantifiable number of UXBs were left *in situ* below the surface of the ground.

Additionally, it has been estimated that at least 20% of the *UK's* land surface area has been used for military training activities or has otherwise been requisitioned for military use historically. Therefore, *British* Abandoned Explosive Ordnance (AXO), Land Service Ammunition (LSA), Small Arms Ammunition (SAA) and aerially delivered ordnance is also commonly encountered in areas that were formerly occupied by military forces (such as *Royal Air Force* (RAF) airfields, military camps and/or military training areas). Conventional and chemical munitions dumping was also prevalent in these periods with little consideration given to future safety implications. There was also widespread unrecorded dumping of LSA and SAA below the ground that was rarely recorded because the activity was often perceived to be inconsequential.

2.3 Generic UXO Risks

The explosive or chemical fill within UXO rarely becomes inert or loses its effectiveness with age, but the explosive fill may change or crystallise over time – increasing the high explosive's sensitivity to a physical shock or an impact. Trigger mechanisms and fuses, which may have failed, may corrode and deteriorate over time, becoming more sensitive to detonation. It is therefore possible that a significant impact on the UXO case, and the resultant effect upon the fuse, may cause its inadvertent detonation.

2.4 UXO Industry Best Practice

In the absence of specific legislation concerning the management of UXO risks during construction projects, the *UK*'s *Construction Industry Research and Information Association* (CIRIA) has published a best practice guide for the assessment and management of UXO risk in the construction industry (*CIRIA* document reference C681). The *CIRIA C681* guide has been judged and recognised by the *Health and Safety Executive* (HSE) as a minimum standard of good practice, that satisfies the law when applied in an appropriate manner.

6 Alpha were *CIRIA's* lead technical author for their *C681* publication and as such, are in a unique position to ensure that Client's manage UXO risk in a safe, cost-effective and time-efficient manner.

2.5 UXO Risk Management Strategic Framework

At Section 5 of *CIRIA's* C681 guide, a framework for the management of UXO risk is articulated and consists of four key stages. These correspond with the framework employed by *6 Alpha*, as presented at Table 1.

6 Alpha Risk Management Framework	UXO Risk Management Phase	CIRIA C681 Risk Management Framework	Delivered within Report? (✔/✘)
UXO Threat Assessment	**STAGE ONE**	Preliminary Risk Assessment	✔
UXO Risk Assessment	**STAGE TWO**	Detailed Risk Assessment	✔
Risk Mitigation Strategy	**STAGE THREE**	Risk Mitigation	✔
Implementation	**STAGE FOUR**	Implementation	✘

Table 1: 6 Alpha and CIRIA UXO Risk Management Frameworks

3 UXO Threat and Risk Assessment Methodology

3.1 Source – Pathway – Receptor Risk Model

The source-pathway-receptor model is a conceptual risk model employed by *6 Alpha* across all projects that informs how UXO risks are assessed. The model also helps to explain the link between the separate sections of this report and the UXO risk assessment at Section 7. The components of the model are as follows:

3.1.1 UXO Sources

The nature and scope of the UXO threat is summarised in the UXO threat assessment (at Section 4) and it forms the source element of the source-pathway-receptor model.

3.1.2 UXO Pathways

The UXO pathways are the routes by which the sources can reach the receptors. UXO pathways are likely to be either by contact and/or through soil energy transfer, through which the resulting shock wave (generated by a UXO source, or sources) may reach potential receptors. Nonetheless, surface events may also generate a through-air risk pathway in which blast and fragmentation from the UXO sources may also reach the receptors.

UXO risk pathways may be generated by a variety of operations that interact with the ground. Therefore, likely operations have been assessed and summarised (at Section 6), to demonstrate the potential risk pathway elements of the model.

3.1.3 UXO Receptors

Receptors are defined as anything which might be adversely affected by the consequences of an inadvertent detonation of any UXO source through an identified pathway. The proximity, robustness, and sensitivity of such receptors is essential in determining their capacity to withstand such high explosive effects and defining what degree of UXO risk might be tolerated (if any).

3.2 Semi-Quantitative Risk Assessment Methodology

The assessment of UXO risk is a semi-quantitative measure of the probability of UXO encounter and initiation and the consequence of an inadvertent UXO initiation; the former being a function of the identified hazard and proposed development methodology and the latter being a function of the type of hazard and the proximity of personnel (and/or other sensitive receptors) to the hazard.

UXO risk is calculated using the following formula:

Risk **(R)** = Probability **(P)** x Consequence **(C)**

3.3 Information Sources

Significant archive research associated with the Study Site has been undertaken to corroborate and to highlight, any and all potential sources of UXO contamination as well as to assess their likelihood of encounter. For the production of this report, *6 Alpha* have reviewed information from the following sources:

- Information gathered from the *National Archives* at *Kew*, including but not limited to:
  - *Ministry of National Security WWII Bomb Census* statistics;
  - *Air Raid Precaution* (ARP) written records and associated bomb strike mapping;
  - Official WWII bomb damage mapping;
- *Ministry of Defence* (MoD) *Abandoned Bomb Register*;
- *Former 33 Engineer Regiment* (Explosive Ordnance Disposal) records at *Carver Barracks, Wimbish*;
- Post-WWII *RAF* aerial photography;
- *County Series* (CS) and *Ordnance Survey* (OS) mapping.

3.3.1 Azimuth© UXO Threat Database

The above list is not exhaustive, and *6 Alpha's Azimuth*© database has also been heavily drawn upon to deliver the UXO threat assessment element of this report. The *Azimuth*© database contains digitised historic charts, aerial photographs and other extensive analogue records from an exhaustive range of additional national, regional and global archives and/or data sets that have been digitised.

3.4 Constraints

This UXO threat and risk assessment is constrained and limited by that information which is reasonably available to *6 Alpha* at the time of writing, as well as that UXO information that is reasonably accessible in a variety of archives, which *6 Alpha* have digitised and georeferenced or have otherwise summarised in written form.

This document may also require updates and changes, especially wherever and whenever the circumstances and factors associated with assessing UXO risk change. For example, if UXO threats are subsequently discovered and they are different from those that have been anticipated, and/or if proposed intrusive operations are significantly changed.

In such circumstances, risks may require re-evaluation and any such changes are to be made by *6 Alpha*, to ensure the continued technical veracity and risk management efficacy of this document.

Part II: UXO Threat & Risk Assessment

4 UXO Threat Assessment

4.1 WWII Aerial Bombing

The *Luftwaffe* bombing campaign of *Manchester* peaked between the 22nd and the 24th December 1940 (the *Manchester,* or *Christmas, Blitz* as it was known) and involved over 400 aircraft delivering more than 460 tons of HE bombs and 37,000 IBs.

Manchester continued to be bombed throughout the war and on the 24th December 1944 *V1* rockets were launched towards the city. The rockets failed to meet their intended targets with one stray bomb impacting *Oldham*, killing 27 civilians.

