



Preliminary Environmental Risk Assessment

Trinity Academy, Barnsley

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Executive Summary

Objectives

Waterman Infrastructure & Environment Limited ("Waterman") was instructed by Waterman Buildings Services Limited to undertake a Preliminary Environmental and Geotechnical Risk Assessment for potential ground contamination or geotechnical issues at the site known as Trinity Academy, Barnsley.

Site Setting

Current Use	The Site comprises two distinct land parcels, the Keresforth Medical Centre at the north-east and an area of Public Open Space at the south-west. The Keresforth Medical Centre is largely disused and comprises low-rise buildings with access roads, parking areas and soft landscaping in the north-east. The POS is a flat grassed area of land.
History	A review of the historical plans indicates the Site remained undeveloped until the Medical Centre was constructed circa 1978. Previous to this, the Site comprised arable farmland. Within the surrounding area, industrial land uses including foundries, works, mills and quarrying activities are recorded.
Geology	BGS records indicate the Site is underlain by Made Ground over 1-2m of Glacial Till. Bedrock comprises the Pennine Middle Coal Measures Formation. The entire Site lies within a Coal Mining Reporting Area. Furthermore, the northernmost boundary and southern half of the Site are identified as 'Development High Risk' by The Coal Authority.
Controlled Waters	The Made Ground is an Unproductive Stratum. The Glacial Till and Middle Pennine Coal Measures are designated as Secondary A Aquifers
Consultation	A Groundsure Insight report was ordered for the Site. Information relating to the Site was requested from Barnsley Metropolitan Borough Council Environmental Health Department, Planning Department and Building Control Department.

Preliminary Conceptual Model

Potential pollutant linkages identified for the Site are as follows:

- Ground gas accumulation in confined spaces within new structures, associated with the Middle Pennines Coal Measures beneath the Site;
- Exposure of construction workers to potential ground contamination via contact with soils and groundwater during construction works;
- Construction workers encountering UXO during below-ground works;
- Off-site users and residents at nearby houses contacting potential ground contamination via windborne dust or run-off from stockpiled excavation materials;
- Potential leaks or spills of construction materials reaching soils or groundwater during works;
- Future Site users contacting potential ground contamination via soft landscaping at the completed development;
- Exposure of plants in new soft landscaping to potential ground contamination via root uptake;
- Ground conditions impacting new structures via chemical attack; and
- Potential groundwater contamination reaching surrounding and underlying aquifers.

Conclusions

The recommendations of this report outline preliminary remedial and mitigation measures that require confirmation through additional works. However, once successfully implemented the risks are anticipated to be low. Therefore, the NPPF requirement that on completion the Site can no longer be captured under the Part IIA regime is expected to be met.

Recommendations

The following actions are recommended to address the potentially unacceptable risks identified:

- A Coal Mining Risk Assessment should be undertaken for the Site to support a future planning application and inform the development design;
- A geo-environmental ground investigation should be completed, including soil/groundwater sampling and ground gas/vapour monitoring to confirm risks to future Site users and provide design parameters for the proposed development;
- The geotechnical investigation as part of design works for the development should include an assessment of the risk posed by chemical attack;
- If necessary, mitigation measures to protect the Site from ground gas or vapour ingress should be included in the final development design;
- Soft landscaping at the Development should be planted using an appropriate thickness of imported, certified clean cover material if necessary;
- A UXO Risk Management Plan should be prepared for the Site. Site Specific UXO Awareness Briefings should be provided to all personnel conducting intrusive works;
- A Construction Environmental Management Plan (CEMP) should be developed for the Site, detailing measures to minimise the potential risk to the surface watercourse and shallow Secondary A aquifer during the demolition and construction works;
- During the Works, appropriate measures for managing materials, chemicals and waste should be utilised. Measures should also be taken to prevent run-off from stockpiled soils reaching nearby residents, and to suppress the generation of dust;
- Construction workers should be provided with and use personal protective equipment (PPE) and be informed of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater or ground gas / vapours;
- Concrete used in construction, and any new water pipes installed as part of the redevelopment works should be appropriately protected against chemical attack from shallow soils and groundwater underlying the Site; and,
- In the event that materials are to be excavated for re-use on Site or off-site disposal, a preliminary waste classification assessment should be undertaken. Waste acceptance criteria (WAC) testing may then be necessary where off-site disposal is proposed.

1. Introduction

1.1 Objectives

Waterman Infrastructure & Environment Limited (“Waterman”) was instructed by Waterman Building Structures Limited on behalf of the Department for Education to undertake a Preliminary Environmental Risk Assessment for potential ground contamination, for the proposed redevelopment of land off Keresforth Close including the former Keresforth Medical Centre, Keresforth Close, Barnsley (hereafter termed “the Site”).

1.2 Proposed Development

The Site is approximately 7.2 hectares (ha) in area and centred on Ordnance Survey Grid Reference SE334055. The site comprises the former Keresforth Centre NHS facility, and a playing field adjacent to the A6133 Broadway. The NHS site was a base that originally provided a range of services on behalf of South West Yorkshire Partnership NHS Foundation Trust. The Site is on split-levels, the buildings located at the back of the site on the lower lying land and the open space on higher land fronting Broadway. The Site is bounded by Broadway to the south-west, residential properties and playing fields to the north, Joseph Locke Primary school to the east and a mixture of allotments and two-storey residential properties to the south-east. There are mature trees along the south-eastern boundary with some semi-mature trees along the Broadway frontage and along the slope between the open space and former NHS buildings.

It is proposed to demolish all structures within the Site boundary, to facilitate the construction of Trinity Academy, Barnsley which is to provide a 900 place secondary school on the Site. This development will include a new school building in the north-east, hard landscaping car park in the centre of the Site and both soft and hard landscaping sports fields in the surrounding area. New residential buildings with private gardens will be built in the north of the Site.

The proposed development is presented in the Edward Architecture Drawing Ref. 0632/EA/A/S001, included in Appendix A.

1.3 Regulatory Context

The National Planning Policy Framework (NPPF) 2019 sets out Government planning policy for England and how this is expected to be applied to development. Paragraph 118 of Section 11 – Making effective use of land and paragraphs 170, 178, 179 and 183 of Section 15 – Conserving and enhancing the natural environment of the NPPF relate to contaminated land matters and state the following:

‘118. Planning policies and decisions should:

c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

178. Planning policies and decisions should ensure that:

- a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
- b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the **Environmental Protection Act 1990**; and
- c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

179. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

In order to assess the contamination status of the Site, with respect to the proposed end use, it is necessary to assess whether the Site could potentially be classified as “Contaminated Land”, as defined in Part IIA of the Environmental Protection Act 1990 and Contaminated Land Statutory Guidance 2012. This is assessed by the identification and assessment of potential pollutant linkages. The linkage between the potential sources and potential receptors identified needs to be established and evaluated.

To fall within this definition, it is necessary that, as a result of the condition of the land, substances may be present in, on or under the land such that:

- a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) significant pollution of controlled waters is being caused, or there is significant possibility of such pollution being caused’.

It should be noted that DEFRA has advised (Ref. Section 4, DEFRA Contaminated Land Statutory Guidance 2012) Local Authorities that land should not be designated as “Contaminated Land” where:

- a) the relevant substance(s) are already present in controlled waters;
- b) entry into controlled waters of the substance(s) from land has ceased; and
- c) it is not likely that that further entry will take place.

These exclusions do not necessarily preclude regulatory action under the Environmental Permitting (England and Wales) Regulations 2016, which make it a criminal offence to cause or knowingly permit a water discharge of any poisonous, noxious or polluting matter to controlled waters. In England and Wales, under The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, a works notice may be served by the regulator requiring appropriate investigation and clean-up.

1.4 Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman and Turner and Townsend on behalf of the Department for Education, as documented in Waterman’s standard Terms of Appointment.

The benefit of this report is made to the Department for Education.



The information contained in this report is based on a review of available historical, geological and hydrogeological sources, consultation with the regulatory authorities and observations made on-Site on 15 June 2020

Waterman has endeavoured to assess all information provided to them during this investigation but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this ground investigation includes an assessment of the presence of asbestos containing materials in the ground at the Site but not within buildings or structures or below ground structures (basements, buried service ducts and the like).

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.

2. Methodology

This Preliminary Environmental Risk Assessment has been undertaken in general accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11 – Environment Agency, September 2004).

The report includes the following:

- Collation of available documentary information;
- A Site reconnaissance;
- Consultation with relevant regulatory bodies including the Metropolitan Borough of Barnsley Council Environmental Protection, Planning Department, and Building Control Department;
- Hazard identification;
- Formulation of a Preliminary Conceptual Model for the Site;
- Hazard assessment for the identification of potentially unacceptable risks; and,
- Recommendations for further action.

3. Hazard Identification

3.1 Site Description and Reconnaissance

The Site is located at National Grid Reference 433423, 405601 at Keresforth Close, Barnsley, S70 6RS. The Site comprises an elongated parcel of land with the former Keresforth Medical Centre located at the north and an area of open space at the south. The Site extends to 7.2 hectares. A Site Location plan and Site Features Plan are presented as Appendix A. The current Site layout is presented in Figure 1 below.

Figure 1: Current Site Layout



Source: Site Plan 2020

A walkover was undertaken at the Site on 25th June 2020. A selection of photographs taken during the Site inspection is presented as Appendix B.

The Site is split into two distinct land parcels; the Keresforth Centre at the north-east and an area of Public Open Space (POS) at the south-west. The area at the north comprises the existing and part operational Keresforth Medical Centre. A rectangular shaped building immediately to the east of the POS is in use. All

other remaining buildings appear to be disused, with windows and doors boarded up. No access was gained to these buildings.

Keresforth Medical Centre

Buildings on-Site comprise one-storey properties with pitched roofs aligned along Keresforth Close. No visual or olfactory evidence of contamination was noted.

A Boiler House is present at the northern section of the Site, with an above ground fuel storage tank and chimney present (possibly a former incinerator).

The topography of the Site trends downwards to the north and east boundaries. The former grassed areas surrounding the buildings are now overgrown. The edges of the Site are vegetated with trees and shrubs.

The hardstanding and roadways were in good repair with drainage grids and manholes recorded across the Site.

Public Open Space

The POS is a flat grassed area bounded by trees and bushes. Ground level is higher than at the adjacent Keresforth Medical Centre to the east.

Current potentially contaminative Site uses were identified during the property inspection, these are summarised in Table 1.

Table 1: Summary of potentially contaminative activities on-Site

Potential Issue	Description	Condition
Aboveground Storage Tanks (and fuel lines)	1No at the rear of the Boiler House / Incinerator	Good

3.1.1 Site Surroundings

The Site is bounded to the north and east by a Sports Facility and the playing fields of the Joseph Locke Primary School. The area to the south comprises of allotment gardens at a lower elevation than the current Site surface. Residential developments surround the Site to the south and west.

A summary of the current surrounding land uses, including any relevant licences and consents identified, is shown in Table 2.

Table 2: Summary of Surrounding Land Uses

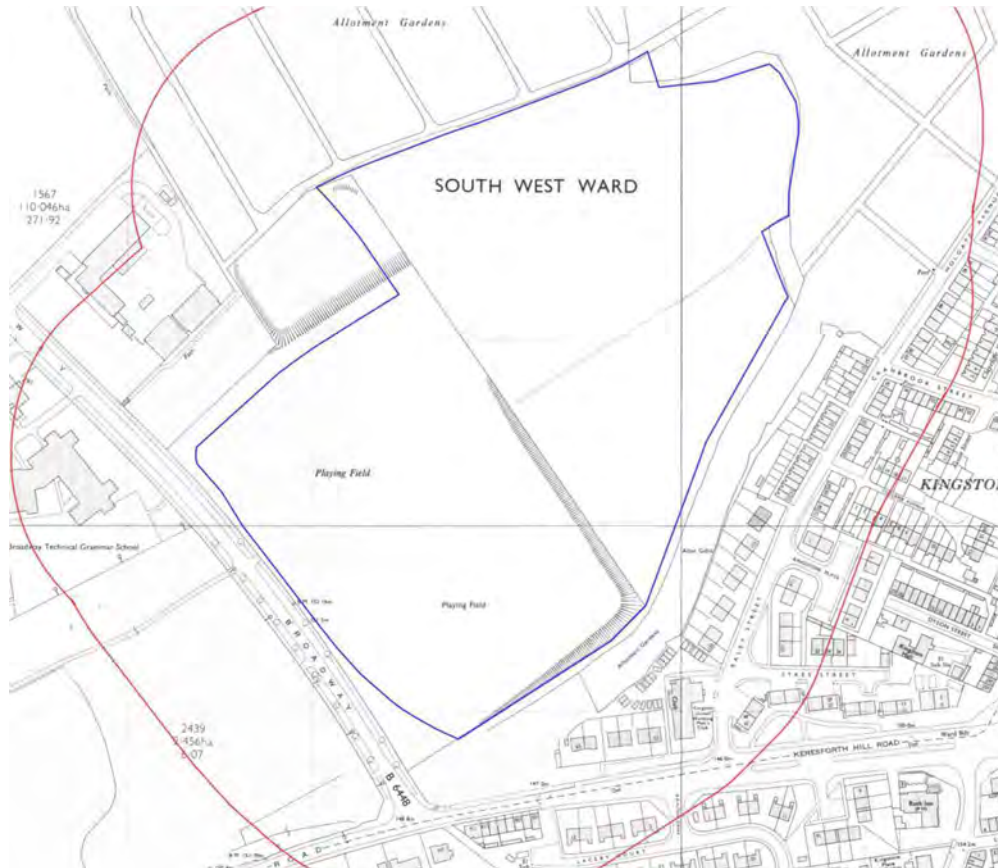
Location	Description
North	Barnsley Fire Station, warehouses, undeveloped arable land Single waste storage exemption, registered to The Cooperative NDC 82m north-west for storage of non-agricultural waste in a secure location Single historical license for pollutant release 403m north-east, registered to a packaging and gaskets manufacturer
East	Residences, Raley Street
South	A6133 highway, residences
West	A6133 highway, residences, school

3.2 History

A review of historical maps obtained from Landmark Information Group has been undertaken. Figure 2

presents the historical mapping from 1969.

Figure 2: Historical Site Use



Source: National Grid Map 1969 (1:2500)

A review of historical plans obtained as part of the Groundsure Insight report indicates the Site remained undeveloped until the Medical Centre was constructed circa 1978. Previous to this, the area comprised arable farmland and playing fields.

Within the surrounding area, industrial land uses including foundries, works, mills and quarrying activities are recorded. A full review of historical information for the Site is detailed in Table 3.

Table 3: Site History

Source	Site ^a	Surroundings ^a
County Series maps (1850)	The Site comprises vacant undeveloped land likely in arable use on the dates of the first maps	The site surroundings comprise vacant, undeveloped land to the north, east and west. Residences to the south Sandstone Quarry 500m south-east
County Series maps (1890)	<i>No significant changes</i>	Foundries 850m north Brick works 830m north-west Colliery buildings listed 810m east
County series Maps (1904)	<i>No significant changes</i>	Second brick works built 820m north-west Velvet works have replaced the colliery 810m east

Source	Site ^a	Surroundings ^a
County Series maps (1929)	<i>No significant changes</i>	Foundries 850m north are no longer present Opencast clay pit 500m north-west Disused colliery mapped 500m south
National Grid maps (1959)	The south-west half of the Site recorded as playing fields. An embankment area is shown dividing the playing fields from the north-east.	Allotments located directly adjacent to the Site to the north and east. New school building located 50m west
Provisional maps (1965-1966)	<i>No significant changes</i>	Brick works 820m north-west and 830m north-west are both no longer present Series of six unspecified works buildings 500m north and north-east
National Grid maps (1978)	Current Keresforth Centre buildings are now present.	Fire and ambulance centre built 50m north-west
National Grid Maps (1989-1991)	<i>No significant changes</i>	Allotment gardens directly adjacent to the Site to the north are now a playing field
National Grid maps (2001)	<i>No significant changes</i>	Two works buildings 500m north east no longer present, with further three to the north now listed as two depots and a mill
2010	<i>No significant changes</i>	Depots and mill buildings are no longer present.
2020	<i>No significant changes</i>	Remaining works 500m north are no longer present

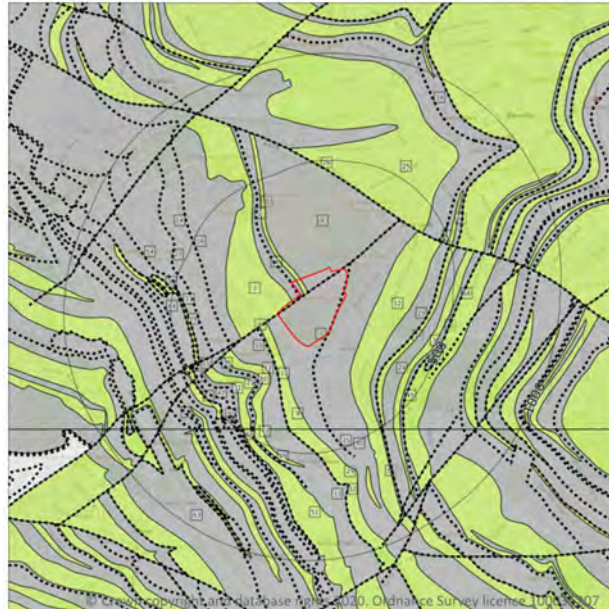
^a potentially contaminative uses are shown in bold italics.

3.3 Geology

The geology beneath the Site has been established from the British Geological Survey (BGS) 1:50,000 scale Geological Map, Sheet 87, Barnsley (Bedrock and Superficial) and borehole logs SE30NW209, SE30NW181, SE30NW221 and SE30NW185 (accessed via BGS website June 2020). Geology is summarised in Figure 3 below.

Figure 3: Geology

Bedrock



ID	Description
1	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone
3	Pennine Middle Coal Measures Formation - Sandstone

Superficial



ID	Description
1	Made Ground (Undivided)

Source: Groundsure Enviro Insight Bedrock and Superficial Geology (1:10,000)

A large section of the Site comprising the POS is indicated to comprise of Made Ground. A summary of the geology is provided in Table 3.

Table 4: Site Geology

Stratum	Area Covered	Depth to Top of Stratum (m bgl)	Typical Description
Made Ground or Topsoil	Entire Site	0 to 1.0m – deeper in the west	Topsoil over colliery waste or soft brown clay with fragments of brick, concrete and pottery
Glacial Till (alluvial clays and sands)	Entire Site	0.45 to 1.06	Soft to firm grey laminated sandy clay with silt partings and bands of medium-coarse gravel.
Pennine Middle Coal Measures Formation	Entire Site	1.5 to 2.7	Interbedded hard, grey siltstone with bands of soft mudstone, and black coal shale. 5cm void reported in one location to the north of the Site.

3.3.1 Ground Stability and Potential Geotechnical Issues

BGS data does not record any ground stability hazards relating to shrink/swelling clays, running sands, compressible or collapsible deposits, landslides or ground dissolution within the Site boundary.

3.3.2 Coal Mining

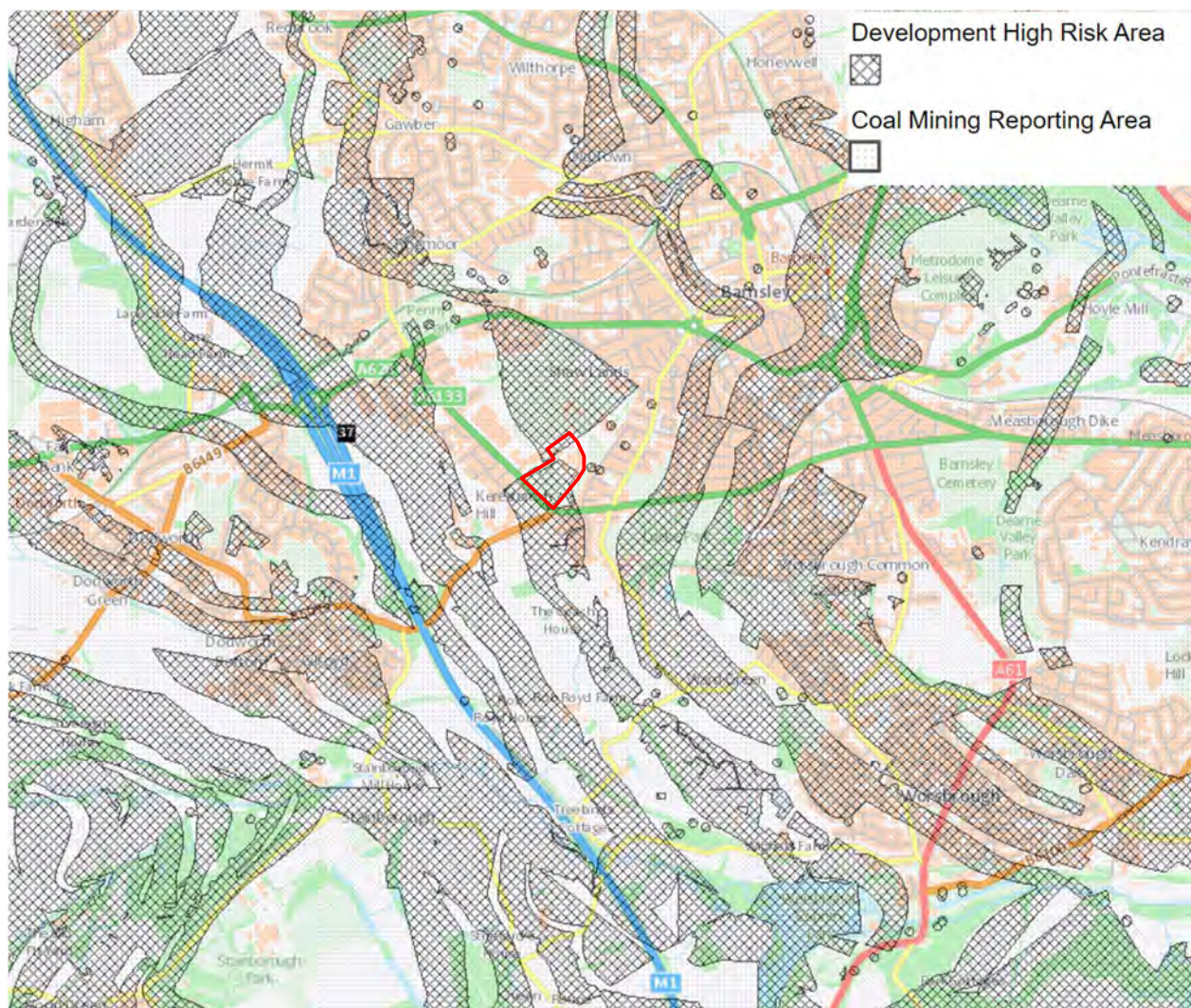
The Site is in an area that could be affected by coal mining activity. The BGS map identifies a fault series

within the Pennine Lower Coal Measures Formation, with faults running broadly north-east to south-west within and surrounding the Site boundary. BGS data identifies these as faults as coal seams.

Keresford Hill Coal Pit is recorded both beneath and adjacent to the Site, recorded as having ceased activity. Further Kingston and Hound Hill colliery pits are recorded 81m south-east and 123m south-west respectively.

The entire Site lies within a Coal Mining Reporting Area and a Coal Authority report will be required. Furthermore, the northernmost boundary and southern half of the Site are identified as 'Development High Risk' by The Coal Authority, refer to Figure 4 below. Consequently, a Coal Mining Risk Assessment Report will be required to support a planning application for the Site.

Figure 4: Coal Mining Reporting Area



Source: Reproduced with the permission of © The Coal Authority. All rights reserved

A Coal Authority report should be obtained for the Site to further clarify the potential risks of coal mining activities to future developments.

3.3.3 Ground Gas and Vapours

Radon

Radon is a colourless and odourless radioactive gas, formed from the decay of naturally occurring uranium within soils and rocks. The radioactive elements formed by the decay of radon may be inhaled, entering the lungs, and potentially leading to localised damage, and lung cancer.

Current Building Regulations, endorsed by Public Health England (PHE) detail that all new buildings or extensions require radon protective measures where the development is in an area of high radon.

Information recovered from the Landmark Report, BGS, and PHE show that the Site is partially within an area of elevated radon levels (between 1% and 3%). Correspondingly, basic protective measures may be required in the proposed development.

In 2009 the Health Protection Agency ((HPA), now Public Health England) recommended that radon protection measures be built into all new occupied buildings in the UK, whether or not they were situated in radon sensitive area as identified by British Geological Survey (BGS) maps. The Building Regulations Advisory Committee supported the HPA's proposal. However, the then Government rejected this recommendation and the current Building Regulations (2013) do not include it.

This approach should be confirmed with the Building Control Officer.

Ground Gas

There are no registered active landfills within 500m of the Site. Records detail historical landfill activities at a disused quarry 490m north-west circa 1968, however the nature of this fill material is not known.

Coal mining activities have been undertaken historically close to or beneath the Site. A potential risk from mines gas is present at the Site.

The potential for ground gas has been further assessed according to the Waterman Ground Gas Assessment Tool, with results reproduced in Appendix C. Following assessment, the Site is considered at a higher risk for ground gas issues due to the potential for coal mine gas. Based on the sensitivity of the end-use receptor, ground gas monitoring is recommended as part of a ground investigation at the Site.

Vapours

Land uses with the potential to result in ground contamination that could result in vapour risks have not been identified at the Site. The Groundsure dataset does not record any pollution incidents relating to oils or fuels within 500m of the Site.

Given the distance from the Site and assessed impact of identified sources, there is not considered a significant vapour risk to the Site.

3.3.4 Unexploded Ordnance (UXO)

A UXO Detailed Desk Study was prepared for the Site by 1st Line Defence in June 2020, and has been included in Appendix D. The report is based on local and national archive data, historical mapping, available material from 33 Engineer Regiment (EOD) Archive (now 28 Regt), historical archives, library and UXO geo-datasets and open sources such as published books and internet resources.

Following assessment, the report concluded that there is an overall low risk from German and anti-aircraft unexploded ordnance at the Site of proposed works. There is an assessed Negligible Risk from Allied ordnance.

The report recommended that a UXO Risk Management Plan be prepared for the Site. Site Specific UXO

Awareness Briefings should be provided to all personnel conducting intrusive works.

3.4 Controlled Waters

3.4.1 Surface Waters

The nearest surface water to the Site is a small watercourse 26m south-east. A small pond is present 650m south-east. The Environment Agency (EA) has not classified the Ecological Potential of either of these surface water bodies under the Water Framework Directive.

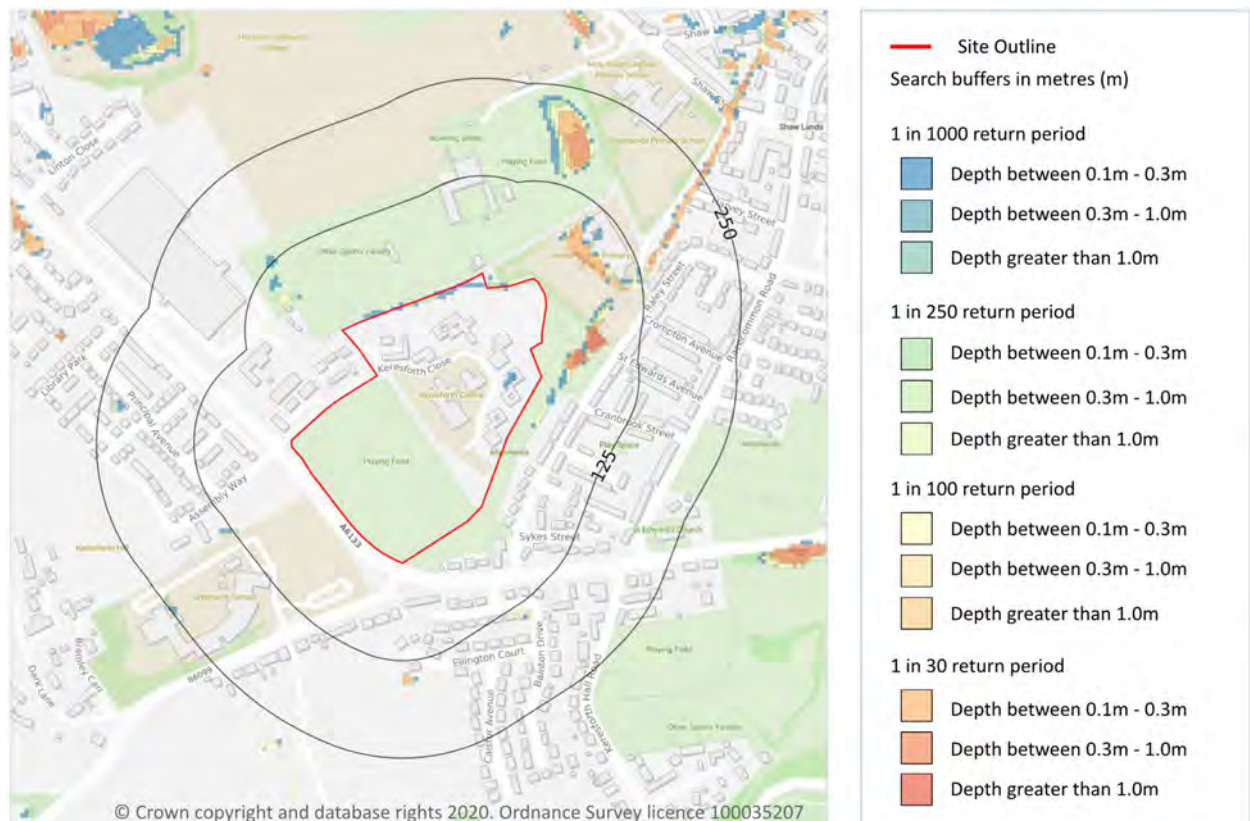
There are no recorded surface water abstractions within a 1km radius of the Site.

Four active discharge consents are documented within 1km of the Site. The closest of these is located 385m south-west, involving discharge of sewage to a tributary of Dodworth Dyke. The three further consents are located 411m south-west, 438m south-west and 458m south-west and also involve discharge of sewage to Dodworth Dyke.

3.4.2 Flood Risk

According to the EA's indicative flooding data, the majority of the Site is not located in an area of fluvial or tidal flooding, or on a flood plain. However, the northernmost border and a small area in the centre of the Site are identified as having a 1 in 100 year risk of surface water flooding, as detailed in Figure 5.

Figure 5: Flood Risk from Surface Water



Source: Groundsure Enviro Insight Flood Risk from Surface Waters map

3.4.3 Groundwater

The Groundsure Enviro Insight report identifies geological deposits underlying the Site are classified as per Table 5.

Table 5: Summary of Hydrogeological Properties of The Main Geological Strata

Stratum	EA Classification	Hydrogeological Significance
Made Ground	Unproductive Strata	Contains insignificant quantities of vertically or laterally extensive groundwater
Glacial Till (alluvial clays and sands)	Secondary A Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams
Pennine Lower Coal Measures Formation	Secondary A Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams

Based on available information, it is anticipated that groundwater flow will be in a southerly direction.

No active abstraction licenses were found within 1km of the Site. Two historical groundwater abstractions are noted, the closest 291m north-east and registered to Sheffield Water Limited for drawing of groundwater at a water bottling plant. The further abstraction is 344m north-east, registered to Sheffield Developments for the same purpose.

No groundwater discharge consents are recorded within a 1km radius of the Site.

3.5 Ecological Systems

The Groundsure dataset identified that land 95m to the Site to the south forms part of the green-belt. No sensitive ecological receptors were identified within 1km.

3.6 Consultations

The agencies and individuals which have been contacted and/or their records reviewed during the course of this study are listed in Table 6.

Table 6: List of Parties Consulted During This Study

Organisation	Consultee	Response
Barnsley Council		
Environmental Health	environmental.health@barnsley.gov.uk	Awaited
Planning	developmentcontrol@barnsley.gov.uk	Awaited
Building Control	developmentcontrol@barnsley.gov.uk	Awaited

3.6.1 Environmental Health

Information was requested from Barnsley Metropolitan Borough Council Environmental Health department in June 2020. No response has been received.

3.6.2 Planning Department

Information was requested from Barnsley Council Planning department in June 2020. No response has been received.

A search of the Barnsley Council Planning portal (accessed June 2020) identified two former planning

applications relating the Site. The first was submitted in January 2006, relating to addition of a hardstanding car park at the existing Keresford Medical Centre (*application reference 2005/2152*). The further record is for extension of this car park in December 2009 (*reference 2009/1579*). Both applications were approved, with no conditions relating to contaminated land imposed.

3.6.3 Building Control Department

Information was requested from Barnsley Council Building Control department in June 2020. No response has been received.

3.7 Previous Environmental Assessments

No previous environmental assessments of the Site have been provided for review.

4. Hazard Assessment and Preliminary Conceptual Model

The Preliminary Conceptual Model for the Site is presented in Table 8 and graphically in Figure A1 of Appendix A. The risk rating included in Table 7 has been assessed qualitatively using the criteria given in Appendix E and the potential receptors identified using the criteria given in Appendix F.

4.1 Contaminants of Concern

Contaminants of concern identified at the Site are summarised in Table 7.

Table 7: Contaminants of Concern

Source	Associated Contaminants
On-Site (current)	
Coal seams and mining activity	Ground gas
Boiler Room and Chimney/Incinerator	PAHs, metals, dioxins & furans
Above Ground Storage Tank	Oils and fuels (TPH)
On-Site (historic)	
Arable land use	Pesticides and herbicides
Off-site (current)	
<i>None identified</i>	
Off-site (historic)	
Foundries ¹	Metals and semimetals, hydrocarbons inc. MTBE and BTEX, PCBs, asbestos, sulphates / chlorites
Colliery ²	Metals, hydrocarbons, VOCs and SVOCs, asbestos
Velvet works ³	Metals and semimetals, hydrocarbons, VOCs and SVOCs, asbestos
Brick works	Metals, hydrocarbons, asbestos
Fire and ambulance centre	Diesel fuel, asbestos
Unspecified mills, works and depots	Metals, hydrocarbons, asbestos

¹ DoE Industry Profile - Metal manufacturing, refining and finishing works - iron and steel works

² DoE Industry Profile - Gas works, coke works and other coal carbonisation plants

³ DoE Industry Profile - Textile works and dye works

Table 8: Preliminary Conceptual Model for the Site

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Human Health					
Potential contamination in Made Ground and shallow soils from land uses surrounding the Site.	Dermal contact and inhalation of dust from contaminated soils during works Contact with potential contamination in shallow soils in areas of soft landscaping.	Future Site Users	Low	Significant potentially contaminative land uses have not been identified at the Site. Within the surrounding area, some activities including foundries and collieries, along with various works may have caused minor ground contamination with the potential to migrate onto the Site via shallow groundwater within the Glacial Till. The proposed development works involve construction of new residential and academy buildings, surrounded by hardstanding with some soft landscaping and play areas. The Site is within an area identified by the Coal Authority as being high risk for new developments. Geotechnical ground investigation will be necessary to inform foundations design for future structures This investigation should include environmental testing of shallow soils and groundwater to identify if contamination from nearby land uses has impacted the Site.	Low
Worked Coal Seams (Ground gas and vapours)	Accumulation in confined spaces, leading to inhalation.	Future Site Users	Medium	The Site is within an area of coal seams, with the Middle Pennines Coal Measures present at shallow depths. This could act as a potential source for ground gas. The proposed ground investigation should include an assessment of the potential for ground gas or vapours. Findings should inform any mitigation or remediation measures necessary at the proposed development.	Low
Potential contamination in Made Ground and shallow soils.	Windborne, potentially contaminated construction dust. Runoff from stockpiled soils.	Off-Site Users and nearby residents	Medium	A Construction Environmental Monitoring Plan (CEMP) should be prepared for the works, including measures to minimise runoff from stockpiled soils, manage groundwater in excavations and suppress the generation of dust. Construction materials brought on-Site as part of works will be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching off-Site residents.	Low

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Potential contamination in Made Ground, shallow soils, and shallow groundwater.	Dermal contact and ingestion. Dust inhalation. Ground gas and vapour accumulation in trenches and confined spaces, leading to inhalation followed by asphyxiation and risk of explosion.	Construction Workers	Medium	Construction workers will be provided with appropriate personal protective equipment (PPE). Workers should be aware of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater, ground gas, vapours and dust inhalation. Works will be undertaken in accordance with the Control of Asbestos Regulations 2012.	Low
Unexploded Ordnance	Direct contact	Construction workers and nearby residents.	Low	An Unexploded Ordnance Desktop Assessment for the Site determined the risk from German and anti-aircraft unexploded ordnance as low. The risk of Allied ordnance was assessed as negligible. A UXO Risk Management Plan will be prepared for the Site. Site Specific UXO Awareness Briefings will be provided to all personnel conducting intrusive works.	Low
Property					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Site structures and services	Medium	Geotechnical investigation as part of design works for the development should include sampling and testing of soils to assess the risk posed by chemical attack. If required, appropriately designed buried concrete and barrier water supply pipes should be used at the development.	Low
Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Off-Site Structures	Low	No significant previous potentially contaminated land uses have been identified at the Site, and therefore the risk for potential impacts to off-site surrounding receptors is considered to be low.	Low
Controlled Waters					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Migration through Glacial Till to nearby watercourses. Runoff from stockpiled soils.	Surface watercourse 26m south of the Site	Low	No significant previous potentially contaminated land uses have been identified at the Site, and therefore the risk for potential ground contamination sources causing impacts to the watercourse is considered low.	Low

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Construction materials stored on-Site as part of development works.	Spills to ground, and the nearby watercourse.	Surface watercourse 26m south of the Site	Medium	A CEMP should be prepared for the demolition and construction works on-Site, detailing measures to minimise the potential risk to controlled waters. Construction materials brought on-Site as part of works should be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching surface watercourses.	Low

5. Conclusions

A Preliminary Environmental Risk Assessment has been prepared to inform a feasibility phase for the construction of a new academy complex with an area of residential properties.

A review of historical mapping indicated that the Site remained undeveloped until circa 1978. The Keresforth Medical Centre was constructed on the north-eastern section, with the south-western area remaining undeveloped to present day.

The geology underlying the Site is anticipated to comprise Made Ground underlain Glacial Till. The solid geology is the Pennine Lower Coal Measures. The Site is located in a Coal Mining Reporting area, with parts of the Site encroaching on to a Development High Risk Area. A separate Coal Mining Risk Assessment report should be prepared to support a planning application and inform the development design.

The Site is underlain by a Secondary A Aquifers associated with both the Glacial Till and the Pennine Middle Coal Measures. The Site is not located within a Source Protection Zone and there are no potable groundwater abstractions within 500m of the Site. The nearest surface water receptor to the Site is an unnamed stream 26m to the south.

The risk from ground gas is considered to be Medium based on the anticipated thickness of Made Ground, the underlying Coal Measures.

The Preliminary Conceptual Site Model indicates that the highest risk estimated for potential pollutant linkages was Medium. This rating was given to five of eight potential pollutant linkages. It is considered that the overall risk rating for the proposed development is **Medium**.

The recommendations of this report outline preliminary remedial and mitigation measures that require confirmation through additional works. However, once successfully implemented, the risks are anticipated to be Low. Therefore, the NPPF requirement that on completion the Site can no longer be captured under the Part IIA regime is expected to be met.

6. Recommendations

The following actions are recommended to address the potentially unacceptable risks identified:

- A Coal Mining Risk Assessment should be undertaken for the Site to support a future planning application and inform the development design;
- A geo-environmental ground investigation should be completed, including soil/groundwater sampling and ground gas/vapour monitoring to confirm risks to future Site users and provide design parameters for the proposed development;
- The geotechnical investigation as part of design works for the development should include an assessment of the risk posed by chemical attack;
- If necessary, mitigation measures to protect the Site from ground gas or vapour ingress should be included in the final development design;
- Soft landscaping at the Development should be planted using an appropriate thickness of imported, certified clean cover material if necessary;
- A UXO Risk Management Plan should be prepared for the Site. Site Specific UXO Awareness Briefings should be provided to all personnel conducting intrusive works;
- A Construction Environmental Management Plan (CEMP) should be developed for the Site, detailing measures to minimise the potential risk to the surface watercourse and shallow Secondary A aquifer during the demolition and construction works;
- During the Works, appropriate measures for managing materials, chemicals and waste should be utilised. Measures should also be taken to prevent run-off from stockpiled soils reaching nearby residents, and to suppress the generation of dust;
- Construction workers should be provided with and use personal protective equipment (PPE) and be informed of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater or ground gas / vapours;
- Concrete used in construction, and any new water pipes installed as part of the redevelopment works should be appropriately protected against chemical attack from shallow soils and groundwater underlying the Site; and,
- In the event that materials are to be excavated for re-use on Site or off-site disposal, a preliminary waste classification assessment should be undertaken. Waste acceptance criteria (WAC) testing may then be necessary where off-site disposal is proposed.

GLOSSARY

For the purpose of this report, the following terms and definitions apply (see BS 10175:2001).