4.1.1 WWII HE Bomb Density

The Study Site was located within *Manchester County Borough,* as presented at Appendix 4. This region recorded six HE bomb strikes per 100 hectares, a "very low" level of bombing. However, further **site-specific** data has been considered regarding the potential bombing of the Site during WWII.

4.1.2 WWII Luftwaffe Bombing Targets

Luftwaffe aerial reconnaissance photography did not identify any primary bombing targets on-site nor within a 1,000m radius of the Study Site boundary.

4.1.3 WWII HE Bomb Strikes

During WWII, *ARP* wardens and other local officials compiled detailed logs of bomb strikes across their respective districts that were then often consolidated and mapped at the end of WWII. These records identified eight HE bomb strikes within a 1,000m radius of the Study Site boundary, the closest of which was documented 290m to the north-west. Four additional HE bomb strikes were similarly documented between 395m to the north-west and 480m to the south-east of the Study Site.

In addition to IBs and HE bomb strikes, during the latter stage of WWII, when more conventional aerial bombardment of the *UK* had significantly declined, the main threat came from *V* type weapons. *V1* and *V2* rockets were thin-skinned, unmanned and inaccurate weapons and generally exploded upon impact and thus, are less likely to pose a UXO threat. There is also no evidence to suggest that the Study Site (or its immediate vicinity) was subjected to rockets strikes during WWII.

The locations of WWII-era bomb strikes, in relation to the Study Site, are presented at Appendix 5.

4.1.4 WWII Bomb Damage

Official bomb damage mapping did not cover the Site. Nonetheless, extensive archival research, in addition to an analysis of post-wartime mapping and aerial photography, did not identify any evidence of WWII-era bomb damage on-site nor within the immediate vicinity of the Study Site boundary.

4.1.5 UXB Entry Holes

The CS mapping prior to WWII (1938) and post-wartime mapping (1956) shows that the Study Site was situated within a developed area, with structures located in the northern and south-eastern sectors of the Study Site. The remainder of the Study Site consisted of undeveloped greenspace. Therefore, it is likely that the Study Site would have been subjected to varied levels of footfall during WWII and as such, there is an elevated likelihood that any clearly visible UXB entry points would have been observed and reported across the more developed parts of the Study Site.

Contrastingly, there is an increased possibility that any UXB entry points within the undeveloped parts of the Study Site may have been obscured or otherwise gone unnoticed at the time.

4.2 *British* Military Activity

Whilst military encampments were recorded in the wider area (such as at *Heaton Park,* 1,400m west of the Site) during WWI and WWII, there is no evidence to suggest that the Study Site or its immediate vicinity has previously been occupied by military personnel. Therefore, it is considered unlikely that munitions were previously stored, located and/or fired from this Study Site.

4.3 Previous UXO Encounters

An analysis of historic records noted several UXO encounters within the vicinity of the Study Site, as follows:

4.3.1 Abandoned Bombs

The Abandoned Bomb register was compiled from wartime records and was published in the form of a written answer to the *House of Commons* in 1996. The list initially only covered abandoned bombs in *London* but has since been released for the rest of the UK.

An examination of the *MoD*'s official abandoned bomb records has not identified any abandoned bombs on-site nor within a 1,000m radius.

4.3.2 WWII UXO Disposal Tasks

An examination of pertinent historical records associated with the Study Site has not identified any WWII-era UXO disposal tasks on-site nor within a 1,000m radius.

4.3.3 Post-WWII UXO Encounters

An examination of pertinent historical records associated with the Study Site has identified the following post-WWII UXO encounters:

- One artillery shell was discovered on *Hill Lane*, *Blackley* (located approximately 955m to the south-east of the Study Site) on the 20th of April 2010.

4.4 UXO Threat Summary

Given the evidence presented above, *6 Alpha* consider it highly unlikely (but not impossible) that a UXO encounter could occur at this Site. The most probable UXO threat items are *German* HE bombs and IBs. *British* AAA projectiles may also pose a residual threat as they were likely fired in defence of the local area during WWII bombing raids.

5 UXO Burial Depths

5.1 Overview

It is important to establish the likely burial depth for threat spectrum UXO at the Study Site. The potential penetration depth of an UXB was dependent on a number of factors including but not restricted to those prior to striking the ground (e.g. velocity and orientation of the UXB), which in turn will be influenced on factors such as the release altitude from the aircraft and encounters with infrastructure during its fall; those encountered at the point of impact (i.e. was the impact on concrete, grass, water etc.) and finally, the below ground level conditions (e.g. infrastructure/services, basements, foundations, and geology).

Accordingly, the ground conditions at the Study Site must be understood in order to determine the average and maximum *German* UXB penetration depths, as well as the potential for other types of munitions to be buried. The provenance of made ground must also be considered in order to accurately determine the ground levels at the time when UXO contamination may have occurred (so as to accurately determine the average/maximum bomb penetration depths) and subsequently to inform any further recommendations.

5.1.1 Ground Conditions

BGS borehole log "*SD80SE211 – M66 MANCHESTER OUTER RING ROAD. 559*" (located 160m to the north-east of the Study Site), recorded the following strata:

Depth bgl (m)	Strata	Description
0.00m to 0.10m	**Topsoil**	Turf and Topsoil.
0.10m to 1.90m	**Clay**	Firm dark brown and grey silty sandy Clay with fragments of brick.
1.90m to 3.90m	**Clay**	Firm to stiff dark brown and grey poorly laminated silty sandy Clay with some rock fragments.
3.90m to 5.60m	**Clay**	Firm to stiff dark brown highly laminated very silty Clay, interbedded with silt and sand.
5.60m to 9.60m	**Clay**	Stiff dark brown silty sandy Clay with numerous rock fragments and partings of silt.
9.60m to 11.20m	**Clay**	Stiff dark brown silty very sandy Clay with narrow bands of sand.

Depth bgl (m)	Strata	Description
11.20m to 15.00m	Clay	Stiff dark brown silty very sandy Clay with occasional rock fragments.

Table 2: Ground Conditions Summary

In addition, an analysis of *BGS* mapping associated with the Study Site suggests that the Site is likely to be underlain by a bedrock of "*Manchester Marls Formation - Mudstone*" and *"Pennine Lower Coal Measures Formation – Mudstone, Siltstone and Sandstone"*.

5.2 UXB Burial Depths

Based on the ground conditions described above, the average BPD for a 250kg *German* HE bomb is assessed to be approximately 7m bgl, with the maximum BPD considered to be approximately 16m bgl.

Although it is possible that the *Luftwaffe* deployed larger bombs in the area, an analysis of WWII bomb census data clearly evidences that their deployment was infrequent. Therefore, to use such larger bombs for BPD calculations **are not justifiable under the ALARP principle and thus, CIRIA C681 guidance**.

WWII *German* bombs have a greater penetration depth when compared to IBs and AAA projectiles, which are unlikely to be encountered at depths greater than 1m bgl.