Accuracy	Level of agreement between true value and observed value.
Conceptual Exposure model	Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. Note 1: The conceptual exposure model is initially derived from the information obtained by the preliminary investigation. This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model.
Contamination	Presence of a substance which is in, on or under land, and which has <u>the potential</u> to cause significant harm or to cause significant pollution of controlled water. Note 1: There is no assumption in this definition that harm results from the presence of the contamination. Note 2: Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. Note 3: Contamination may relate to soils, groundwater or ground gas.
Controlled water	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters. Note 1: See Section 104 of The Water Resources Act 1991.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property.
Hazard	Inherently dangerous quality of a substance, procedure or event.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
Precision	Level of agreement within a series of measurements of a parameter.
Receptor	Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).
Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
Soil	Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter. Note 1: In accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms.
Source	Location from which contamination is, or was, derived. Note 1: This could be the location of the highest soil or groundwater concentration of the contaminant(s).
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

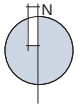


APPENDICES

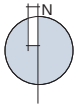
A. Site Plans

- **Site Location Plan (Ref. WIE17125-103_GR_PRA_A1A)**
- **Site Features Plan (Ref. WIE17125-GR_PRA_A2A)**
- **Conceptual Model (Ref. WIE17125-103_GR_PRA_A3A)**
- **Edwards Architecture Plan Ref. 0632/EA/A/S001**

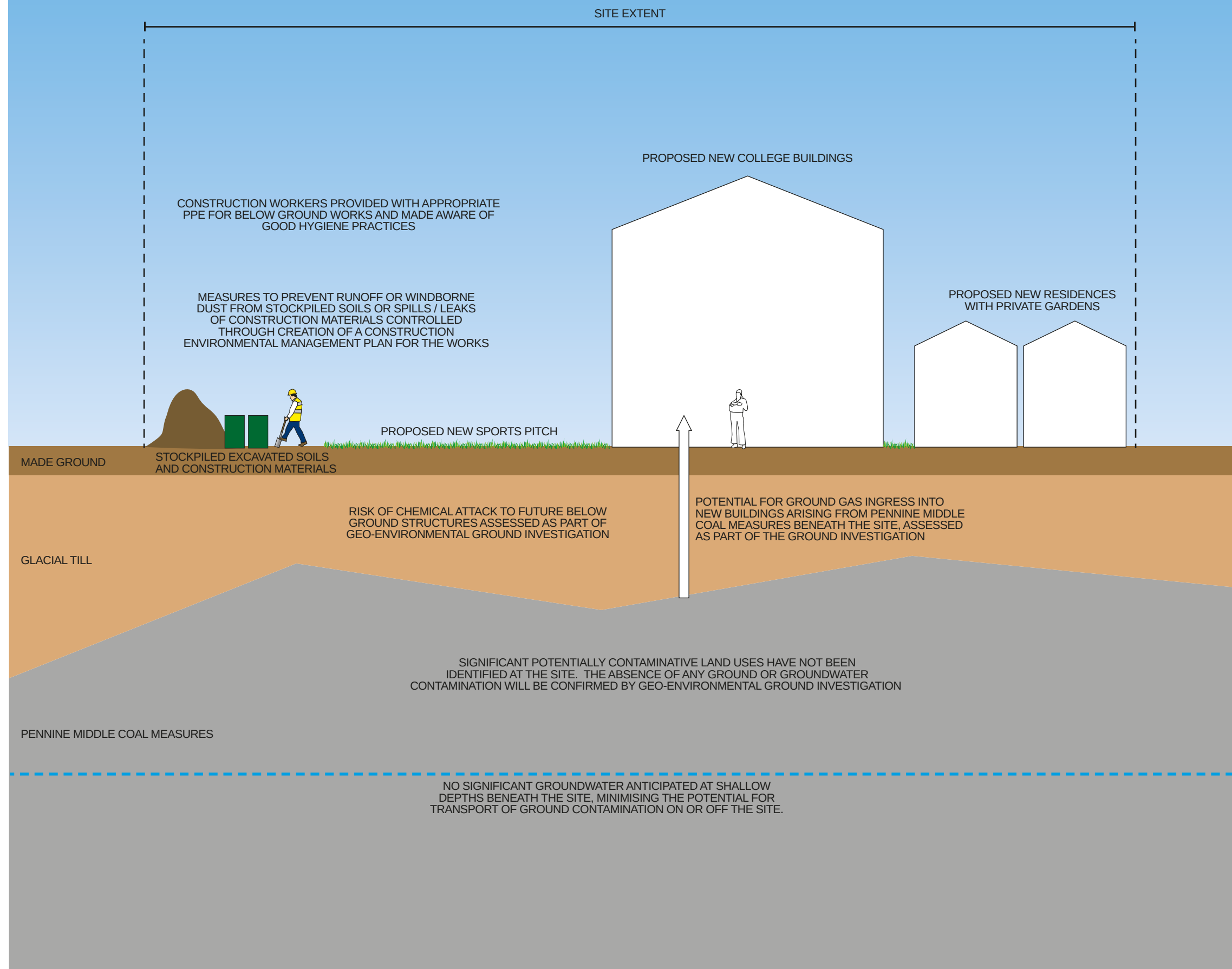
Appendices



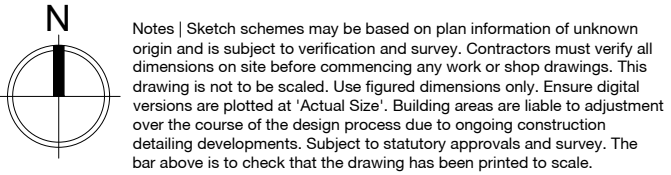
Project Details	WIE17125-103: Keresforth Academy
Figure Title	Figure A1: Site Location Plan
Figure Ref	WIE17125-103_GR_PRA_A1A
Date	June 2020
File Location	\\s-Incs\wiel\projects\wie17125\103\graphics\pra\issued figures



Project Details	WIE17125-103: Keresforth Academy
Figure Title	Figure A2: Site Plan
Figure Ref	WIE17125-103_GR_PRA_A2A
Date	June 2020
File Location	\\s-inc\swiel\projects\wie17125\103\graphics\pra\issued figures



Project Details	WIE17125-103: Keresforth Academy
Figure Title	Figure A3: Conceptual Site Model
Figure Ref	WIE17125-103_GR_PRA_A3A
Date	June 2020
File Location	\\s-incs\wiel\projects\wie17125\103\graphics\pra\issued figures





B. Site Photographs



Plate 1 – Rear of Boiler Room, AST in raised area.



Plate 2 – Boiler Room and chimney (possibly incinerator) at the north of the Site.



Plate 3 – Flat grassed area of POS.



Plate 4 – Disused Area of the Keresforth Medical Centre.



Plate 5 – Further Disused buildings in the Keresforth Medical Centre.



Plate 6 – Dipping site levels and overgrown former grassed areas.



Plate 7 – Roadways facing to the west in the Keresforth Centre.

Project Details	WIE17125-103: Keresforth Academy
Figure Title	Figure B1: Site Photographs
Figure Ref	WIE17125-103_GR_PRA_B1A
Date	June 2020
File Location	\\s-Incs\wie1\projects\wie17125\103\graphics\pra\issued figures
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C. Ground Gas Risk Assessment

Appendices

Preliminary Environmental Risk Assessment
WIE17125-100-R-1.2.1-RJM

Table C.1:Waterman Ground Gas Risk Assessment Tool

Parameter	Select parameter	Assessment score	Impact on ground gas risk to completed development	Reasoning	Supporting guidance and reference
Is there an existing Ground Investigation report for the Site?	No	0	Refer to available online resources i.e. BGS online	Information from online resources such as the Groundsure/Landmark Environmental report and BGS datasets will provide a general understanding of the likely ground conditions at the Site.	
Is the Site within 20m of an area of former coal mining or landfilling?	Yes	1	Increases risk	Coal mine gas and landfill gas account for the majority of real-world case studies involving ground gas affecting developments, and are the most significant sources of ground gas risks to developments	The Coal Authority: Risk Based Approach to Development Management; Guidance for Developers (2017) [Section 2.2, Page 7] CL:AIRE: Research Bulletin RB17 A Pragmatic Approach to Ground Gas Risk Assessment (November 2012) [Section 3, Page 3] EPG: Ground Gas Information Sheet 3 Screening approach for landfill gas migration around
Is the Site in an area at risk of radon?	Yes, basic protective measures required	-1	May reduce risk	the development, in certain instances these measures may also mitigate ground gas risk.	Building Research Establishment: BRE 211 Radon - Guidance on protective measures for new buildings [Section 5 Page 6]
Primary soil type assessed	Made Ground with low organic content (i.e. bricks, demolition material, crushed concrete sub-base)	1	No increase in risk	Where organic matter is unlikely to comprise a significant component of Made Ground the methane generation potential is relatively low as material such as brick, glass, concrete and demolition waste (except wood) does not putrefy.	CL:AIRE: Research Bulletin RB17 A Pragmatic Approach to Ground Gas Risk Assessment (November 2012) [Section 3, Page 3] EPG: A pragmatic approach to ground gas risk assessment for the 21st Century (2011) [Page 2]
Secondary soil type assessed (if assessing multiple strata)	Chalk, Clay or Limestone	0	Reduces risk	Strata of this type do not contain material capable of ground gas generation, and do not represent a significant risk for methane generation.	CL:AIRE: Research Bulletin RB17 A Pragmatic Approach to Ground Gas Risk Assessment (November 2012) [Section 3, Page 3] EPG: A pragmatic approach to ground gas risk assessment for the 21st Century (2011) [Page 2]
Thickness of Made Ground (if present on-Site)	Under 5m (with average of less than 3m)	0	Reduces risk	organic material present to generate significant volumes of methane, unless it has a significantly high organic content.	CL:AIRE: Research Bulletin RB17 A Pragmatic Approach to Ground Gas Risk Assessment (November 2012) [Section 3: Page 4]
Period since Made Ground emplaced (if present on-Site)	>20 years	0	Reduces risk	of methane has been exhausted. Minor volumes may remain within the pore space however, which can be	CL:AIRE: Research Bulletin RB17 A Pragmatic Approach to Ground Gas Risk Assessment (November 2012) [Appendix A, Page 10]
Existing building type (if applicable)	New development proposed	0	Reduces risk only if appropriate protective measures are included where necessary	Construction of new buildings offers an opportunity to design gas protection directly into the structure , with more flexibility and reliability than retrofitting an existing structure. Requirement for gas protection is informed by ground conditions.	CIRIA: C665 Assessing Risks Posed by Hazardous Ground Gases to Buildings (2007) [Table 8.6, Page 90] British Standard: BS8485 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (2015) [Table 86 Page 90]
Development type	Type B: Residential (flats) or public buildings such as hospitals, schools, leisure centres, hotels etc	1	-	-	British Standard: BS8485 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (2015) [Section 7, Page 21]
Ground floor slab construction details	Not known	0	Does not reduce risk	Does not reduce risk	CIRIA: C665 Assessing Risks Posed by Hazardous Ground Gases to Buildings (2007) [Table 8.6, Page 90] British Standard: BS8485 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (2015) [Section 7.2, Page 23]
Development includes a basement?	No	1	Does not reduce risk	Where the development does not include a basement the majority of potential ground gas source material will likely remain beneath the Site.	British Standard: BS8485 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (2015) [Annex A Page 36] CIEH: The Local Authority Guide to Ground Gas (September 2008) [Section 7 Page 101]
If a basement is present, is this structure in contact with groundwater-bearing strata?	No basement	0	Does not increase risk	Not Applicable	EPG: Dissolved methane monitoring for ground gas risk assessment (September 2018) [Page 1]
Presence of off-Site sources with potential pathway to Site?	Yes	5	Increases risk	The where potential on-site sources for ground gases are present close to the Site, potential pathways for migration onto the Site may be present dependent on underlying geology.	

Total Assessed Score	8	
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In consideration of the above details the development is considered to be at	Moderate Risk	for ground gas issues.
Based on the sensitivity of the end-use receptor	Ground investigation is recommended to more accurately investigate the potential for gas generation.	

Coal mines and landfills represent potentially significant ground gas sources. Where these are identified on or in close proximity to the Site this tool is unlikely to be appropriate and a more detailed preliminary ground gas risk assessment should be undertaken. It should also be noted landfills should only be considered where they lie within 250m of the Site as per EA policies.

D. Consultation Information

- **Groundsure Enviro Insight Technical Report (report reference WTM1-6786594; June 2020)**
- **1st Line Defence Detailed Unexploded Ordnance Risk Assessment (report reference DA11373-00, June 2020)**

KERESFORTH CENTRE, KERESFORTH CLOSE, BARNSELEY, S70 6RS

Order Details

Date: 09/06/2020
Your ref: WIE16416_Trinity_College_REQ_104690
Our Ref: WTM1-6786594
Client: Waterman Infrastructure & Environment Limited

Site Details

Location: 433423 405601
Area: 7.23 ha
Authority: [Barnsley Metropolitan Borough 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>	0	3	18	17	-
16	1.2	<u>Historical tanks</u>	0	0	1	5	-
17	1.3	<u>Historical energy features</u>	0	0	7	4	-
17	1.4	Historical petrol stations	0	0	0	0	-
18	1.5	<u>Historical garages</u>	0	0	0	2	-
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>	0	4	22	20	-
21	2.2	<u>Historical tanks</u>	0	0	3	10	-
22	2.3	<u>Historical energy features</u>	0	0	17	7	-
23	2.4	Historical petrol stations	0	0	0	0	-
23	2.5	<u>Historical garages</u>	0	0	0	3	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
25	3.1	Active or recent landfill	0	0	0	0	-
25	3.2	Historical landfill (BGS records)	0	0	0	0	-
26	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
26	3.4	<u>Historical landfill (EA/NRW records)</u>	0	0	0	1	-
26	3.5	Historical waste sites	0	0	0	0	-
26	3.6	Licensed waste sites	0	0	0	0	-
27	3.7	<u>Waste exemptions</u>	0	0	1	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
28	4.1	<u>Recent industrial land uses</u>	1	2	7	-	-
29	4.2	Current or recent petrol stations	0	0	0	0	-
29	4.3	Electricity cables	0	0	0	0	-
29	4.4	Gas pipelines	0	0	0	0	-
30	4.5	Sites determined as Contaminated Land	0	0	0	0	-



30	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
30	4.7	Regulated explosive sites	0	0	0	0	-
30	4.8	Hazardous substance storage/usage	0	0	0	0	-
30	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
31	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
31	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	0	1	-
31	4.12	Radioactive Substance Authorisations	0	0	0	0	-
31	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	0	12	-
33	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
34	4.15	Pollutant release to public sewer	0	0	0	0	-
34	4.16	List 1 Dangerous Substances	0	0	0	0	-
34	4.17	List 2 Dangerous Substances	0	0	0	0	-
34	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
34	4.19	Pollution inventory substances	0	0	0	0	-
35	4.20	Pollution inventory waste transfers	0	0	0	0	-
35	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
36	5.1	Superficial aquifer	None (within 500m)				
37	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
39	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
40	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
40	5.5	Groundwater vulnerability- local information	None (within 0m)				
41	5.6	<u>Groundwater abstractions</u>	0	0	0	4	3
43	5.7	Surface water abstractions	0	0	0	0	0
44	5.8	<u>Potable abstractions</u>	0	0	0	4	0
45	5.9	Source Protection Zones	0	0	0	0	-
45	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
46	6.1	<u>Water Network (OS MasterMap)</u>	0	1	0	-	-



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

59	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
59	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
59	10.15	Nitrate Sensitive Areas	0	0	0	0	0
59	10.16	<u>Nitrate Vulnerable Zones</u>	1	0	1	0	2
61	10.17	SSSI Impact Risk Zones	0	-	-	-	-
61	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
62	11.1	World Heritage Sites	0	0	0	-	-
63	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
63	11.3	National Parks	0	0	0	-	-
63	11.4	<u>Listed Buildings</u>	0	0	1	-	-
64	11.5	Conservation Areas	0	0	0	-	-
64	11.6	Scheduled Ancient Monuments	0	0	0	-	-
64	11.7	<u>Registered Parks and Gardens</u>	0	0	1	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
65	12.1	<u>Agricultural Land Classification</u>	Grade 3 (within 250m)				
66	12.2	Open Access Land	0	0	0	-	-
66	12.3	Tree Felling Licences	0	0	0	-	-
66	12.4	Environmental Stewardship Schemes	0	0	0	-	-
66	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
67	13.1	Priority Habitat Inventory	0	0	0	-	-
67	13.2	Habitat Networks	0	0	0	-	-
67	13.3	Open Mosaic Habitat	0	0	0	-	-
67	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
68	14.1	<u>10k Availability</u>	Identified (within 500m)				
69	14.2	<u>Artificial and made ground (10k)</u>	1	0	2	3	-
71	14.3	Superficial geology (10k)	0	0	0	0	-

71	14.4	Landslip (10k)	0	0	0	0	-
72	14.5	<u>Bedrock geology (10k)</u>	5	0	7	23	-
74	14.6	<u>Bedrock faults and other linear features (10k)</u>	3	0	2	26	-
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	<u>Artificial and made ground (50k)</u>	1	0	2	2	-
79	15.3	<u>Artificial ground permeability (50k)</u>	1	0	-	-	-
80	15.4	Superficial geology (50k)	0	0	0	0	-
80	15.5	Superficial permeability (50k)	None (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>	3	0	7	5	-
82	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
83	15.10	<u>Bedrock faults and other linear features (50k)</u>	3	0	4	17	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
85	16.1	<u>BGS Boreholes</u>	0	1	42	-	-
Page	Section	Natural ground subsidence					
88	17.1	<u>Shrink swell clays</u>	Very low (within 50m)				
89	17.2	<u>Running sands</u>	Very low (within 50m)				
91	17.3	<u>Compressible deposits</u>	Very low (within 50m)				
93	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
94	17.5	<u>Landslides</u>	Very low (within 50m)				
95	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
96	18.1	Natural cavities	0	0	0	0	-
97	18.2	<u>BritPits</u>	1	2	11	8	-
100	18.3	<u>Surface ground workings</u>	0	2	17	-	-
101	18.4	<u>Underground workings</u>	0	0	2	0	15
102	18.5	Historical Mineral Planning Areas	0	0	0	0	-



<u>102</u>	<u>18.6</u>	<u>Non-coal mining</u>	1	0	0	1	2
103	18.7	Mining cavities	0	0	0	0	0
103	18.8	JPB mining areas	None (within 0m)				
<u>104</u>	<u>18.9</u>	<u>Coal mining</u>	Identified (within 0m)				
104	18.10	Brine areas	None (within 0m)				
104	18.11	Gypsum areas	None (within 0m)				
104	18.12	Tin mining	None (within 0m)				
104	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
<u>105</u>	<u>19.1</u>	<u>Radon</u>	Between 1% and 3% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
<u>107</u>	<u>20.1</u>	<u>BGS Estimated Background Soil Chemistry</u>	9	3	-	-	-
108	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
108	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
109	21.1	Underground railways (London)	0	0	0	-	-
109	21.2	Underground railways (Non-London)	0	0	0	-	-
109	21.3	Railway tunnels	0	0	0	-	-
109	21.4	Historical railway and tunnel features	0	0	0	-	-
109	21.5	Royal Mail tunnels	0	0	0	-	-
110	21.6	Historical railways	0	0	0	-	-
110	21.7	Railways	0	0	0	-	-
110	21.8	Crossrail 1	0	0	0	0	-
110	21.9	Crossrail 2	0	0	0	0	-
110	21.10	HS2	0	0	0	0	-



Recent aerial photograph



Capture Date: 01/07/2018

Site Area: 7.23ha



Recent site history - 2013 aerial photograph



Capture Date: 07/06/2013

Site Area: 7.23ha



Recent site history - 2012 aerial photograph



Capture Date: 26/03/2012

Site Area: 7.23ha



Recent site history - 2009 aerial photograph



Capture Date: 11/09/2009

Site Area: 7.23ha



Recent site history - 1999 aerial photograph



Capture Date: 10/07/1999

Site Area: 7.23ha



OS MasterMap site plan



Site Area: 7.23ha



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

14

ID	Location	Land use	Dates present	Group ID
B	43m NW	Fire and Ambulance Station	1973 - 1982	1469911
A	44m SE	Unspecified Heap	1850	1417624
D	74m SW	Unspecified Heap	1966	1417623
D	81m SW	Refuse Heap	1938	1495446
B	81m NW	Fever Hospital	1993	1422016
D	81m SW	Refuse Heap	1948	1465004
D	83m SW	Refuse Heap	1951	1496027
1	106m W	Unspecified Warehouse	1993	1418717
E	111m W	Unspecified Pit	1890 - 1904	1500945
E	113m W	Unspecified Pit	1951	1531910
E	119m W	Unspecified Pit	1948	1541023
E	121m W	Unspecified Pit	1938	1541914
E	122m W	Sandstone Quarry	1850	1451613
F	124m SW	Unspecified Pits	1938	1479746
F	127m SW	Unspecified Pits	1951	1514217
F	135m SW	Unspecified Pits	1948	1501992
2	165m SW	Unspecified Pit	1966	1455321
H	174m NW	Unspecified Tank	1982	1433410
3	201m W	Unspecified Works	1982	1438961
4	211m SW	Unspecified Pump	1850	1456724
5	260m S	Unspecified Pit	1966	1455323
I	356m NE	Unspecified Mill	1948	1544561
8	374m SW	Unspecified Quarry	1904	1428041
I	380m NE	Unspecified Mill	1951	1519666
I	383m NE	Sawmill	1850	1419538
I	385m NE	Unspecified Mill	1938	1526790
J	397m NW	Unspecified Factories	1982 - 1993	1479904
J	401m NW	Unspecified Quarry	1966	1428050



ID	Location	Land use	Dates present	Group ID
J	407m NW	Old Clay Pit	1951	1408275
J	408m NW	Clay Pit	1938 - 1948	1534585
J	409m NW	Unspecified Disused Pit	1973	1431756
10	416m NE	Unspecified Pump	1850	1456730
L	452m NW	Unspecified Ground Workings	1993	1414407
11	468m E	Unspecified Shaft	1850	1425321
12	477m E	Old Sandstone Quarry	1850	1421996
13	479m E	Unspecified Quarry	1938	1428046
J	482m NW	Tramway Sidings	1938 - 1948	1491835

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

6

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
H	172m NW	Unspecified Tank	1974 - 1983	237018
9	406m NW	Unspecified Tank	1991	228987
14	480m N	Unspecified Tank	1959 - 1981	233869
L	488m NW	Tanks	1988 - 1991	239026
L	497m NW	Tanks	1988 - 1991	242425
L	498m NW	Tanks	1988 - 1991	240581

This data is sourced from Ordnance Survey / Groundsure.



1.3 Historical energy features

Records within 500m

11

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
C	69m SE	Electricity Substation	1969 - 1991	141705
C	70m SE	Electricity Substation	-	128809
B	74m NW	Electricity Substation	1974 - 1991	144598
E	95m W	Electricity Substation	1974 - 1991	146594
G	166m E	Electricity Substation	1969 - 1991	140766
G	166m E	Electricity Substation	1970	138030
G	167m E	Electricity Substation	-	128636
6	346m N	Electricity Substation	1991	131132
7	350m E	Electricity Substation	1989 - 1993	136712
K	430m NW	Electricity Substation	1969 - 1970	142539
K	438m NW	Electricity Substation	1991	142452

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**2**

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'.

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

ID	Location	Land use	Dates present	Group ID
I	359m NE	Garage	1981	41972
I	413m NE	Garage	1959 - 1960	45779

This data is sourced from Ordnance Survey / Groundsure.

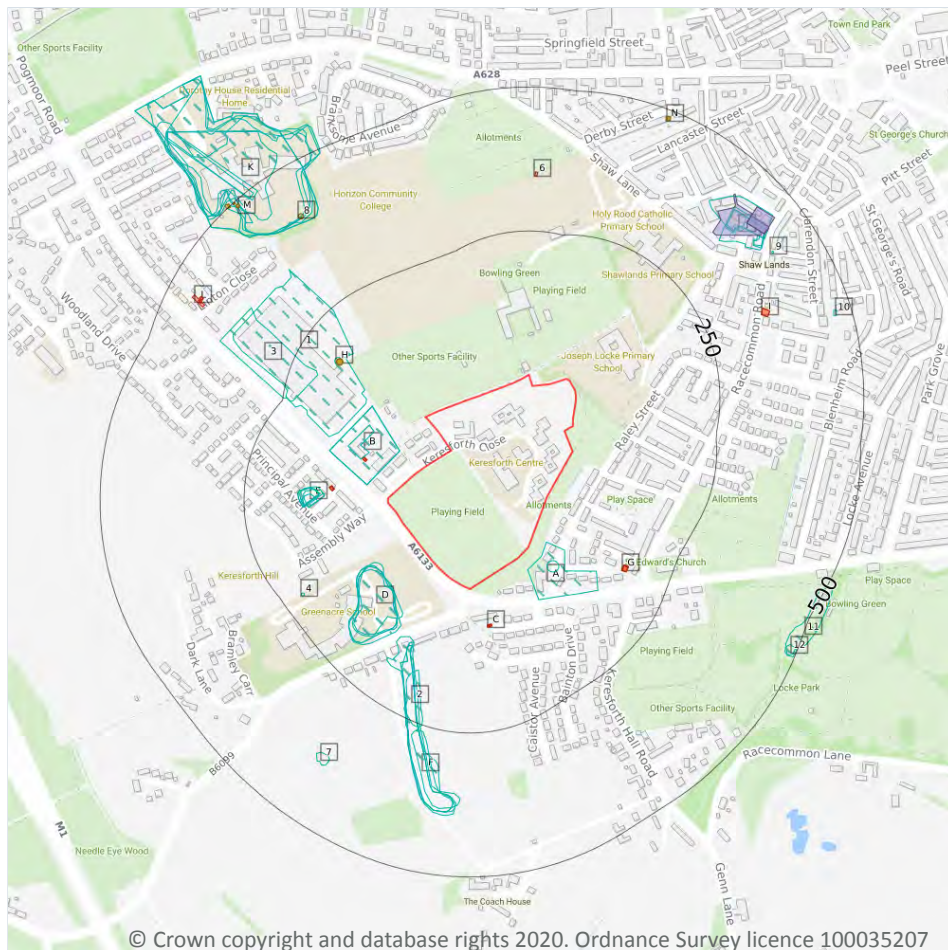
1.6 Historical military land

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
- Historical garages

2.1 Historical industrial land uses

Records within 500m

46

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
A	26m E	Brick Field	1850	1428451
B	43m NW	Fire and Ambulance Station	1973	1469911
B	43m NW	Fire and Ambulance Station	1982	1469911



ID	Location	Land Use	Date	Group ID
A	44m SE	Unspecified Heap	1850	1417624
D	74m SW	Unspecified Heap	1966	1417623
D	81m SW	Refuse Heap	1938	1495446
B	81m NW	Fever Hospital	1993	1422016
D	81m SW	Refuse Heap	1948	1465004
D	81m SW	Refuse Heap	1948	1465004
D	83m SW	Refuse Heap	1951	1496027
1	106m W	Unspecified Warehouse	1993	1418717
E	111m W	Unspecified Pit	1890	1500945
E	113m W	Unspecified Pit	1951	1531910
E	119m W	Unspecified Pit	1948	1541023
E	119m W	Unspecified Pit	1948	1541023
E	121m W	Unspecified Pit	1938	1541914
E	121m W	Unspecified Pit	1904	1500945
E	122m W	Sandstone Quarry	1850	1451613
F	124m SW	Unspecified Pits	1938	1479746
F	127m SW	Unspecified Pits	1951	1514217
F	135m SW	Unspecified Pits	1948	1501992
F	135m SW	Unspecified Pits	1948	1501992
2	165m SW	Unspecified Pit	1966	1455321
H	174m NW	Unspecified Tank	1982	1433410
3	201m W	Unspecified Works	1982	1438961
4	211m SW	Unspecified Pump	1850	1456724
5	260m S	Unspecified Pit	1966	1455323
J	356m NE	Unspecified Mill	1948	1544561
7	374m SW	Unspecified Quarry	1904	1428041
J	380m NE	Unspecified Mill	1951	1519666
J	383m NE	Sawmill	1850	1419538

ID	Location	Land Use	Date	Group ID
J	385m NE	Unspecified Mill	1938	1526790
K	397m NW	Unspecified Factories	1993	1479904
K	397m NW	Unspecified Factories	1982	1479904
K	401m NW	Unspecified Quarry	1966	1428050
K	407m NW	Old Clay Pit	1951	1408275
K	408m NW	Clay Pit	1948	1534585
K	409m NW	Unspecified Disused Pit	1973	1431756
9	416m NE	Unspecified Pump	1850	1456730
K	440m NW	Clay Pit	1938	1534585
M	452m NW	Unspecified Ground Workings	1993	1414407
10	468m E	Unspecified Shaft	1850	1425321
11	477m E	Old Sandstone Quarry	1850	1421996
12	479m E	Unspecified Quarry	1938	1428046
K	482m NW	Tramway Sidings	1938	1491835
K	487m NW	Tramway Sidings	1948	1491835

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

13

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
H	172m NW	Unspecified Tank	1974	237018
H	172m NW	Unspecified Tank	1983	237018
H	172m NW	Unspecified Tank	1983	237018
8	406m NW	Unspecified Tank	1991	228987
N	480m N	Unspecified Tank	1960	233869



ID	Location	Land Use	Date	Group ID
N	480m N	Unspecified Tank	1959	233869
N	481m N	Unspecified Tank	1981	233869
M	488m NW	Tanks	1988	239026
M	488m NW	Tanks	1991	239026
M	497m NW	Tanks	1988	242425
M	497m NW	Tanks	1991	242425
M	498m NW	Tanks	1988	240581
M	498m NW	Tanks	1991	240581

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m

24

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
C	69m SE	Electricity Substation	1969	141705
C	70m SE	Electricity Substation	1970	141705
C	70m SE	Electricity Substation	-	128809
C	70m SE	Electricity Substation	1991	141705
C	70m SE	Electricity Substation	1991	141705
B	74m NW	Electricity Substation	1983	144598
B	74m NW	Electricity Substation	1983	144598
B	74m NW	Electricity Substation	1991	144598
B	75m NW	Electricity Substation	1974	144598
E	95m W	Electricity Substation	1983	146594
E	95m W	Electricity Substation	1983	146594
E	95m W	Electricity Substation	1991	146594



ID	Location	Land Use	Date	Group ID
E	96m W	Electricity Substation	1974	146594
G	166m E	Electricity Substation	1991	140766
G	166m E	Electricity Substation	1969	140766
G	166m E	Electricity Substation	1970	138030
G	167m E	Electricity Substation	-	128636
6	346m N	Electricity Substation	1991	131132
I	350m E	Electricity Substation	1993	136712
I	350m E	Electricity Substation	1989	136712
L	430m NW	Electricity Substation	1970	142539
L	437m NW	Electricity Substation	1969	142539
L	438m NW	Electricity Substation	1991	142452
L	438m NW	Electricity Substation	1991	142452

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

3

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

Features are displayed on the Past land use - un-grouped map on **page 19**

ID	Location	Land Use	Date	Group ID
J	359m NE	Garage	1981	41972

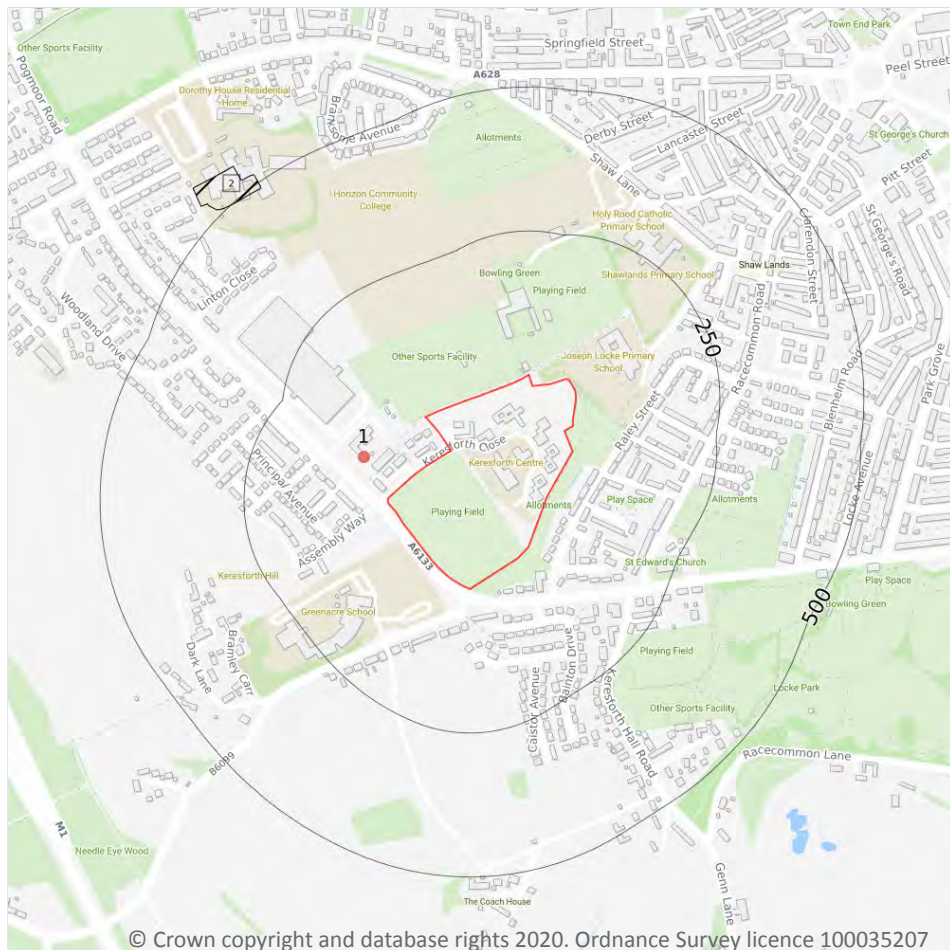


ID	Location	Land Use	Date	Group ID
J	413m NE	Garage	1960	45779
J	413m NE	Garage	1959	45779

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Historical landfill (EA/NRW)
- 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

1

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.

Features are displayed on the Waste and landfill map on **page 25**

ID	Location	Details		
2	490m NW	Site Address: Disused Quarry, Dodworth Road, Barnsley, Yorkshire Licence Holder Address: -	Waste Licence: - Site Reference: - Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: - Licence Surrender: -	Operator: Barnsley County Borough Council Licence Holder: - First Recorded 31/12/1968 Last Recorded: -

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

1

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.

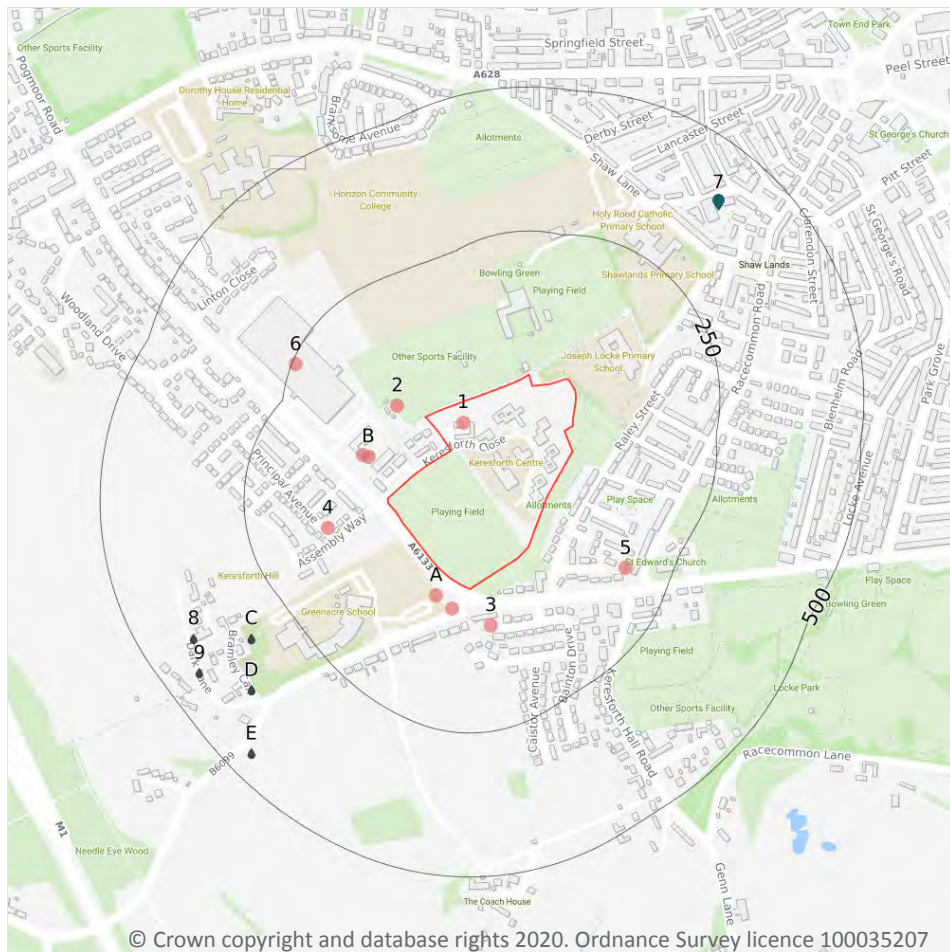
Features are displayed on the Waste and landfill map on **page 25**

ID	Location	Site	Reference	Category	Sub-Category	Description
1	82m NW	The Cooperative NDC Broadway S70 6RA	EPR/XE5152E Q/A001	Storing waste exemption	Non-Agricultural Waste Only	Storage of waste in a secure place

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
- Licensed pollutant release (Part A(2)/B)
- Licensed Discharges to controlled waters

4.1 Recent industrial land uses

Records within 250m

10

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 28**

ID	Location	Company	Address	Activity	Category
1	On site	Chimney	South Yorkshire, S70	Chimneys	Industrial Features
A	39m SW	Electricity Sub Station	South Yorkshire, S70	Electrical Features	Infrastructure and Facilities
A	44m SW	Gas Governor	South Yorkshire, S70	Gas Features	Infrastructure and Facilities



ID	Location	Company	Address	Activity	Category
2	53m W	Mast (Telecommu nication)	South Yorkshire, S70	Telecommunications Features	Infrastructure and Facilities
3	73m SE	Electricity Sub Station	South Yorkshire, S70	Electrical Features	Infrastructure and Facilities
B	77m NW	Electricity Sub Station	South Yorkshire, S70	Electrical Features	Infrastructure and Facilities
B	84m NW	Barnsley Fire Station	Barnsley Fire Station, Broadway, Barnsley, South Yorkshire, S70 6RA	Fire Brigade Stations	Central and Local Government
4	113m W	Electricity Sub Station	South Yorkshire, S70	Electrical Features	Infrastructure and Facilities
5	171m E	Electricity Sub Station	South Yorkshire, S70	Electrical Features	Infrastructure and Facilities
6	244m W	Warehouse	South Yorkshire, S70	Container and Storage	Transport, Storage and Delivery

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m

0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m

0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m

0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.



4.5 Sites determined as Contaminated Land

Records within 500m**0**

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

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m**0**

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

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m**0**

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

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m**0**

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

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m**0**

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

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

4.10 Licensed industrial activities (Part A(1))

Records within 500m

0

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

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

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

Records within 500m

1

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 28**

ID	Location	Address	Details	
7	403m NE	Seals Packaging And Gaskets, Shaw Lane, Barnsley, S70 6HE	Process: Asbestos Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements 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

12

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 28**

ID	Location	Address	Details	
C	330m SW	KERESFORTH HOUSE, DARK LANE, OFF KERESFORTH HILL ROAD, BARNSELY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3815 Permit Version: 1 Receiving Water: TRIBUTARY OF DODWORTH DYKE	Status: TRANSFERRED FROM R(PP)A 1951-1961 Issue date: 03/09/1984 Effective Date: 03/09/1984 Revocation Date: 15/01/1985
C	330m SW	KERESFORTH HOUSE, DARK LANE, OFF KERESFORTH HILL ROAD, BARNSELY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3815 Permit Version: 2 Receiving Water: TRIBUTARY OF DODWORTH DYKE	Status: TRANSFERRED FROM R(PP)A 1951-1961 Issue date: 16/01/1985 Effective Date: 16/01/1985 Revocation Date: 14/11/2006
D	385m SW	1 BRAMLEY CARR, KERESFORTH HILL, BARNSELY	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: WRA8056 Permit Version: 2 Receiving Water: LAND	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 23/09/2003 Effective Date: 23/09/2003 Revocation Date: 25/07/2012
D	385m SW	1 BRAMLEY CARR, KERESFORTH HILL, BARNSELY	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: WRA8056 Permit Version: 3 Receiving Water: LAND	Status: VARIED UNDER EPR 2010 Issue date: 26/07/2012 Effective Date: 26/07/2012 Revocation Date: -
8	411m SW	1 BRAMLEY CARR, KERESFORTH HILL, BARNSELY	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: WRA8056 Permit Version: 1 Receiving Water: LAND	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 03/09/2003 Effective Date: 03/09/2003 Revocation Date: 22/09/2003
9	438m SW	CHERRY TREES, DARK LANE, BARNSELY	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: WRA7645 Permit Version: 1 Receiving Water: TRIB OF DODWORTH DYKE	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 20/11/2000 Effective Date: 20/11/2000 Revocation Date: -
E	458m SW	DARK LANE DEVELOPMENT, OFF KERESFORTH HILL ROAD, BARNSELY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3630 Permit Version: 1 Receiving Water: TRIB OF DODWORTH DYKE	Status: TRANSFERRED FROM R(PP)A 1951-1961 Issue date: 29/06/1982 Effective Date: 29/06/1982 Revocation Date: 25/04/1983



ID	Location	Address	Details	
E	458m SW	DARK LANE DEVELOPMENT, OFF KERESFORTH HILL ROAD, BARNLEY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3630 Permit Version: 2 Receiving Water: TRIB OF DODWORTH DYKE	Status: TRANSFERRED FROM R(PP)A 1951-1961 Issue date: 26/04/1983 Effective Date: 26/04/1983 Revocation Date: 09/10/1997
E	458m SW	DARK LANE DEVELOPMENT, OFF KERESFORTH HILL ROAD, BARNLEY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3630 Permit Version: 3 Receiving Water: TRIB OF DODWORTH DYKE	Status: VARIED BY APPLICATION - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 10/10/1997 Effective Date: 10/10/1997 Revocation Date: -
E	458m SW	DARK LANE DEVELOPMENT, OFF KERESFORTH HILL ROAD, BARNLEY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3630 Permit Version: 1 Receiving Water: TRIB OF DODWORTH DYKE	Status: TRANSFERRED FROM R(PP)A 1951-1961 Issue date: 29/06/1982 Effective Date: 29/06/1982 Revocation Date: 25/04/1983
E	458m SW	DARK LANE DEVELOPMENT, OFF KERESFORTH HILL ROAD, BARNLEY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3630 Permit Version: 2 Receiving Water: TRIB OF DODWORTH DYKE	Status: TRANSFERRED FROM R(PP)A 1951-1961 Issue date: 26/04/1983 Effective Date: 26/04/1983 Revocation Date: 09/10/1997
E	458m SW	DARK LANE DEVELOPMENT, OFF KERESFORTH HILL ROAD, BARNLEY, SOUTH YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 3630 Permit Version: 3 Receiving Water: TRIB OF DODWORTH DYKE	Status: VARIED BY APPLICATION - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 10/10/1997 Effective Date: 10/10/1997 Revocation Date: -

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

5.1 Superficial aquifer

Records within 500m

0

Aquifer status of groundwater held within superficial geology.