5.2.1 The J-Curve Effect

As a UXB penetrated the ground, it's velocity naturally slowed where it either came to an abrupt stop (e.g., against foundations) or would continue along a route of least resistance – which often resulted in a curving of the trajectory back towards the surface. This is known as the "J Curve" effect and often resulted in a considerable horizontal off-set from the point of entry. This explains why UXBs have been discovered against or under the foundations of buildings which were present during WWII, or many meters from their entry holes. A diagrammatical representation of the "J Curve" effect is presented at Figure 1.

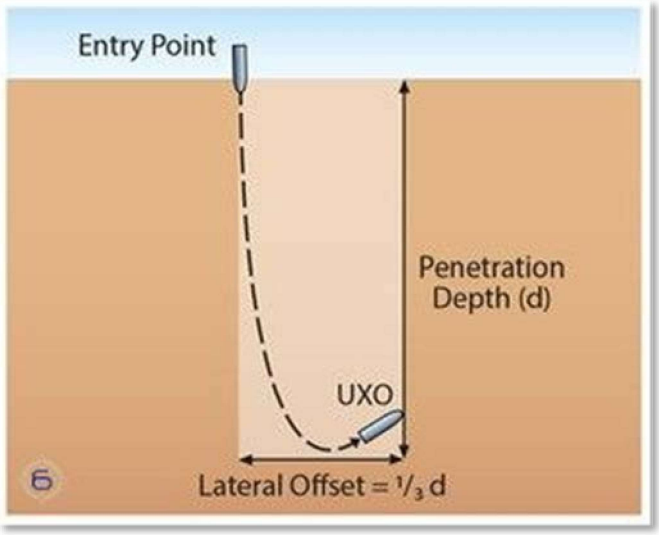


Figure 1: The "J Curve" Effect

6 UXO Risk Pathways

6.1 Overview

In order to assess whether a viable UXO risk pathway might exist at the Study Site, potential UXO contamination sources must be assessed (and have been at Section 4 of the report) and the likely depth of UXO contamination ought to be established (as per Section 5 of the report). Additionally, the Site's construction history ought to be considered to assess whether any previous intrusive works will have encountered and removed any UXO contamination present at the Site.

6.2 Study Site Construction History

From an analysis of CS and OS mapping, together with aerial photography, the following site history can be deduced:

Year	Development History
1938 CS Map	The Study Site was situated within a developed area, with some structures located in the northern and south-eastern sectors of the Study Site. The remainder of the Study Site consisted of undeveloped greenspace.
1956 OS Map	Additional structures were developed in the northern and south-eastern sectors of the Study Site.
1977-78 OS Map	Further structural changes had occurred in the northern sector of the Study Site.
1990 OS Map	Changes were not recorded at the Study Site.
2003 Aerial Photography	Changes were not recorded at the Study Site.
2017 Aerial Photography	Changes were not recorded at the Study Site.
2024 OS Map	Changes were not recorded at the Study Site.

Table 3: Study Site Development History

As per Table 3, it is apparent that the Study Site has undergone some post-WWII development, with additional structures developed in the northern and south-eastern sectors of the Study Site by 1956. Similarly, further structural changes had also occurred in the northern sector of the Study Site by 1978.

Consequently, it is considered likely that any UXO contamination within ground that has been disturbed since WWII would likely have been discovered and removed.

Nonetheless, the remainder of the Study Site has not undergone any obvious post-wartime developments and as such, a limited UXO risk pathway could be generated by intrusive works within any remaining area(s) of ground that has not been disturbed since the time it might have been contaminated with UXO.

6.3 Proposed Works

An outline of the proposed intrusive works is also presented in order to evidence the potential UXO risk pathways that may be generated, should such work encounter those threat spectrum UXO that have been identified in Section 4.

A general overview of the scope of works for the project has been communicated to *6 Alpha* and consists of:

- *"Medium Trial Pit between 1m and 5m below ground level;*
- *Borehole Depth: 3m;*
- *Intrusive Work: Likely machine excavated trial pits;*
- *Excavation Depth: 3m."*

Consequently, it is apparent that the proposed works could theoretically generate a limited UXO risk pathway in ground that has not been previously disturbed (including any ground below post-WWII intrusive work) to a depth of 7m bgl.

If the planned methods are changed, then the risk assessment is to be reviewed and updated if necessary.

7 UXO Risk Assessment

7.1 Threat Items

Whilst there is no evidence to suggest there is an elevated probability of encountering UXO at this Study Site, a residual threat might be posed by *German* aerially delivered ordnance and *British* AAA projectiles. The consequences of initiating *German* HE bombs are generally more severe than initiating IBs or AAA projectiles, and thus they pose the greatest prospective risk to intrusive works.

7.2 Risk Pathways

Whilst there is a residual UXO risk within this Study Site, *6 Alpha* do not believe that the proposed intrusive works will generate a significant risk pathway given the low likelihood that UXO will be encountered at the Study Site.

7.3 Risk Receptors

The likely risk receptors include:

- Site personnel;
- Plant and equipment;
- Third-party infrastructure (utilities/services) and buildings;
- The natural environment.

Consequences of UXO initiation include:

- Injuries and/or fatalities to personnel;
- Damage to plant and equipment, nearby buildings and infrastructure;
- Rupture and damage underground utilities/services and the natural environment.

Consequences of an unexpected and unplanned UXO discovery include:

- Incurring delays and additional costs through the expenditure of additional risk mitigation resources and EOD clearance;
- Disruption to local community;
- Negative publicity.

7.4 Semi-Quantitative Risk Assessment

A semi-quantitative risk assessment has been undertaken and the results are presented at Table 4.

Activity	UXO Threat Item	Probability (SH+EM=P)	Consequence (D+PSR=C)	Risk (PxC=R)
Trial Pits	Aerial Bombs	0+2=2	3+3=6	**2x6=12**
	AAA Projectiles	1+2=3	3+1=4	**3x4=12**
Boreholes	Aerial Bombs	0+3=3	3+2=5	**3x5=15**
	AAA Projectiles	1+3=4	3+1=4	**4x4=16**
Excavations	Aerial Bombs	0+2=2	3+3=6	**2x6=12**
	AAA Projectiles	1+2=3	3+1=4	**3x4=12**

Table 4: UXO SQRA Results

7.4.1 SQRA Conclusions

The SRQA has determined that the proposed intrusive works may generate, as a reasonable worst-case scenario, a ***LOW*** level of risk at the Study Site.