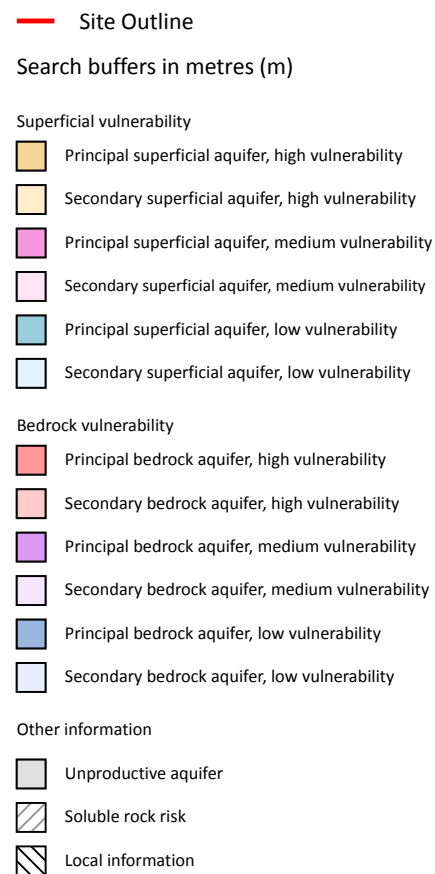
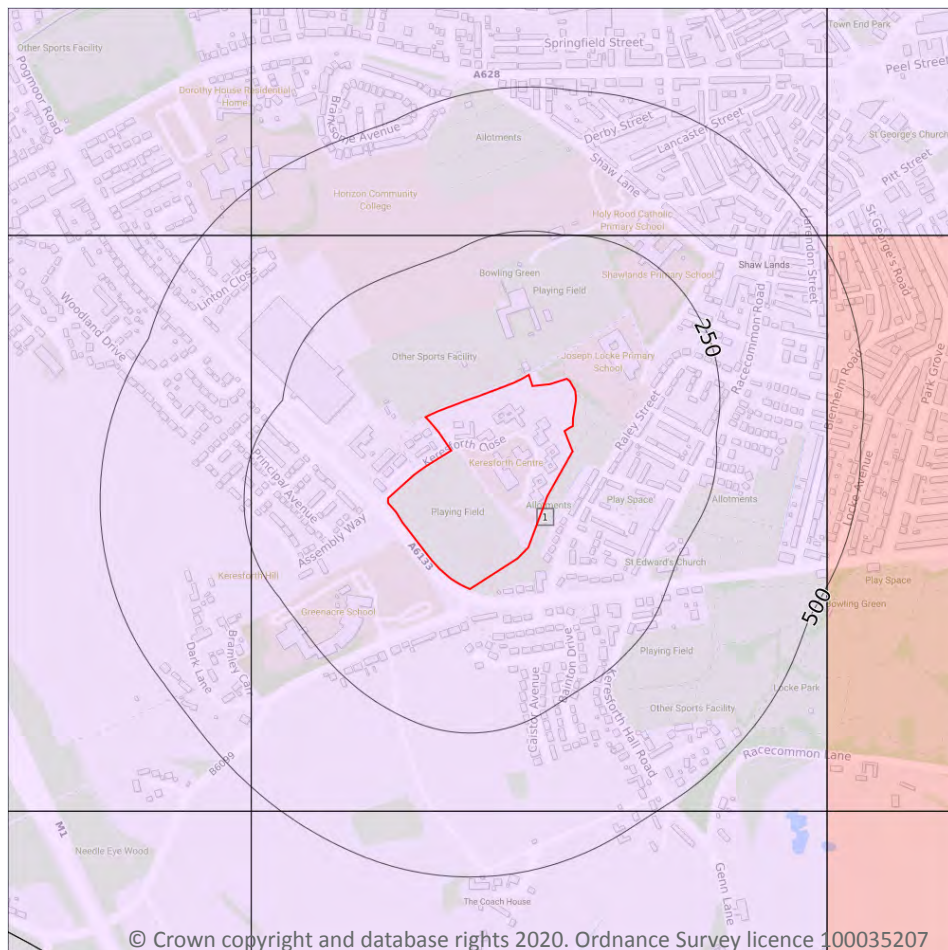
This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



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

1

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

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

Features are displayed on the Groundwater vulnerability map on **page 39**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300- 550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: Medium 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

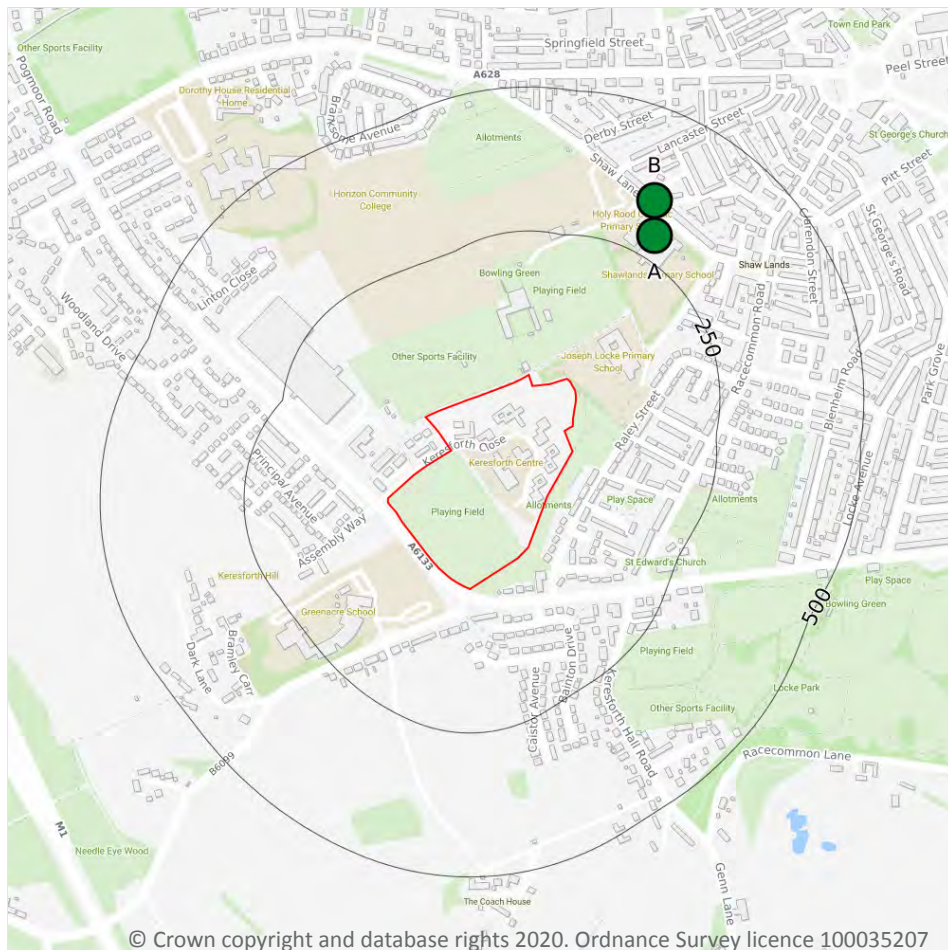
Records on site

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



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

5.6 Groundwater abstractions

Records within 2000m

7

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

Features are displayed on the Abstractions and Source Protection Zones map on **page 41**



ID	Location	Details	
A	291m NE	Status: Historical Licence No: 2/27/08/110 Details: Water Bottling Direct Source: GROUNDWATERS Point: WELL/SPRING - SANDSTONE/MIDDLE COAL MEASURES - SHAW LANE Data Type: Point Name: SHELDALÉ WATER LIMITED Easting: 433700 Northing: 406000	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 23/03/1994 Expiry Date: 31-Dec-03 Issue No: 100 Version Start Date: 01/12/1999 Version End Date: -
A	291m NE	Status: Historical Licence No: 2/27/08/110 Details: Water Bottling Direct Source: GROUNDWATERS Point: SPRING-SANDSTONE/MIDDLE COAL MEASURES-SHAW LANE Data Type: Point Name: SHELDALÉ DEVELOPMENTS LTD Easting: 433700 Northing: 406000	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 23/03/1994 Expiry Date: 31/12/2003 Issue No: 101 Version Start Date: 08/04/2003 Version End Date: -
B	344m NE	Status: Historical Licence No: 2/27/08/133 Details: Water Bottling Direct Source: GROUNDWATERS Point: SPRING-SANDSTONE/MIDDLE COAL MEASURES-SHAW LANE Data Type: Point Name: SHELDALÉ DEVELOPMENTS LTD Easting: 433700 Northing: 406060	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 01/01/2004 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 01/01/2004 Version End Date: -
B	344m NE	Status: Historical Licence No: 2/27/08/133 Details: Water Bottling Direct Source: GROUNDWATERS Point: SPRING - SANDSTONE&MIDDLE COAL MEASURES - BARNSELEY Data Type: Point Name: SHELDALÉ DEVELOPMENTS LTD Easting: 433700 Northing: 406060	Annual Volume (m ³): 350000 Max Daily Volume (m ³): 1400 Original Application No: - Original Start Date: 01/01/2004 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 01/01/2004 Version End Date: -



ID	Location	Details	
-	1695m SW	Status: Active Licence No: 2/27/08/145/R01 Details: Transfer Between Sources (Post Water Act 2003) Direct Source: GROUNDWATERS Point: SILKSTONE MINESHAFT-COAL MEASURES-STRAFFORDCOLLIERY-BARNSELEY Data Type: Point Name: THE COAL AUTHORITY Easting: 432200 Northing: 404154	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 01/04/2017 Expiry Date: 31/03/2029 Issue No: 1 Version Start Date: 01/04/2017 Version End Date: -
-	1698m SW	Status: Historical Licence No: 2/27/08/145 Details: Transfer Between Sources (Post Water Act 2003) Direct Source: GROUNDWATERS Point: SILKSTONE MINESHAFT-COAL MEASURES-STRAFFORDCOLLIERY-BARNSELEY Data Type: Point Name: THE COAL AUTHORITY Easting: 432200 Northing: 404150	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 17/12/2008 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 17/12/2008 Version End Date: -
-	1910m E	Status: Active Licence No: NE/027/0008/014 Details: Spray Irrigation - Direct Direct Source: GROUNDWATERS Point: BOREHOLE - COAL MEASURES - OAKWELL ROAD - BARNSELEY Data Type: Point Name: Barnsley Football Club 2002 Ltd Easting: 435336 Northing: 406441	Annual Volume (m ³): 21,400 Max Daily Volume (m ³): 100 Original Application No: - Original Start Date: 29/06/2015 Expiry Date: 31/03/2029 Issue No: 1 Version Start Date: 29/06/2015 Version End Date: -

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

5.7 Surface water abstractions

Records within 2000m

0

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

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



5.8 Potable abstractions

Records within 2000m

4

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.

Features are displayed on the Abstractions and Source Protection Zones map on **page 41**

ID	Location	Details	
A	291m NE	Status: Historical Licence No: 2/27/08/110 Details: Water Bottling Direct Source: GROUNDWATERS Point: WELL/SPRING - SANDSTONE/MIDDLE COAL MEASURES - SHAW LANE Data Type: Point Name: SHELDAL WATER LIMITED Easting: 433700 Northing: 406000	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 23/03/1994 Expiry Date: 31-Dec-03 Issue No: 100 Version Start Date: 01/12/1999 Version End Date: -
A	291m NE	Status: Historical Licence No: 2/27/08/110 Details: Water Bottling Direct Source: GROUNDWATERS Point: SPRING-SANDSTONE/MIDDLE COAL MEASURES-SHAW LANE Data Type: Point Name: SHELDAL DEVELOPMENTS LTD Easting: 433700 Northing: 406000	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 23/03/1994 Expiry Date: 31/12/2003 Issue No: 101 Version Start Date: 08/04/2003 Version End Date: -
B	344m NE	Status: Historical Licence No: 2/27/08/133 Details: Water Bottling Direct Source: GROUNDWATERS Point: SPRING-SANDSTONE/MIDDLE COAL MEASURES-SHAW LANE Data Type: Point Name: SHELDAL DEVELOPMENTS LTD Easting: 433700 Northing: 406060	Annual Volume (m ³): - Max Daily Volume (m ³): - Original Application No: - Original Start Date: 01/01/2004 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 01/01/2004 Version End Date: -



ID	Location	Details	
B	344m NE	Status: Historical Licence No: 2/27/08/133 Details: Water Bottling Direct Source: GROUNDWATERS Point: SPRING - SANDSTONE&MIDDLE COAL MEASURES - BARNSELEY Data Type: Point Name: SHELDALDE DEVELOPMENTS LTD Easting: 433700 Northing: 406060	Annual Volume (m ³): 350000 Max Daily Volume (m ³): 1400 Original Application No: - Original Start Date: 01/01/2004 Expiry Date: 31/03/2017 Issue No: 1 Version Start Date: 01/01/2004 Version End Date: -

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

5.9 Source Protection Zones

Records within 500m	0
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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.

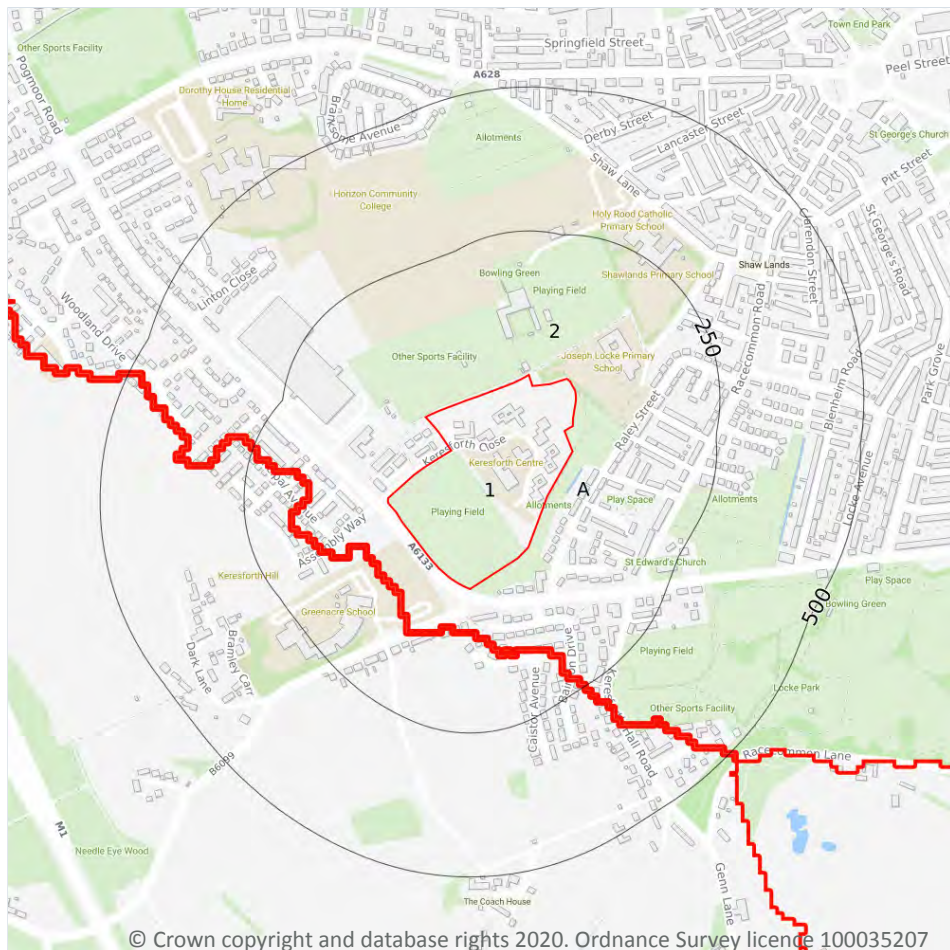
5.10 Source Protection Zones (confined aquifer)

Records within 500m	0
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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

1

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 46**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	26m SE	Inland river not influenced by normal tidal action.	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

1

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 46**

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 46**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
2	On site	River WB catchment	Dearne from Cawthorne Dyke to Lundwood STW	GB104027063171	Dearne	Don and Rother

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 46**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
-	2094m NE	River	Dearne from Cawthorne Dyke to Lundwood STW	GB104027063171	Moderate	Good	Moderate	2016

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 46**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
1	On site	Don & Rother Millstone grit & Coal Measures	GB40402G992300	Poor	Poor	Good	2015

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 Sea (RoFRaS)

Records within 50m

0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition; 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).

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

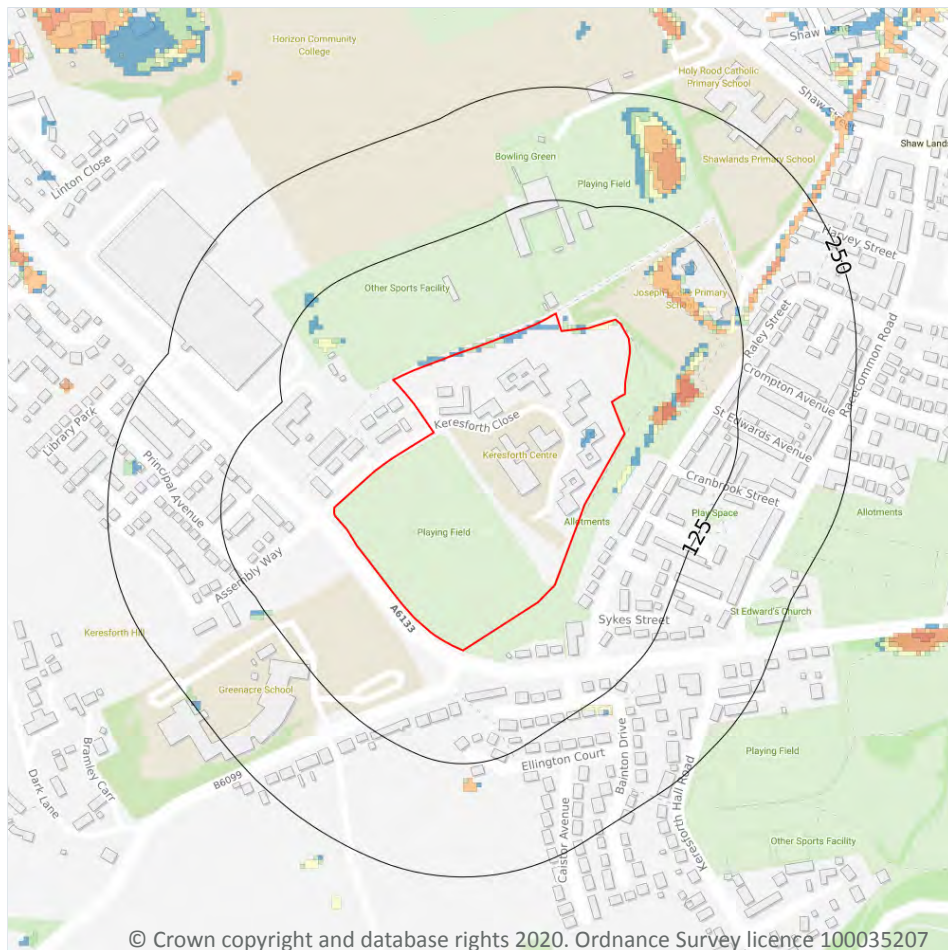
0

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



— Site Outline

Search buffers in metres (m)

1 in 1000 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site

1 in 100 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 52**

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

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

Return period	Maximum modelled depth
1 in 1000 year	Between 0.1m and 0.3m
1 in 250 year	Between 0.1m and 0.3m
1 in 100 year	Between 0.1m and 0.3m
1 in 30 year	Negligible

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

Negligible

Highest risk within 50m

Negligible

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

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

This data is sourced from Ambiantal Risk Analytics.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m**0**

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

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

10.3 Special Areas of Conservation (SAC)

Records within 2000m**0**

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

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

10.4 Special Protection Areas (SPA)

Records within 2000m**0**

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

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

10.5 National Nature Reserves (NNR)

Records within 2000m**0**

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

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

10.6 Local Nature Reserves (LNR)

Records within 2000m

1

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

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

ID	Location	Name	Data source
-	1833m S	Worsborough Country Park	Natural England

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

10.7 Designated Ancient Woodland

Records within 2000m

1

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

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

ID	Location	Name	Woodland Type
-	1986m SW	LOWE WOOD	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**2**

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

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

ID	Location	Name	Local Authority name
1	95m S	South and West Yorkshire	Barnsley
-	1692m SE	South and West Yorkshire	Barnsley

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

4

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.

Location	Name	Type	NVZ ID	Status
On site	River Dearne NVZ	Surface Water	S278	Existing



Location	Name	Type	NVZ ID	Status
225m NW	River Dearne NVZ	Surface Water	S278	Existing
528m SE	River Dearne NVZ	Surface Water	S278	Existing
587m NE	River Dearne NVZ	Surface Water	S278	Existing

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



SSSI Impact Zones and Units

10.17 SSSI Impact Risk Zones

Records on site	0
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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.

This data is sourced from Natural England.