7.5 UXO Risk Mitigation Strategy

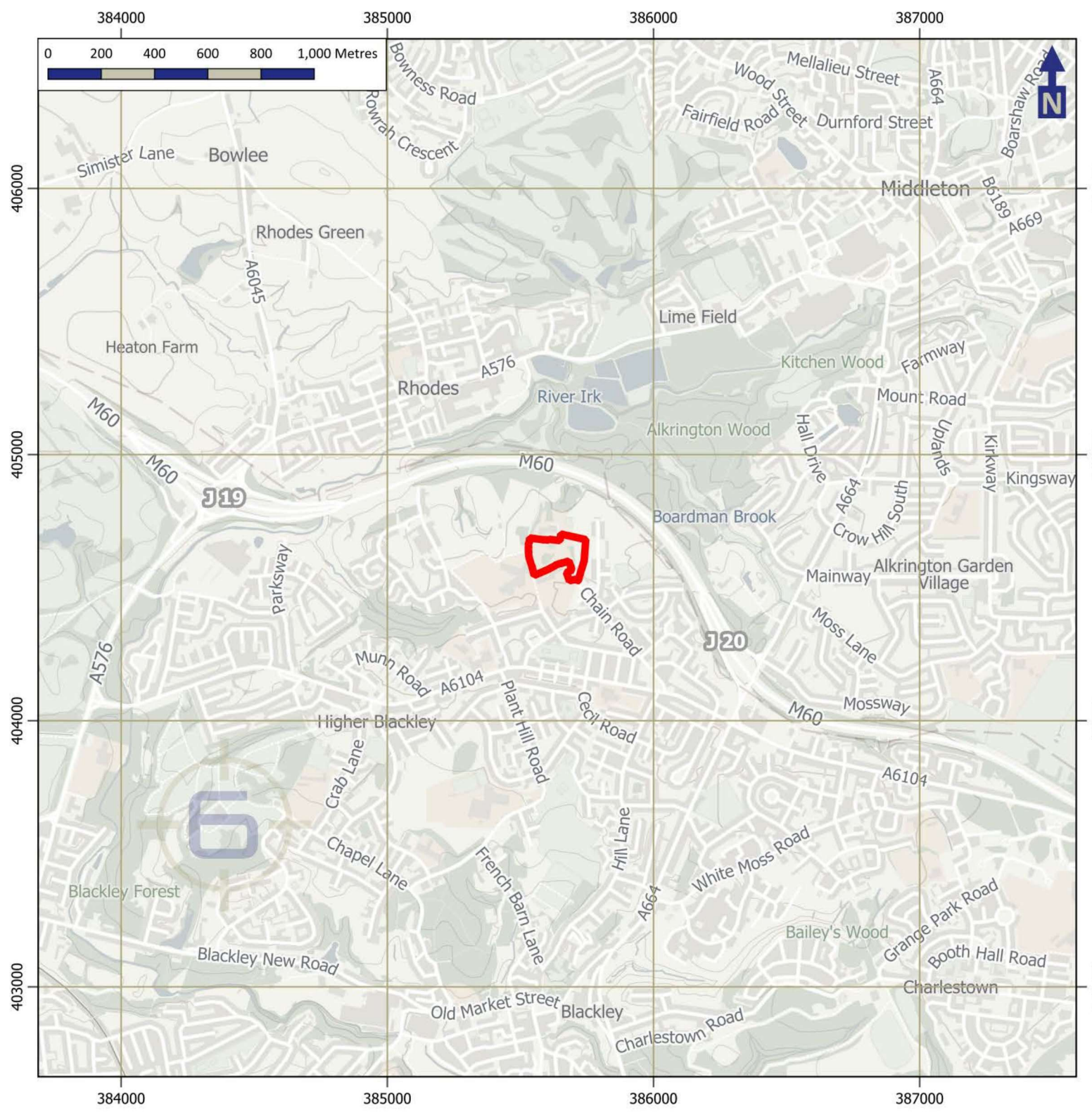
As per *CIRIA* C681 guidance, *6 Alpha* recommended that the identified UXO risks are reduced ALARP. Crucially, the ALARP principle states that if the cost of reducing a risk significantly outweighs the benefit, then the risk may be considered tolerable. This does not mean that there is never a requirement for UXO risk mitigation, but that any mitigation must demonstrate that it is beneficial. Any additional mitigation that delivers diminishing benefits and that consumes disproportionate time, money and effort are considered *de minimis* and thus unnecessary. Because of this principle, UXO risks will rarely be reduced to zero (nor need they be).

Consequently, whilst the UXO risk to the proposed works is not considered to be “zero”, the level of residual UXO risk posed by the proposed intrusive works are considered to be tolerable under the auspices of the As Low As Reasonably Practicable (ALARP) risk reduction principle without the need for a UXO risk mitigation strategy.

7.5.1 Recommended Next Steps

No further action is recommended ahead of the proposed works at this Study Site in order to reduce the UXO risks to ALARP.

Appendices



Site Location

BOMB SEARCH

LEGEND

Site Boundary



British National Grid

Address

SITE AT 385638, 404612

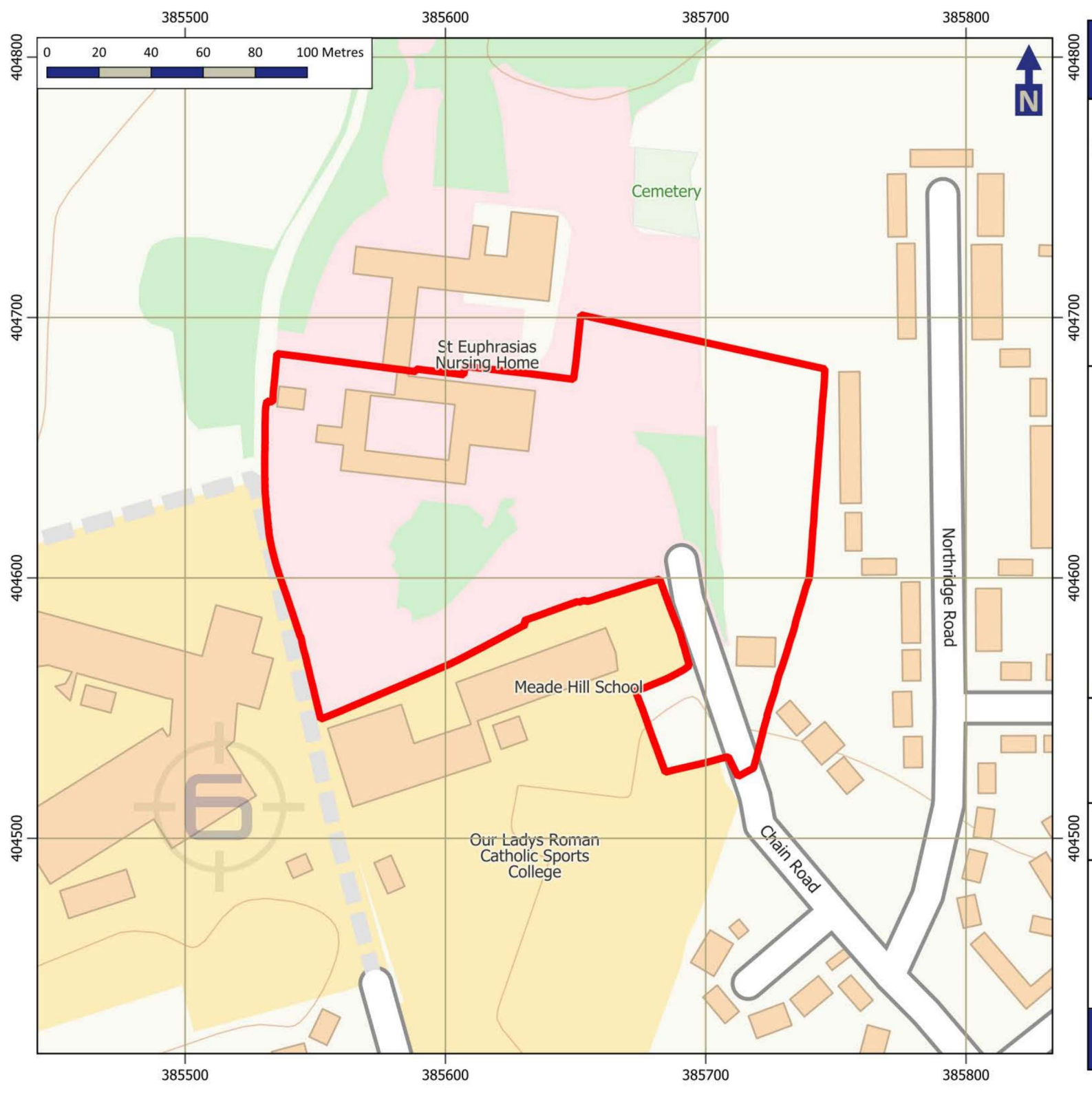
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Site Boundary

BOMB SEARCH

LEGEND

Site Boundary



British National Grid

Address

SITE AT 385638, 404612

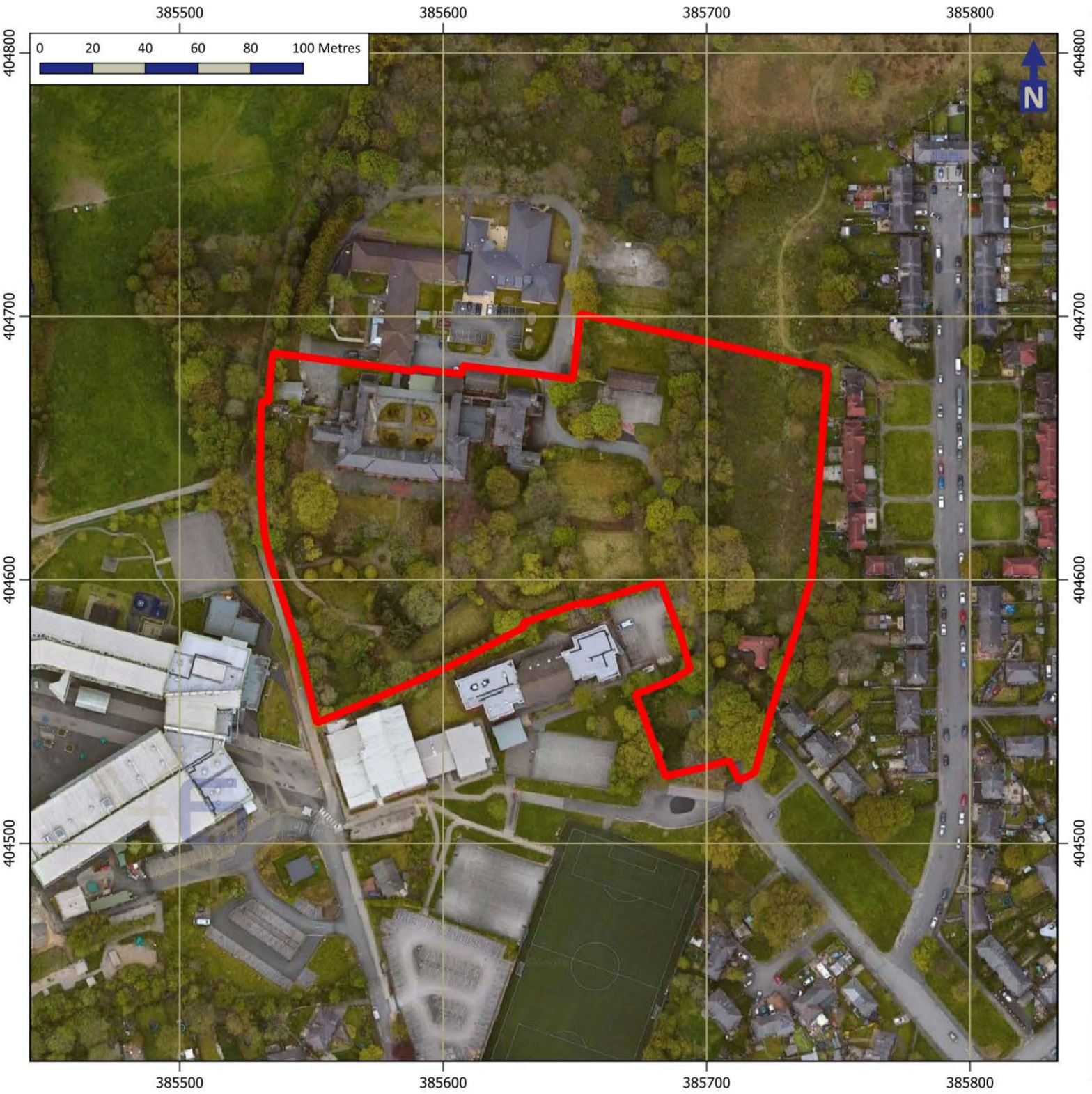
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Modern Aerial Photography

BOMB SEARCH

LEGEND

Site Boundary



British National Grid

Address

SITE AT 385638, 404612

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11451	3	BS	LG	06/09/2024

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WWII High Explosive Bomb Density

BOMB SEARCH

LEGEND

Site Boundary

High Explosive Bomb Density

- Less than 15 bombs per 100 hectares
- 16-25 bombs per 100 hectares
- 26-35 bombs per 100 hectares
- 36-45 bombs per 100 hectares
- Over 46 bombs per 100 hectares