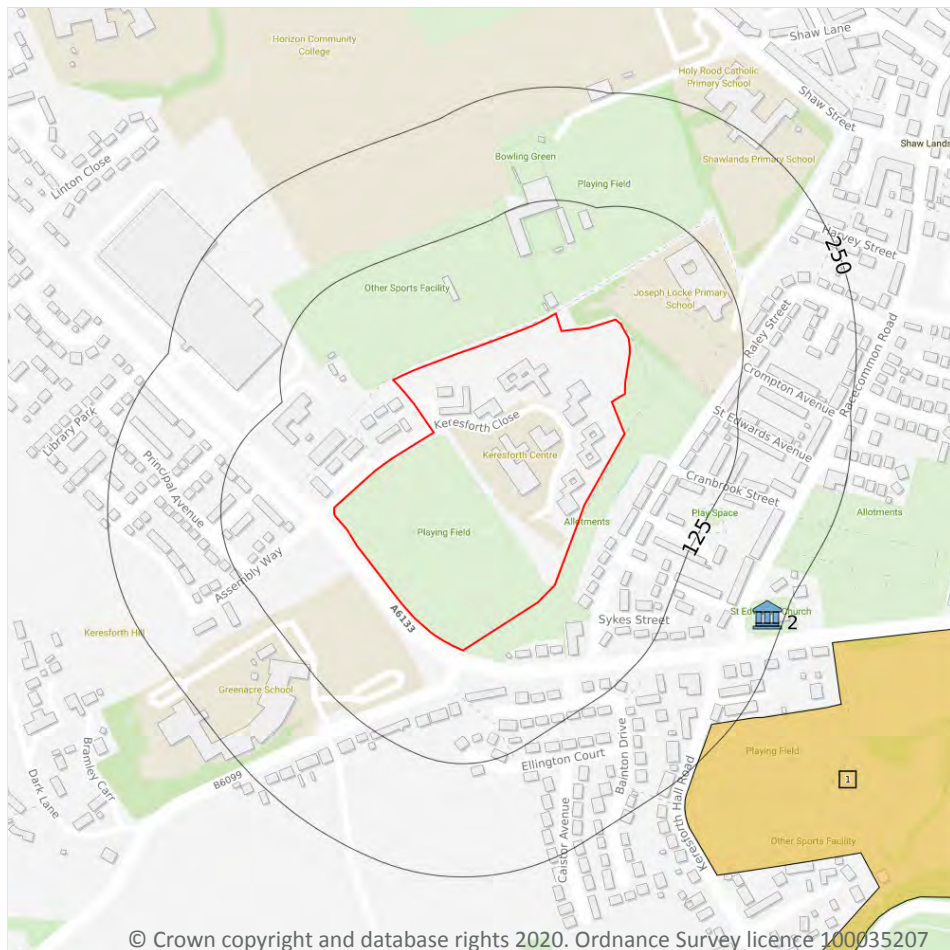
10.18 SSSI Units

Records within 2000m	0
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Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

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

11 Visual and cultural designations



- Site Outline
- Search buffers in metres (m)
- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

11.1 World Heritage Sites

Records within 250m

0

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

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

11.2 Area of Outstanding Natural Beauty

Records within 250m

0

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

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

11.3 National Parks

Records within 250m

0

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

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

11.4 Listed Buildings

Records within 250m

1

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

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

ID	Location	Name	Grade	Reference Number	Listed date
2	232m E	Church Of St Edward, Barnsley, S70	II	1033368	14/12/1998

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

11.7 Registered Parks and Gardens

Records within 250m

1

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.

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

ID	Location	Name	Grade
1	231m SE	Locke Park	II

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

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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

2

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

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

ID	Location	Classification	Description
1	On site	Urban	-
2	18m S	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.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m

0

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

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m**0**

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

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m**0**

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

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m**0**

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

This data is sourced from Natural England.

13.4 Limestone Pavement Orders

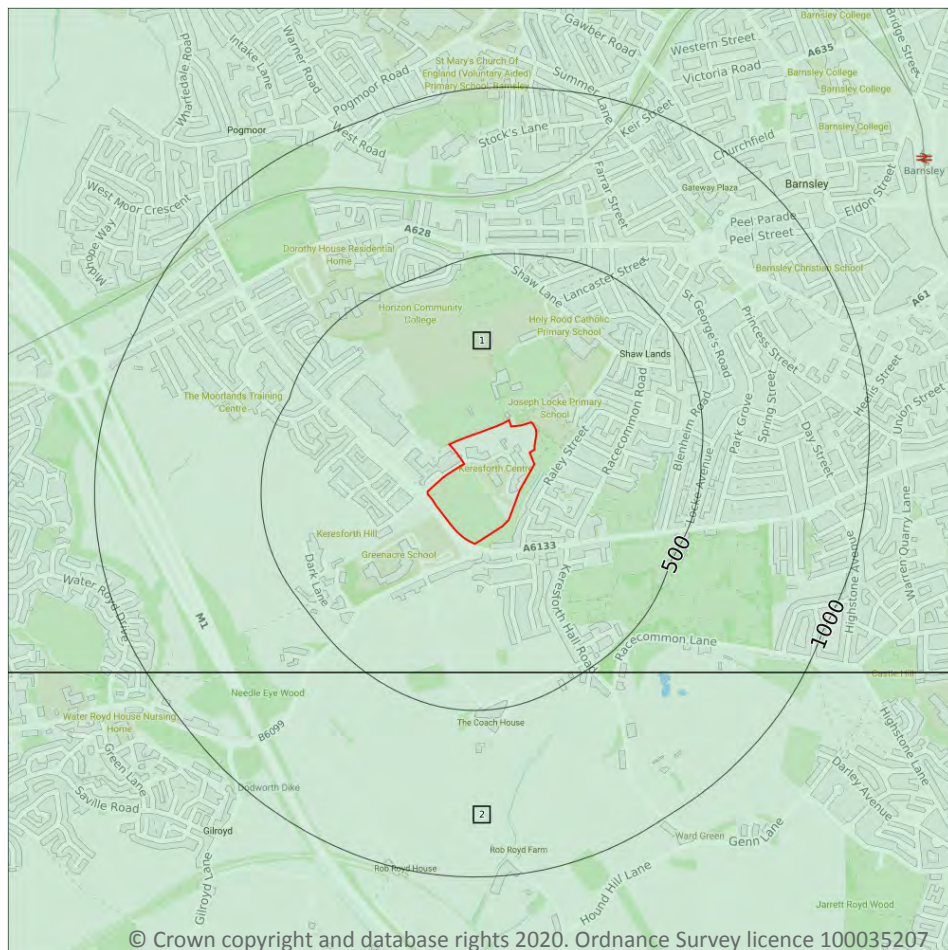
Records within 250m**0**

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

This data is sourced from Natural England.



14 Geology 1:10,000 scale - Availability



- Site Outline
- Search buffers in metres (m)
- Full coverage
 - Partial coverage
 - No coverage

14.1 10k Availability

Records within 500m

2

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

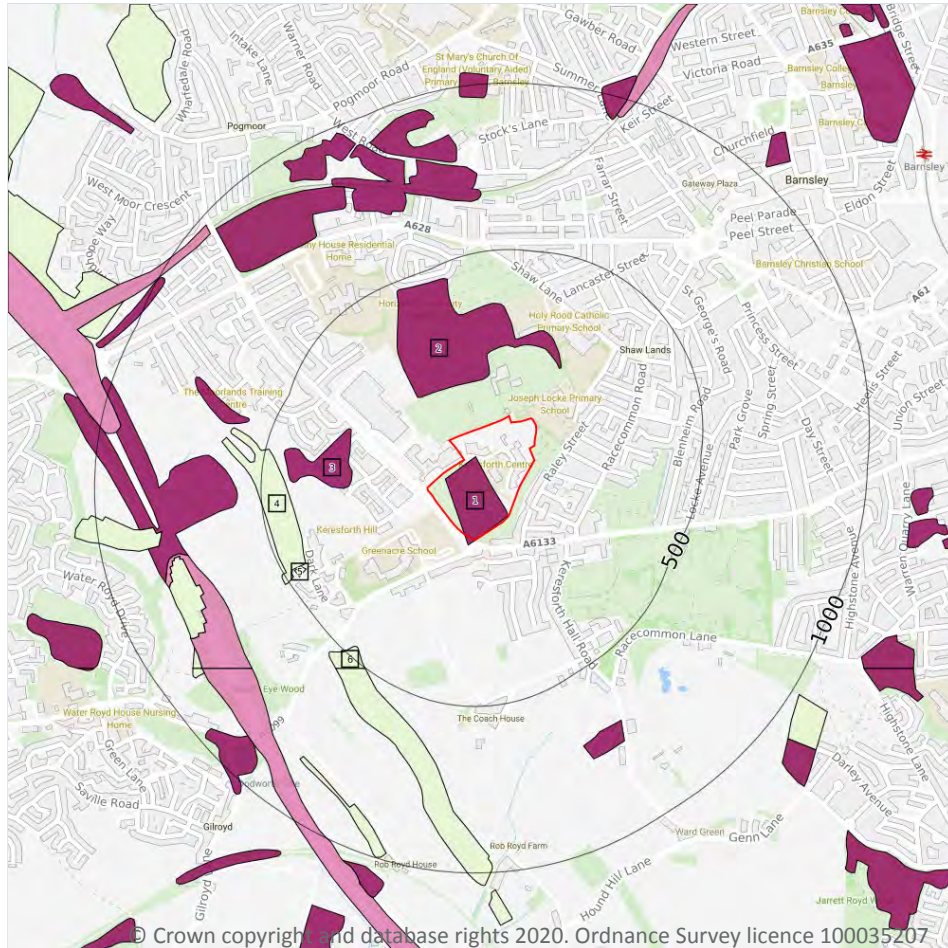
Features are displayed on the Geology 1:10,000 scale - Availability map on **page 68**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	Full	Full	Full	Full	SE30NW
2	386m S	Full	Full	Full	Full	SE30SW

This data is sourced from the British Geological Survey.



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



- Site Outline**
- Search buffers in metres (m)
- Reclaimed ground
 - Made ground
 - Worked ground
 - Infilled ground
 - Disturbed ground
 - Landscaped ground

14.2 Artificial and made ground (10k)

Records within 500m

6

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.

Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 69**

ID	Location	LEX Code	Description	Rock description
1	On site	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	134m NW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	230m W	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
4	403m W	WMGR-ARTDP	Infilled Ground	Artificial Deposit



ID	Location	LEX Code	Description	Rock description
5	435m SW	WMGR-ARTDP	Infilled Ground	Artificial Deposit
6	467m SW	WMGR-ARTDP	Infilled Ground	Artificial Deposit

This data is sourced from the British Geological Survey.



Geology 1:10,000 scale - Superficial

14.3 Superficial geology (10k)

Records within 500m

0

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.

This data is sourced from the British Geological Survey.

14.4 Landslip (10k)

Records within 500m

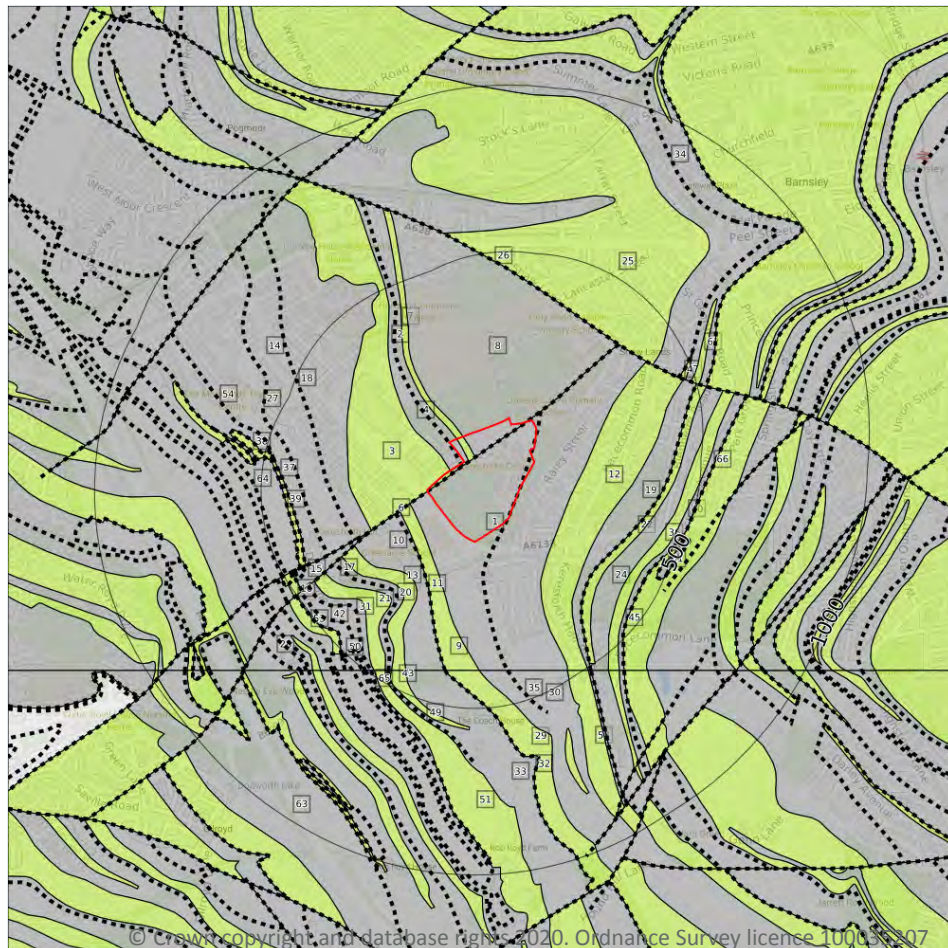
0

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

35

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

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

ID	Location	LEX Code	Description	Rock age
1	On site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
3	On site	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age



ID	Location	LEX Code	Description	Rock age
4	On site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
7	On site	BNR-SDST	Barnsley Rock - Sandstone	Duckmantian Sub-age
8	On site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
9	64m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
10	101m SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
12	142m SE	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
13	198m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
14	203m SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
15	216m SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
17	245m SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
19	262m E	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
21	283m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
22	301m SE	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
24	329m SE	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
25	337m NE	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
28	355m SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
29	386m S	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
30	386m S	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
33	396m S	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age



ID	Location	LEX Code	Description	Rock age
34	397m NE	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
36	399m SE	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
38	403m W	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
40	427m SE	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
43	438m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
44	448m SE	KNR-SDST	Kent's Rock - Sandstone	Duckmantian Sub-age
47	452m E	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
51	468m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
53	471m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
55	474m SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
58	474m SE	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
61	476m E	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
62	485m E	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovia Sub-age - Duckmantian Sub-age
63	486m SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovia Sub-age - Duckmantian Sub-age

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m

31

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

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



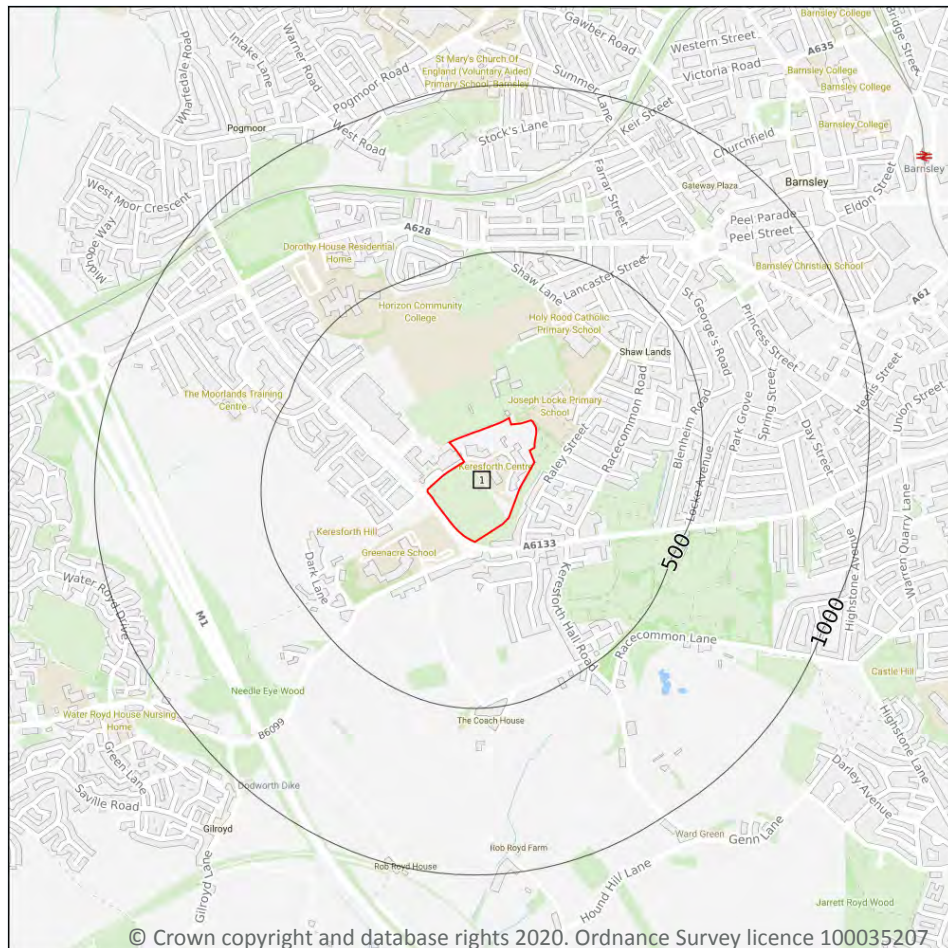
ID	Location	Category	Description
2	On site	ROCK	Coal seam, inferred
5	On site	ROCK	Coal seam, inferred
6	On site	FAULT	Normal fault, inferred
11	116m SW	ROCK	Coal seam, inferred
16	216m SW	FAULT	Normal fault, inferred
18	260m SW	ROCK	Coal seam, inferred
20	263m SW	ROCK	Coal seam, inferred
23	301m SE	ROCK	Coal seam, inferred
26	337m NE	FAULT	Normal fault, inferred
27	352m SW	ROCK	Coal seam, inferred
31	387m SW	ROCK	Coal seam, inferred
32	396m S	ROCK	Coal seam, observed
35	398m S	ROCK	Coal seam, observed
37	403m W	ROCK	Coal seam, observed
39	417m W	ROCK	Coal seam, observed
41	435m SW	ROCK	Coal seam, observed
42	436m SW	ROCK	Coal seam, inferred
45	448m SE	ROCK	Coal seam, inferred
46	448m SE	ROCK	Coal seam, observed
48	452m E	ROCK	Coal seam, inferred
49	463m SW	ROCK	Coal seam, observed
50	467m SW	ROCK	Coal seam, observed
52	471m SW	ROCK	Coal seam, inferred
54	472m W	ROCK	Coal seam, inferred
56	474m SW	ROCK	Coal seam, observed
57	474m SW	ROCK	Coal seam, observed
59	475m SW	ROCK	Coal seam, observed
60	476m E	ROCK	Coal seam, observed

ID	Location	Category	Description
64	487m W	ROCK	Coal seam, observed
65	491m SW	ROCK	Coal seam, observed
66	498m SE	ROCK	Coal seam, inferred

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.

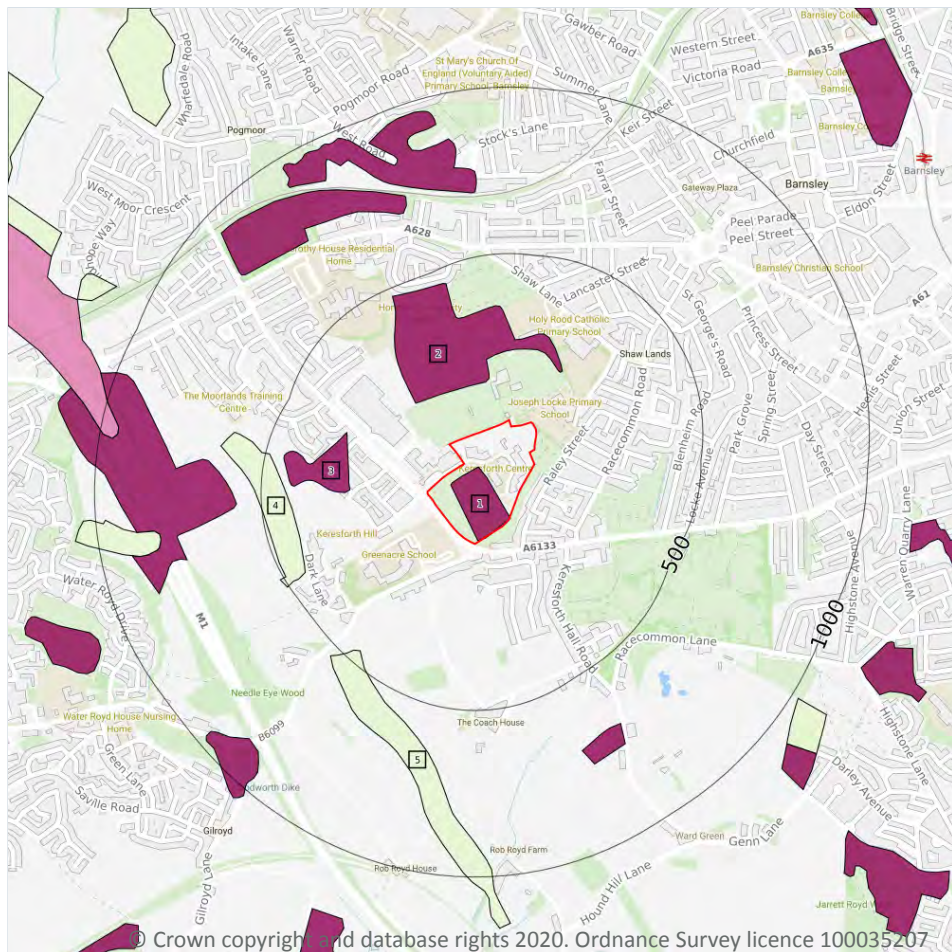
Features are displayed on the Geology 1:50,000 scale - Availability map on **page 77**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	No coverage	Full	Full	Full	EW087_barnsley_v4

This data is sourced from the British Geological Survey.