British National Grid

Address

SITE AT 385638, 404612

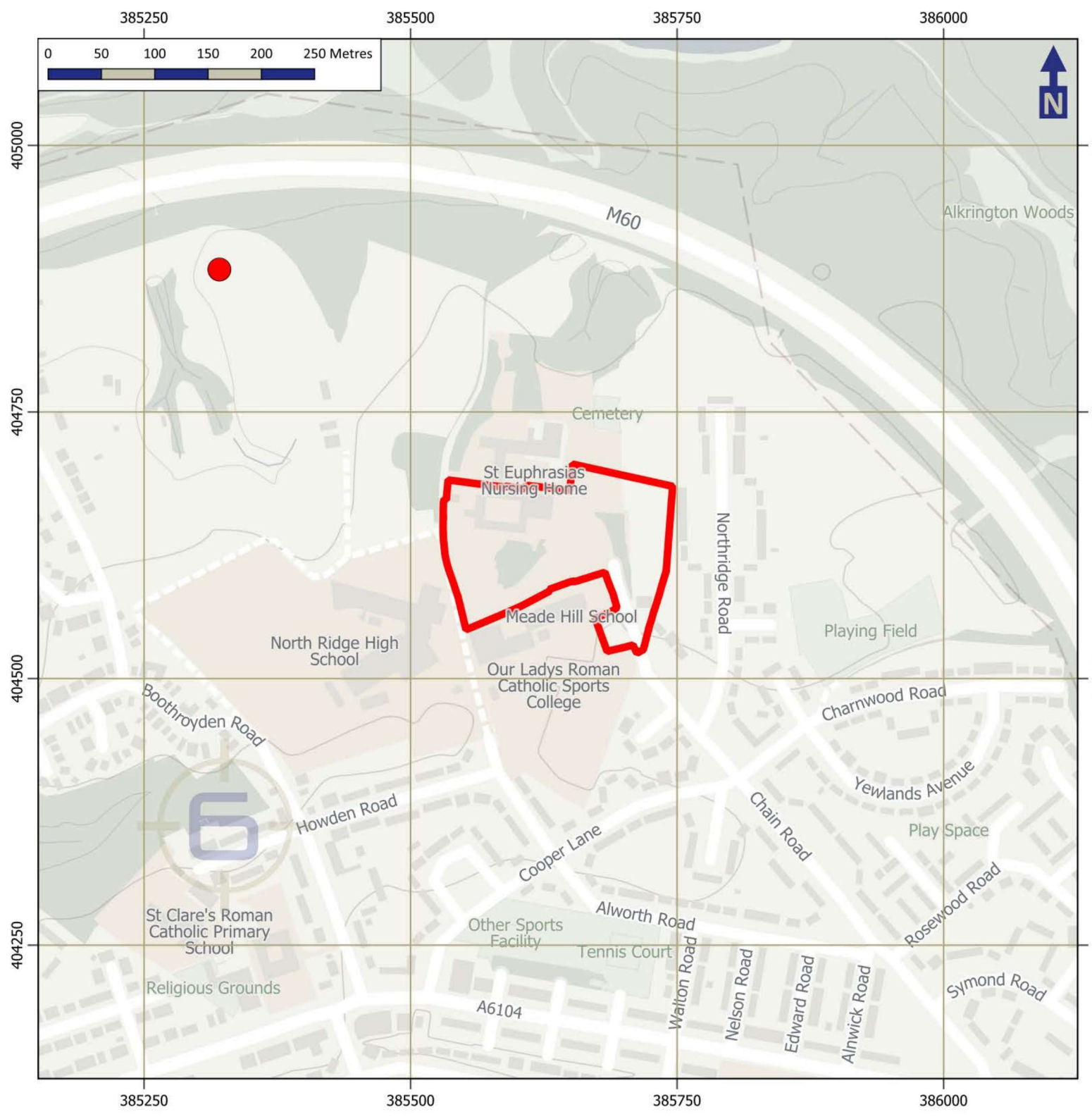
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WWII Bomb Strikes

BOMB SEARCH

LEGEND

Site Boundary

Consolidated Bomb Strikes

High Explosive Bomb



British National Grid

Address

SITE AT 385638, 404612

PROJECT NO.	FIGURE	DRAWN	CHECKED	DATE
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APPENDIX VII: Drainage and SuDS Maintenance Schedule

APPENDIX VII – TYPICAL DRAINAGE MAINTENANCE SCHEDULE

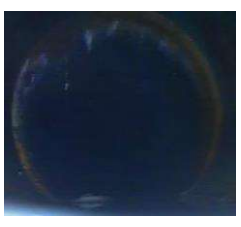
Drainage Item	General Requirements	Scheme Specific Requirements
Channel Drains	Annual visual check for blockages and remove as necessary.	
Gullies	Annual removal of any deposits from sump. Check outlets for blockages.	
Drainage pipework	Clean and jet as required.	
Inspection Chambers / Catch pits / Manholes / Rodding Eyes	Remove cover annually to check for any sign of blockage and clear as required. Empty sumps as required.	
Attenuation Tank System	Annual check of all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	
Flow Control Chambers, penstocks, flap valves	Annual removal of any deposits from sump. Check outlets for blockages. Check flow control valve for blockage and remove as necessary.	
Oil separators	Check alarm system for any notifications, complete regular maintenance as per manufacturer requirements	

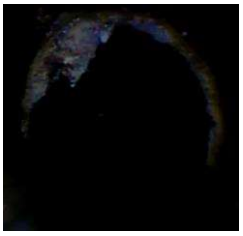
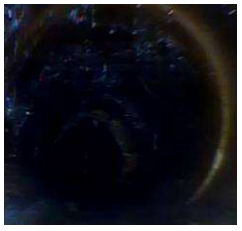
APPENDIX VIII: CCTV Survey Report

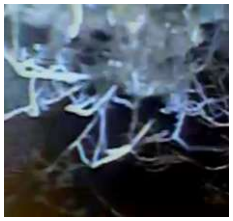
Winners Chapel Chain Road Blackley Manchester M9 6GN

CCTV Survey Review and Remedial Requirements

Ref: 24360-ROS-XX-XX-T-C-00002

Drainage Run	CCTV Comments	Photos	Comments
Existing Connection Run (Combined)			
MH18 Manhole	Survey 1. Manhole condition good		No remedial work required.
MH18 > MH18A Pipe Run	Survey 1. Scale at the joints of the system throughout the run. 2. Radial crack at 9.2m. CCTV 3. Moderate joint displacement throughout the run.	1.    2.  3.	Jetting and cleaning of debris are required. Cracks and displacement appear minor and could possibly be left as current. If deemed required, pipe lining required to fix defects throughout pipe.

			
MH18A Manhole	Survey 1. Manhole condition good		No remedial work required.
MH18A > MH18B (B1 OUTFALL) Pipe Run	Survey 1. Scale at the joints of the system throughout the run. 2. Radial crack at 2.0m. CCTV 3. Moderate joint displacement throughout the run.	1.   2.  3. 	Jetting and cleaning of debris are required. Cracks and displacement appear minor and could possibly be left as current. If deemed required, pipe lining required to fix defects throughout pipe.

			
MH18A > B2 OUTFALL Pipe Run	1. Mass root intrusions. Survey abandoned.	1. 	Run to outfall (B2) to be abandoned.
MH18B Manhole	Survey 1. Manhole condition good		No remedial work required.
MH19 Manhole	1. Manhole detail.	1. 	Manhole serves another dwelling (Adjacent nursing home) which is possibly discharging into MH19. Drain to remain unless proven to not being used by adjacent nursing home.
Inbound B1 > MH19 Pipe Run	1. Silt and debris from start of run to 4.8m. 2. Major radial fracture at 1.0m.	1.  2. 	System serves another dwelling (Adjacent nursing home) which is possibly discharging into MH19. Drain to remain unless proven to not being used by adjacent nursing home.

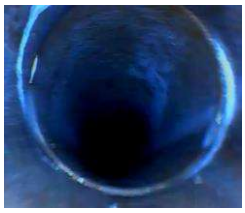
MH19 > MH18 (B2 OUTFALL) Pipe Run	1. Silt and debris throughout the run. 2. Radial and longitudinal cracks at start to 2.0m.	1.  2. 	System serves another dwelling (Adjacent nursing home) which is possibly discharging into MH19 and On to MH18. Drain to remain unless proven to not being used by adjacent nursing home.
Existing Connection Run (Combined) **(To be abandoned)**			
MH1 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH1 > MH2 Pipe Run	No CCTV detail.		Run to be abandoned.
MH2 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH2 > MH3 Pipe Run	No CCTV detail.		Run to be abandoned.
MH3 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.

MH3 > MH4 Pipe Run	No CCTV detail.		Run to be abandoned.
MH4 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH4 > MH5 Pipe Run	No CCTV detail.		Run to be abandoned.
MH8 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH8 > MH5 (B1) Pipe Run	1. Root intrusion at start of run. 2. Silt and debris throughout the run. 3. Joint displacement throughout the run.	1.  2.  3. 	Run to be abandoned.
MH5 Manhole	1. Manhole detail.	1.	Manhole to be abandoned / demolished.

			
MH5 > MH6 (B1) Pipe Run	1. Silt and debris. 2. Root intrusion from 14.0m. 3. Joint displacement throughout the run.	1.  2.  3. 	Run to be abandoned.
MH7 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH7 > MH9 Pipe Run	No CCTV detail.		Run to be abandoned.
MH9 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH9 > MH10	No CCTV detail.		Run to be abandoned.

Pipe Run			
MH10 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH10 > MH11 Pipe Run	No CCTV detail.		Run to be abandoned.
MH11 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH11 > MH12 Pipe Run	No CCTV detail.		Run to be abandoned.
MH12 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH12 > MH6 Pipe Run	No CCTV detail.		Run to be abandoned.
MH22 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH22 > MH21 Pipe Run	No CCTV detail.		Run to be abandoned.
MH23 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.

MH23 > MH21 Pipe Run	No CCTV detail.		Run to be abandoned.
MH21 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH20 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH21 > MH20 > MH19 (B1 OUTFALL) Pipe Run	1. Silt and debris from 18.0m to 33.3m. MH20 at 19.5m. Drain subsided at 35.9m.	1. 	Run to be abandoned.
MH6 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH6 > MH18 (B2 OUTFALL) Pipe Run	Survey 1. Debris and root intrusions start to 7.5m. CCTV 2. Moderate joint displacement throughout the run.	1.  	Run to be abandoned.

		2. 	
MH13 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH13 > MH18 (B3 OUTFALL) Pipe Run	1. Mass root intrusions and debris. 2. Joint displacement.	1.  2. 	Run to be abandoned.
MH13 > B1 OUTFALL Pipe Run	1. Mass root intrusions.	Survey abandoned.	Run to be abandoned.
MH13 > B2 OUTFALL Pipe Run	1. Mass root intrusions from start of run to 7.5m.	1. 	Run to be abandoned.
MH24 Manhole	1. Manhole detail.	1.	Manhole to be abandoned / demolished.

			
MH24 > MH25 Pipe Run	No CCTV detail.		Run to be abandoned.
MH25 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH25 > MH26 Pipe Run	No CCTV detail.		Run to be abandoned.
MH26 Manhole	1. Manhole detail.	1. 	Manhole to be abandoned / demolished.
MH26 > EXT (B3) Pipe Run	1. Silt and heavy debris. Survey abandoned.	1. 	Outfall drainage appears to have been unused for a while. Run not in use and to be abandoned.

APPENDIX VIIII: Infodrainage Calculations for Existing Site

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Roscoe : Existing site network 2yr storm event		



Catchment Area

Type : Catchment Area

Area (ha)	0.177

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.086

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.093

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.104

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (4) Type : Catchment Area

Area (ha)	0.045

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (5) Type : Catchment Area

Area (ha)	0.045

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (6) Type : Catchment Area

Area (ha)	0.121

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (7) Type : Catchment Area

Area (ha)	0.016

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (8) Type : Catchment Area

Area (ha)	0.151

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (9) Type : Catchment Area

Area (ha)	0.254

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (10) Type : Catchment Area

Area (ha)	0.045

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by:	Checked by:	Approved By:
	JT		
Report Details:	Roscoe :		
Type: Junctions Storm Phase: Phase	Existing site network 2yr storm event		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
MH1	Manhole	385558.833	404659.575	106.800	0.980	105.820	Circular	1.200
MH2	Manhole	385558.069	404646.778	106.480	0.850	105.630	Circular	1.200
MH3	Manhole	385557.067	404639.254	106.340	0.730	105.610	Circular	1.200
MH4	Manhole	385587.518	404635.568	106.240	1.360	104.880	Circular	1.200
MH5	Manhole	385608.257	404633.767	106.190	1.500	104.690	Circular	1.200
MH6	Manhole	385637.198	404639.203	104.700	0.540	104.160	Circular	1.200
MH9	Manhole	385609.303	404644.172	106.870	1.620	105.250	Circular	1.200
MH18	Manhole	385639.720	404655.503	105.920	5.650	100.270	Circular	1.200
MH18A	Manhole	385680.595	404643.700	104.650	4.980	99.670	Circular	1.200
MH18B	Manhole	385701.288	404565.888	102.000	3.380	98.620	Circular	1.200
Outfall	Manhole	385731.701	404560.878	101.000	2.800	98.200	Circular	1.200
MH21	Manhole	385604.124	404681.498	106.930	1.150	105.780	Circular	1.200
MH20	Manhole	385622.351	404679.527	106.740	1.380	105.360	Circular	1.200
MH19	Manhole	385641.837	404674.218	106.200	5.750	100.450	Circular	1.200

Name	Lock
MH1	None
MH2	None
MH3	None
MH4	None
MH5	None
MH6	None
MH9	None
MH18	None
MH18A	None
MH18B	None
Outfall	None
MH21	None
MH20	None
MH19	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
MH1	Inlet	Catchment Area	(None)	No Restriction
MH2	Inlet	1 -> 2	(None)	No Restriction
MH3	Inlet	2 -> 3	(None)	No Restriction
	Inlet (1)	Catchment Area (1)	(None)	No Restriction
MH4	Inlet	3 -> 4	(None)	No Restriction
	Inlet (1)	Catchment Area (3)	(None)	No Restriction
MH5	Inlet	4 -> 5 9 -> 5	(None)	No Restriction
	Inlet (1)	Catchment Area (6)	(None)	No Restriction
MH6	Inlet	5 -> 6	(None)	No Restriction
	Inlet (1)	Catchment Area (8)	(None)	No Restriction
MH9	Inlet	Catchment Area (5)	(None)	No Restriction
MH18	Inlet	6 -> 18 19 -> 18	(None)	No Restriction
MH18A	Inlet	18 -> 18A	(None)	No Restriction
	Inlet (1)	Catchment Area (9)	(None)	No Restriction
MH18B	Inlet	18A -> 18B	(None)	No Restriction
	Inlet (1)	Catchment Area (10)	(None)	No Restriction
Outfall	Inlet	18B -> Outfall	(None)	No Restriction
MH21	Inlet	Catchment Area (2)	(None)	No Restriction
MH20	Inlet	21 -> 20	(None)	No Restriction
	Inlet (1)	Catchment Area (4)	(None)	No Restriction
MH19	Inlet	20 -> 19	(None)	No Restriction
	Inlet (1)	Catchment Area (7)	(None)	No Restriction