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



- Site Outline**
- Search buffers in metres (m)
- Made ground
 - Worked ground
 - Infilled ground
 - Disturbed ground
 - Landscaped ground

15.2 Artificial and made ground (50k)

Records within 500m

5

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.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on **page 78**

ID	Location	LEX Code	Description	Rock description
1	On site	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	134m NW	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	234m W	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
4	405m W	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT



ID	Location	LEX Code	Description	Rock description
5	460m SW	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT

This data is sourced from the British Geological Survey.

15.3 Artificial ground 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 artificial deposits (the zone between the land surface and the water table).

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

This data is sourced from the British Geological Survey.



Geology 1:50,000 scale - Superficial

15.4 Superficial geology (50k)

Records within 500m

0

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.

This data is sourced from the British Geological Survey.

15.5 Superficial 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 superficial deposits (the zone between the land surface and the water table).

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

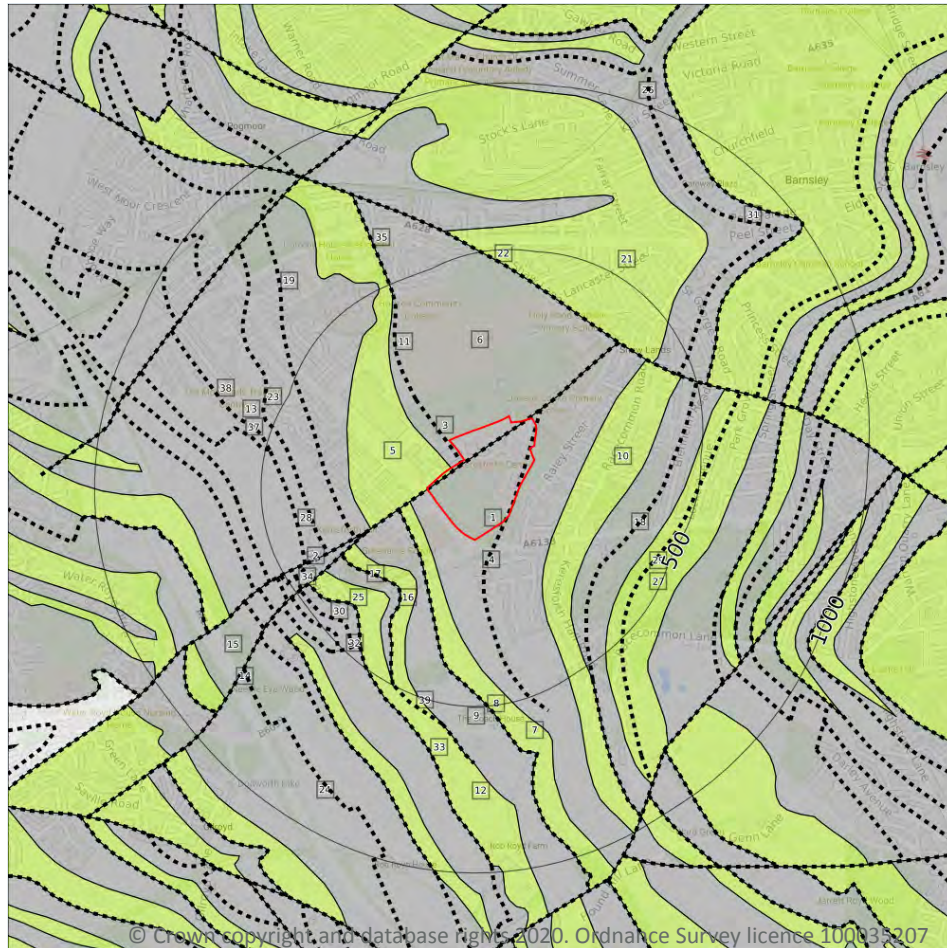
0

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

15

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	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
5	On site	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN

ID	Location	LEX Code	Description	Rock age
6	On site	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
7	64m SW	BNR-SDST	BARNSELEY ROCK - SANDSTONE	WESTPHALIAN
9	104m SW	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
10	138m SE	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
12	193m SW	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
13	206m SW	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
15	217m SW	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
17	249m SW	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
18	258m SE	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
21	336m NE	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
24	385m SW	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
26	397m NE	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
27	399m SE	KNR-SDST	KENT'S ROCK - SANDSTONE	WESTPHALIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	2
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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	High	Moderate
On site	Fracture	Moderate	Low



This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m

24

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
2	On site	FAULT	Fault, inferred
3	On site	ROCK	Coal seam, inferred
4	On site	ROCK	Coal seam, inferred
8	104m SW	ROCK	Coal seam, inferred
11	160m NW	ROCK	Coal seam, inferred
14	217m SW	FAULT	Fault, inferred, displacement unknown
16	249m SW	ROCK	Coal seam, inferred
19	261m SW	ROCK	Coal seam, inferred
20	312m SE	ROCK	Coal seam, inferred
22	336m NE	FAULT	Fault, inferred
23	353m SW	ROCK	Coal seam, inferred
25	385m SW	ROCK	Coal seam, inferred
28	405m W	ROCK	Coal seam, inferred
29	437m SE	ROCK	Coal seam, inferred
30	442m SW	ROCK	Coal seam, inferred
31	452m E	ROCK	Coal seam, inferred
32	460m SW	ROCK	Coal seam, inferred
33	460m SW	ROCK	Coal seam, inferred
34	473m SW	ROCK	Coal seam, inferred
35	475m NW	ROCK	Coal seam, inferred
36	484m SW	ROCK	Coal seam, inferred

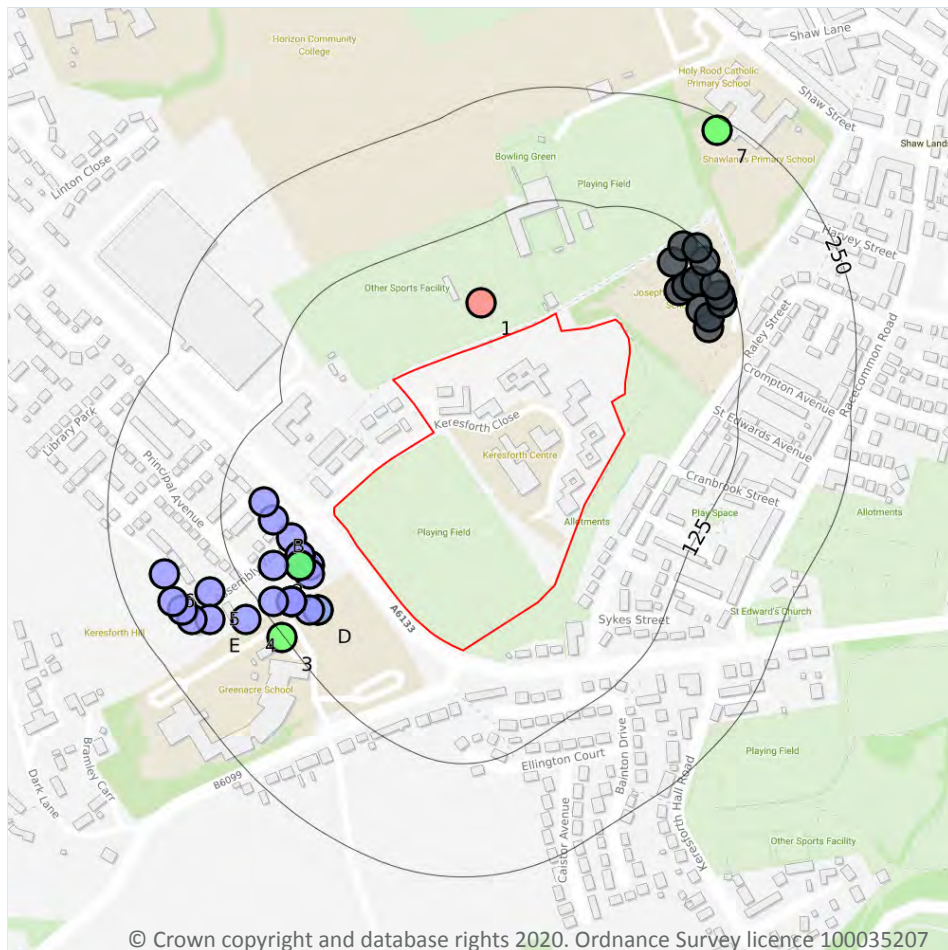


ID	Location	Category	Description
37	488m W	ROCK	Coal seam, inferred
38	488m W	ROCK	Coal seam, inferred
39	498m SW	ROCK	Coal seam, inferred

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

43

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 85**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	44m N	433400 405770	SITE INVESTIGATION BROADWAY BARNSELY	37.19	N	83872
A	54m SW	433190 405510	SPECIAL SCH BROADWAY 12	3.05	N	84058
A	56m SW	433210 405480	SPECIAL SCH BROADWAY 7	5.49	N	84053



ID	Location	Grid reference	Name	Length	Confidential	Web link
A	58m SW	433200 405490	SPECIAL SCH BROADWAY 11	2.13	N	84057
A	58m SW	433200 405490	SPECIAL SCH BROADWAY 10	4.57	N	84056
A	61m SW	433210 405470	SPECIAL SCH BROADWAY 6	8.84	N	84052
A	65m SW	433200 405480	SPECIAL SCH BROADWAY 8	4.57	N	84054
A	65m SW	433200 405480	SPECIAL SCH BROADWAY 9	8.23	N	84055
A	65m SW	433200 405480	SPECIAL SCH BROADWAY 5	16.46	N	84051
B	68m W	433170 405530	SPECIAL SCH BROADWAY 24	3.05	N	84070
C	74m NE	433618 405783	BARNSELEY SCHOOLS PFI - LONGCAR TPLC5	-	Y	N/A
D	77m SW	433220 405430	SPECIAL SCH BROADWAY 2	11.58	N	84048
D	77m SW	433220 405430	SPECIAL SCH BROADWAY 4	8.84	N	84050
B	78m W	433160 405550	SPECIAL SCH BROADWAY 20	3.05	N	84066
C	84m NE	433627 405788	BARNSELEY SCHOOLS PFI - LONGCAR BHLC5	-	Y	N/A
D	85m SW	433210 405430	SPECIAL SCH BROADWAY 3	7.62	N	84049
C	86m E	433642 405762	BARNSELEY SCHOOLS PFI - LONGCAR TPLC6	-	Y	N/A
2	87m SW	433170 405480	SPECIAL SCH BROADWAY 13	3.05	N	84059
C	89m NE	433611 405814	BARNSELEY SCHOOLS PFI - LONGCAR BHLC1	-	Y	N/A
C	89m E	433651 405742	BARNSELEY SCHOOLS PFI - LONGCAR TPLC4	-	Y	N/A
C	93m E	433652 405754	BARNSELEY SCHOOLS PFI - LONGCAR BHLC7	-	Y	N/A
D	95m SW	433190 405440	SPECIAL SCH BROADWAY 17	3.05	N	84063
D	95m SW	433190 405440	SPECIAL SCH BROADWAY 15	4.57	N	84061
D	95m SW	433190 405440	SPECIAL SCH BROADWAY 16	5.18	N	84062
D	95m SW	433190 405440	SPECIAL SCH BROADWAY 19	3.05	N	84065
D	95m SW	433190 405440	SPECIAL SCH BROADWAY 18	3.05	N	84064
C	96m NE	433637 405794	BARNSELEY SCHOOLS PFI - LONGCAR BHLC2	-	Y	N/A
C	110m E	433665 405770	BARNSELEY SCHOOLS PFI - LONGCAR BHLC3	-	Y	N/A
C	110m NE	433623 405832	BARNSELEY SCHOOLS PFI - LONGCAR TPLC1	-	Y	N/A
D	111m SW	433170 405440	SPECIAL SCH BROADWAY 14	6.1	N	84060
C	111m NE	433663 405778	BARNSELEY SCHOOLS PFI - LONGCAR TPLC3	-	Y	N/A

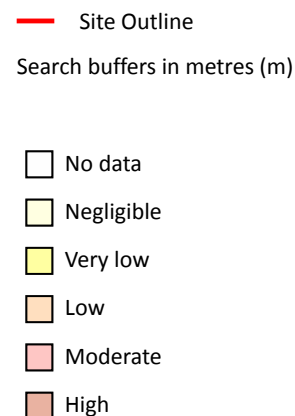
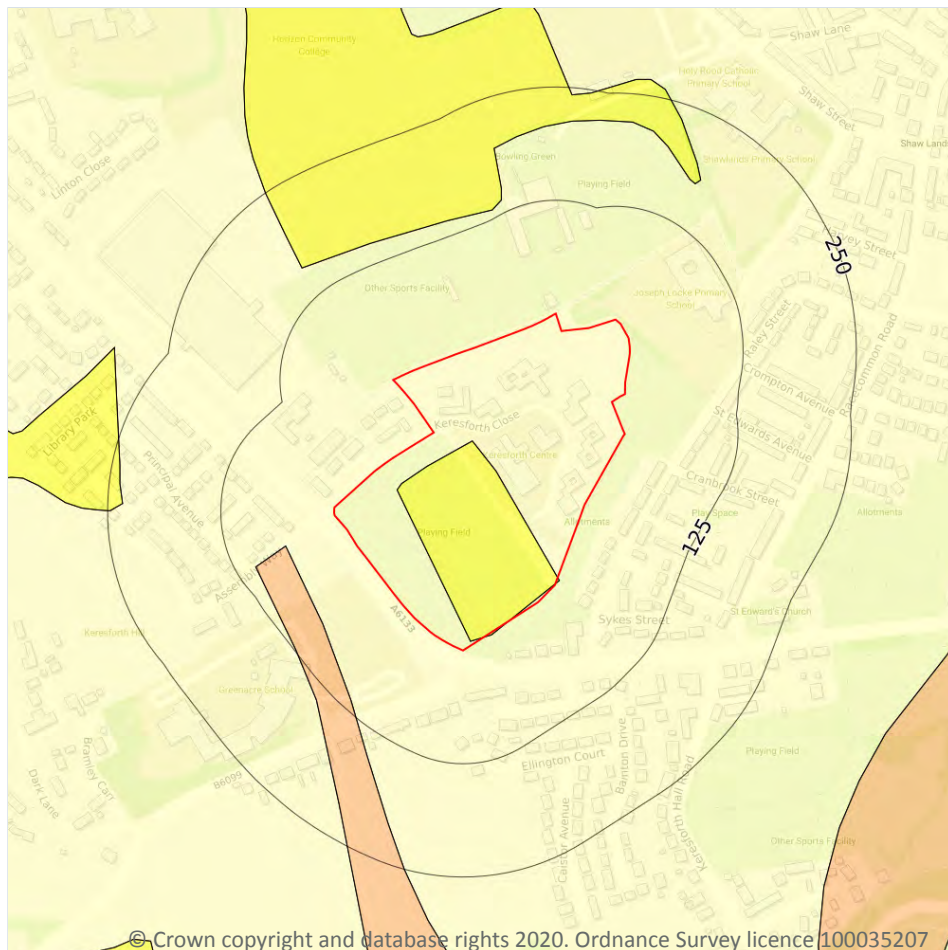


ID	Location	Grid reference	Name	Length	Confidential	Web link
C	112m NE	433658 405789	BARNSELY SCHOOLS PFI - LONGCAR BHLC6	-	Y	N/A
C	117m NE	433647 405816	BARNSELY SCHOOLS PFI - LONGCAR TPLC2	-	Y	N/A
C	119m NE	433638 405830	BARNSELY SCHOOLS PFI - LONGCAR BHLC4	-	Y	N/A
3	127m SW	433180 405400	SPECIAL SCH BROADWAY 1	11.58	N	84047
4	147m SW	433140 405420	SPECIAL SCH BROADWAY 23	3.05	N	84069
5	162m SW	433100 405450	SPECIAL SCH BROADWAY 21	3.05	N	84067
E	180m SW	433100 405420	SPECIAL SCH BROADWAY 22	3.05	N	84068
E	195m SW	433080 405420	SPECIAL SCH BROADWAY 27	3.05	N	84073
E	198m SW	433070 405430	SPECIAL SCH BROADWAY 26	3.05	N	84072
6	199m W	433050 405470	SPECIAL SCH BROADWAY 28	3.35	N	84074
E	202m SW	433060 405440	SPECIAL SCH BROADWAY 25	3.05	N	84071
7	237m NE	433660 405960	SHAW ST BARNSELY 4	12.8	N	84078

This data is sourced from the British Geological Survey.



Natural ground subsidence - Running sands



17.2 Running sands

Records within 50m

2

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 89**

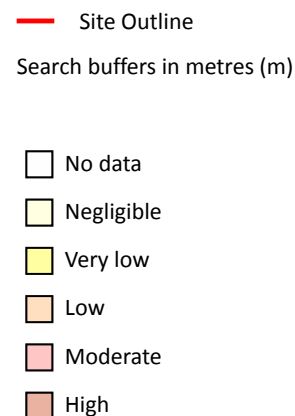
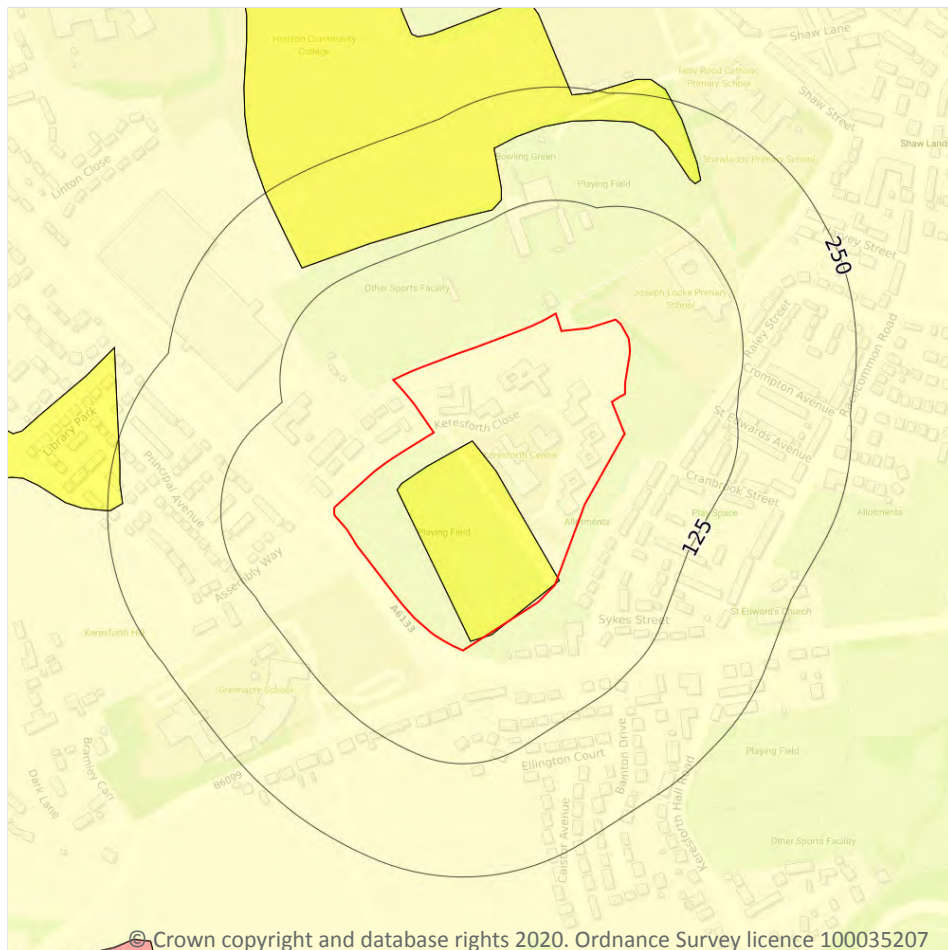
Location	Hazard rating	Details
On site	Negligible	Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.

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



17.3 Compressible deposits

Records within 50m

2

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.