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	Roscoe : Existing site network 2yr storm event		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
MH1	Outlet	1 -> 2	Free Discharge
MH2	Outlet	2 -> 3	Free Discharge
MH3	Outlet	3 -> 4	Free Discharge
MH4	Outlet	4 -> 5	Free Discharge
MH5	Outlet	5 -> 6	Free Discharge
MH6	Outlet	6 -> 18	Free Discharge
MH9	Outlet	9 -> 5	Free Discharge
MH18	Outlet	18 -> 18A	Free Discharge
MH18A	Outlet	18A -> 18B	Free Discharge
MH18B	Outlet	18B -> Outfall	Free Discharge
MH21	Outlet	21 -> 20	Free Discharge
MH20	Outlet	20 -> 19	Free Discharge
MH19	Outlet	19 -> 18	Free Discharge

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by:	Checked by:	Approved By:
	JT		
Report Details:	Roscoe :		
Type: Connections Storm Phase: Phase	Existing site network 2yr storm event		

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
1 -> 2	12.820	Pipe	67.475		0.6	100	106.800	105.820
2 -> 3	7.590	Pipe	379.523		0.6	100	106.480	105.630
3 -> 4	30.673	Pipe	42.018		0.6	100	106.340	105.610
4 -> 5	20.817	Pipe	109.564		0.6	100	106.240	104.880
5 -> 6	29.447	Pipe	55.561		0.6	150	106.190	104.690
6 -> 18	16.494	Pipe	14.219		0.6	150	104.700	104.160
18 -> 18A	42.545	Pipe	70.908		0.6	225	105.920	100.270
18A -> 18B	80.517	Pipe	76.682		0.6	225	104.650	99.670
18B -> Outfall	30.823	Pipe	73.389		0.6	225	102.000	98.620
21 -> 20	18.333	Pipe	43.650		0.6	150	106.930	105.780
20 -> 19	20.196	Pipe	10.858		0.6	150	106.740	105.360
19 -> 18	18.834	Pipe	104.633		0.6	225	106.200	100.450
9 -> 5	10.458	Pipe	18.675		0.6	150	106.870	105.250

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Culvert Type	Culvert Entrance
1 -> 2	106.480	105.630		All	(None)	(None)
2 -> 3	106.340	105.610		All	(None)	(None)
3 -> 4	106.240	104.880		All	(None)	(None)
4 -> 5	106.190	104.690		All	(None)	(None)
5 -> 6	104.700	104.160		All	(None)	(None)
6 -> 18	105.920	103.000		All	(None)	(None)
18 -> 18A	104.650	99.670		All	(None)	(None)
18A -> 18B	102.000	98.620		All	(None)	(None)
18B -> Outfall	101.000	98.200		All	(None)	(None)
21 -> 20	106.740	105.360		All	(None)	(None)
20 -> 19	106.200	103.500		All	(None)	(None)
19 -> 18	105.920	100.270		All	(None)	(None)
9 -> 5	106.190	104.690		All	(None)	(None)

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by:	Checked by:	Approved By:
	JT		
Report Details:	Roscoe :		
Type: Network Design Criteria Storm Phase: Phase	Existing site network 2yr storm event		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
Max. Diameter (mm)	0

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by:	Checked by:	Approved By:
	JT		
Report Details: Type: Network Design Criteria Storm Phase: Phase	Roscoe : Existing site network 2yr storm event		

Manhole Options

Apply Offset	☐

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Rainfall Analysis Criteria	Roscoe : Existing site network 2yr storm event		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Roscoe : Existing site network 2yr storm event		

Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR (1): 100 years: +40 %: 15 mins: Winter	0.18	93.4	45.028
Catchment Area (1)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.09	45.7	22.029
Catchment Area (2)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.09	49.3	23.783
Catchment Area (3)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.10	55.0	26.508
Catchment Area (4)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.04	23.7	11.403
Catchment Area (5)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.04	23.6	11.384
Catchment Area (6)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.12	64.1	30.894
Catchment Area (7)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.02	8.3	3.990
Catchment Area (8)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.15	79.6	38.354
Catchment Area (9)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.25	134.3	64.706
Catchment Area (10)	FSR (1): 100 years: +40 %: 15 mins: Winter	0.05	24.0	11.559

Project:	Date:		
Winners Chapel Blackley	03/04/2025		
	Designed by:	Checked by:	Approved By:
	JT		
Report Details: Type: Junctions Summary Storm Phase: Phase	Roscoe : Existing site network 2yr storm event		

Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR (1): 100 years: +40 %: 60 mins: Winter	106.800	105.820	106.843	1.023	49.7	44.363	43.255	10.6	69.615	Flood
MH2	FSR (1): 100 years: +40 %: 120 mins: Winter	106.480	105.630	106.504	0.874	10.5	25.043	24.082	8.1	94.450	Flood
MH3	FSR (1): 100 years: +40 %: 120 mins: Winter	106.340	105.610	106.398	0.788	23.6	58.501	57.675	10.9	110.555	Flood
MH4	FSR (1): 100 years: +40 %: 60 mins: Winter	106.240	104.880	106.271	1.391	33.1	32.200	30.662	16.8	84.627	Flood
MH5	FSR (1): 100 years: +40 %: 15 mins: Winter	106.190	104.690	106.202	1.512	90.1	13.922	12.225	41.3	55.031	Flood
MH6	FSR (1): 100 years: +40 %: 30 mins: Winter	104.700	104.160	104.766	0.606	109.8	66.650	66.039	53.1	140.024	Flood
MH9	FSR (1): 100 years: +40 %: 15 mins: Winter	106.870	105.250	106.372	1.122	23.6	1.268	0.000	22.6	11.383	Surcharged
MH18	FSR (1): 100 years: +40 %: 15 mins: Winter	105.920	100.270	104.833	4.563	66.5	5.161	0.000	78.0	96.912	Surcharged
MH18A	FSR (1): 100 years: +40 %: 15 mins: Winter	104.650	99.670	104.653	4.983	173.7	8.279	2.647	133.0	153.515	Flood
MH18B	FSR (1): 100 years: +40 %: 15 mins: Winter	102.000	98.620	101.020	2.400	153.3	2.715	0.000	150.9	162.706	Surcharged
Outfall	FSR: 2 years: +0 %: 15 mins: Summer	101.000	98.200	98.425	0.225	81.6	0.000	0.000	81.5	66.734	OK
MH21	FSR (1): 100 years: +40 %: 15 mins: Winter	106.930	105.780	106.931	1.151	49.3	2.506	1.205	36.0	23.537	Flood
MH20	FSR (1): 100 years: +40 %: 15 mins: Winter	106.740	105.360	106.370	1.010	55.3	1.143	0.000	47.5	34.893	Surcharged
MH19	FSR (1): 100 years: +40 %: 15 mins: Winter	106.200	100.450	105.005	4.555	55.8	5.152	0.000	54.6	39.215	Surcharged