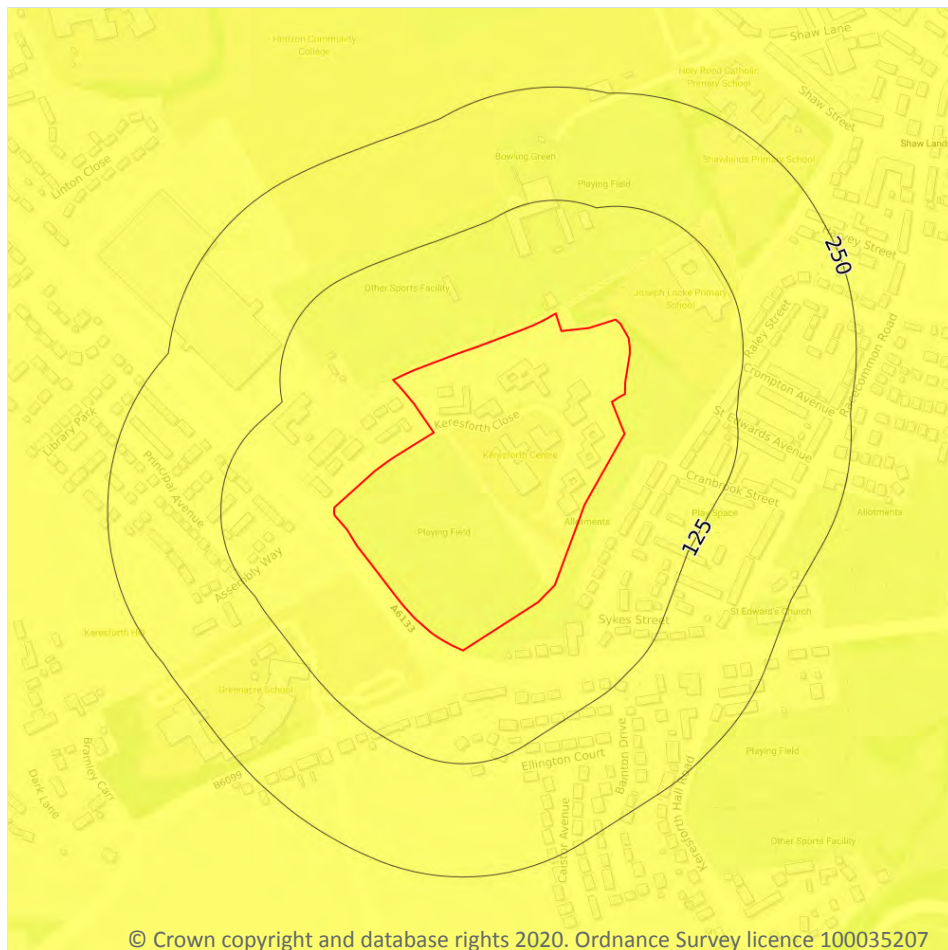
Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 91**

Location	Hazard rating	Details
On site	Negligible	Compressible strata are not thought to occur.
On site	Very low	Compressibility and uneven settlement problems are not likely to be significant on the site for most land uses.

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 93**

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.

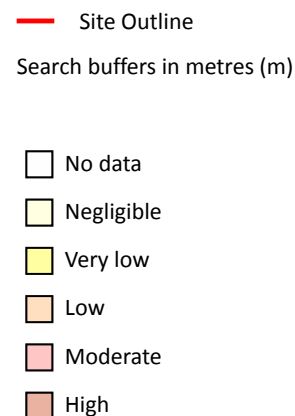
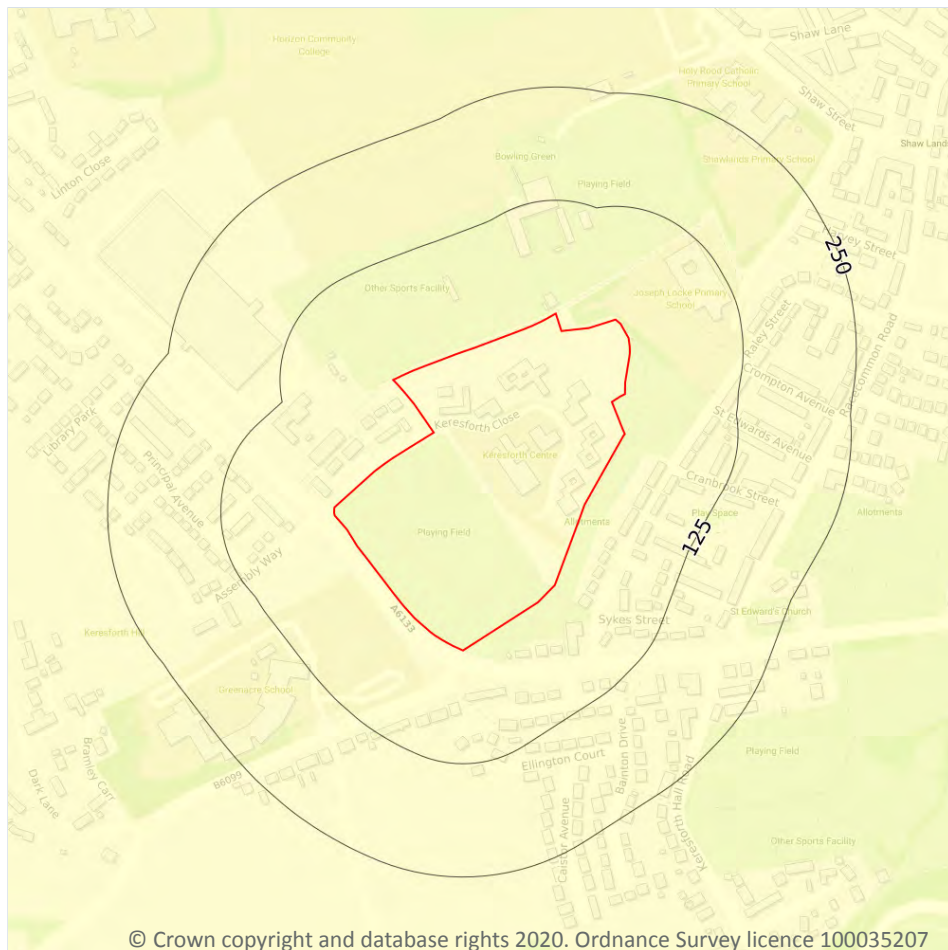


An aerial map of the Keresforth area in Leeds. A red boundary outlines a central residential area. Two concentric black circles are drawn around this area, with the number '125' written in blue between them. The map shows various streets, including Keresforth Close, Keresforth Avenue, and Sykes Street. Other features include a playing field, a sports facility, and several schools. The map is overlaid with a grid of latitude and longitude coordinates.

 No data
 Negligible
 Very low
 Low
 Moderate
 High

94

Natural ground subsidence - Ground dissolution of soluble rocks



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.

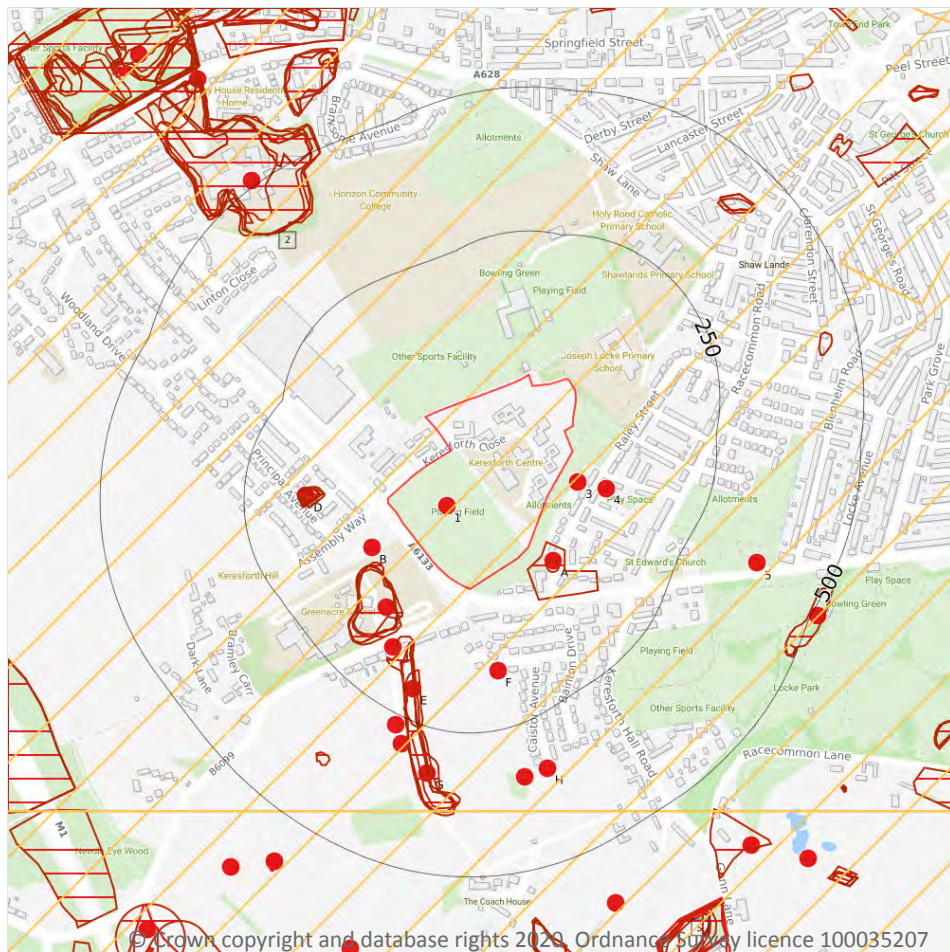
Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 95**

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 Peter Brett Associates (PBA).

18.2 BritPits

Records within 500m

22

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.

Features are displayed on the Mining, ground workings and natural cavities map on **page 96**

ID	Location	Details	Description
1	On site	Name: Keresford Hill Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
3	33m SE	Name: Kingston Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
A	48m SE	Name: Kingston Place Brick Field Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Clay & Shale Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
B	68m SW	Name: Keresford Hill Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
4	81m SE	Name: Kingston Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority



ID	Location	Details	Description
B	89m SW	Name: Keresford Hill Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
C	113m SW	Name: Keresford Hill Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
C	123m SW	Name: Hound Hill Colliery Drift Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
D	142m W	Name: Keresford House Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Sandstone Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
F	149m S	Name: Hound Hill Colliery Air Shaft Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
C	154m SW	Name: Keresforth Hill Drift Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority



ID	Location	Details	Description
E	198m SW	Name: Hound Hill Colliery Drift Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
E	219m SW	Name: Keresforth Hill Shaft Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
E	222m S	Name: Keresforth Hill Shaft Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
E	268m SW	Name: Keresforth Hill Drift Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
E	282m SW	Name: Keresforth Hill Drift Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
E	294m SW	Name: Keresforth Hill Coal Workings Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Surface Mined Status: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

ID	Location	Details	Description
E	303m S	Name: Keresforth Hill Drift Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
G	327m S	Name: Keresforth Hill Shaft Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
H	338m SE	Name: Kingston Main Colliery Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
H	340m S	Name: Keresforth Hill Shaft Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
5	373m SE	Name: Park Road Pit Address: Keresforth Hill, BARNSELEY, South Yorkshire Commodity: Coal, Deep Status: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Type: Ceased Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m

19

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 96**



ID	Location	Land Use	Year of mapping	Mapping scale
A	26m E	Brick Field	1850	1:10560
A	44m SE	Unspecified Heap	1850	1:10560
C	74m SW	Unspecified Heap	1966	1:10560
C	81m SW	Refuse Heap	1938	1:10560
C	81m SW	Refuse Heap	1948	1:10560
C	81m SW	Refuse Heap	1948	1:10560
C	83m SW	Refuse Heap	1951	1:10560
D	111m W	Unspecified Pit	1890	1:10560
D	113m W	Unspecified Pit	1951	1:10560
D	119m W	Unspecified Pit	1948	1:10560
D	119m W	Unspecified Pit	1948	1:10560
D	121m W	Unspecified Pit	1938	1:10560
D	121m W	Unspecified Pit	1904	1:10560
D	122m W	Sandstone Quarry	1850	1:10560
E	124m SW	Unspecified Pits	1938	1:10560
E	127m SW	Unspecified Pits	1951	1:10560
E	135m SW	Unspecified Pits	1948	1:10560
E	135m SW	Unspecified Pits	1948	1:10560
E	165m SW	Unspecified Pit	1966	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m

17

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

Features are displayed on the Mining, ground workings and natural cavities map on **page 96**

ID	Location	Land Use	Year of mapping	Mapping scale
F	146m S	Air Shaft	1951	1:10560



ID	Location	Land Use	Year of mapping	Mapping scale
F	148m S	Air Shaft	1938	1:10560
O	582m SW	Unspecified Old Shaft	1951	1:10560
O	589m SW	Unspecified Old Shaft	1938	1:10560
S	679m SE	Disused Colliery	1951	1:10560
S	687m SE	Disused Colliery	1938	1:10560
-	710m E	Colliery	1890	1:10560
X	775m SW	Colliery	1938	1:10560
P	789m NW	Unspecified Disused Shaft	1973	1:10000
P	789m NW	Unspecified Disused Shaft	1966	1:10560
P	792m NW	Unspecified Old Shafts	1948	1:10560
P	793m NW	Unspecified Old Shafts	1951	1:10560
-	800m NW	Unspecified Old Shaft	1904	1:10560
X	829m SW	Drift	1938	1:10560
-	951m NW	Colliery	1948	1:10560
-	953m NW	Disused Colliery	1951	1:10560
-	971m N	Unspecified Old Shaft	1904	1:10560

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

4

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).

Features are displayed on the Mining, ground workings and natural cavities map on **page 96**

ID	Location	Name	Commodity	Class	Likelihood
2	On site	Not available	Iron Ore (Bedded)	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
7	386m S	Not available	Iron Ore (Bedded)	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
11	512m NE	Sheffield Area	Vein Mineral/Iron ore	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
-	914m E	Sheffield Area	Vein Mineral/Iron ore	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

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 Peter Brett Associates (PBA).

18.8 JPB mining areas

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

Areas which could be affected by former coal 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	1
-----------------	---

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

Location	Details
On site	The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.

This data is sourced from the Coal Authority.

18.10 Brine areas

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

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

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

18.11 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 Mining Searches UK.

18.13 Clay mining

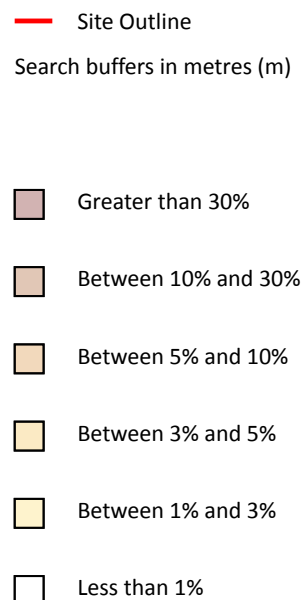
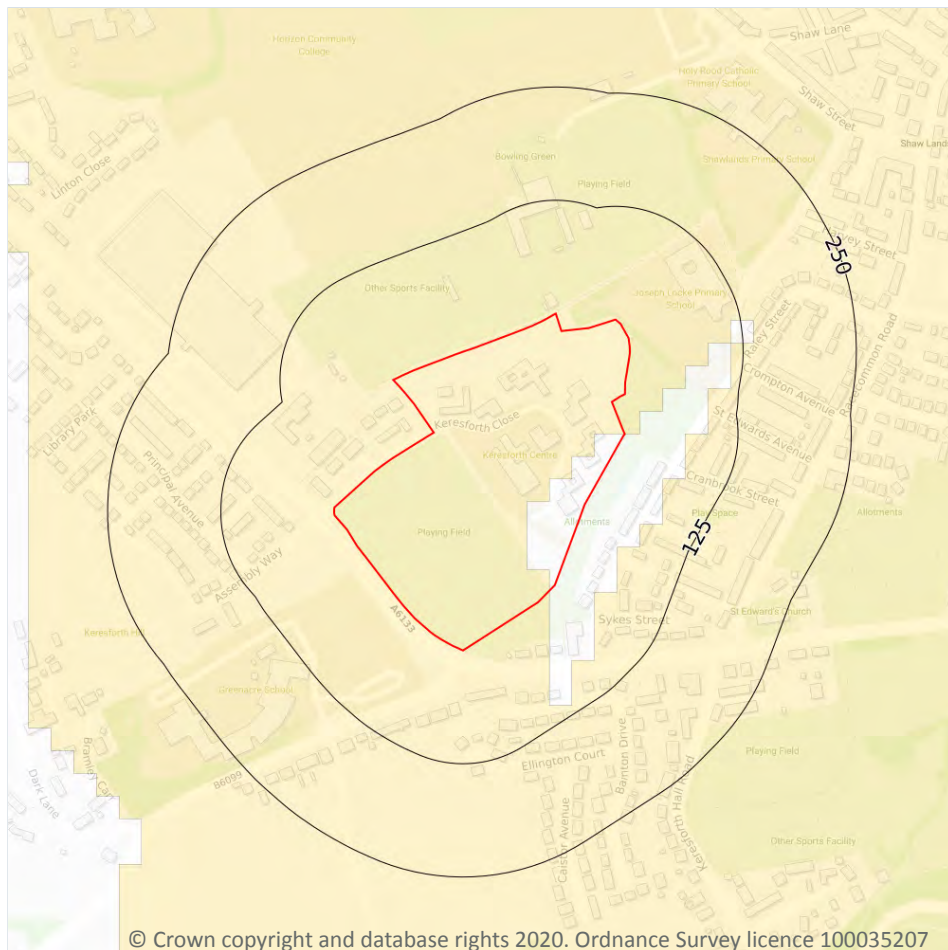
Records on site	0
-----------------	---

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

2

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 105**

Location	Estimated properties affected	Radon Protection Measures required
On site	Less than 1%	None**
On site	Between 1% and 3%	None



This data is sourced from the British Geological Survey and Public Health England.



20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m

12

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 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	25 - 35 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
3m SE	25 - 35 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
24m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
25m SW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 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
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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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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: County Series

Map date: 1850

Scale: 1:10,560

Printed at: 1:10,560



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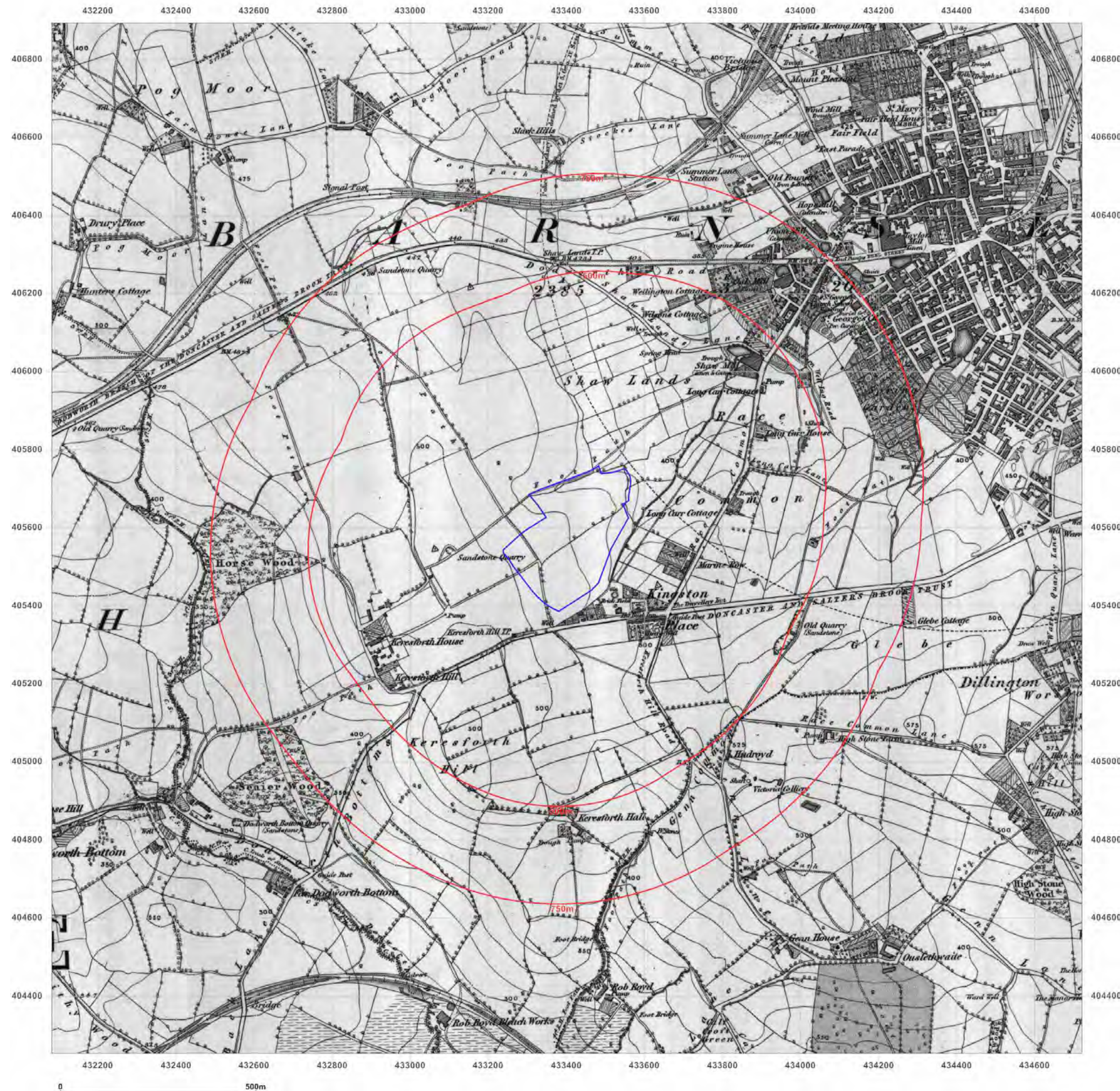


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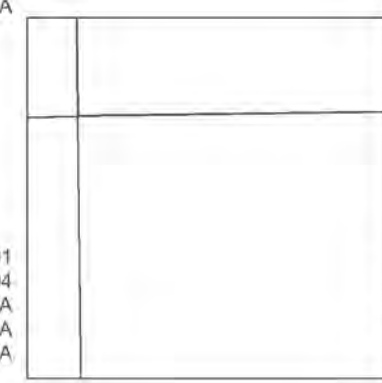
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Map Name: County Series
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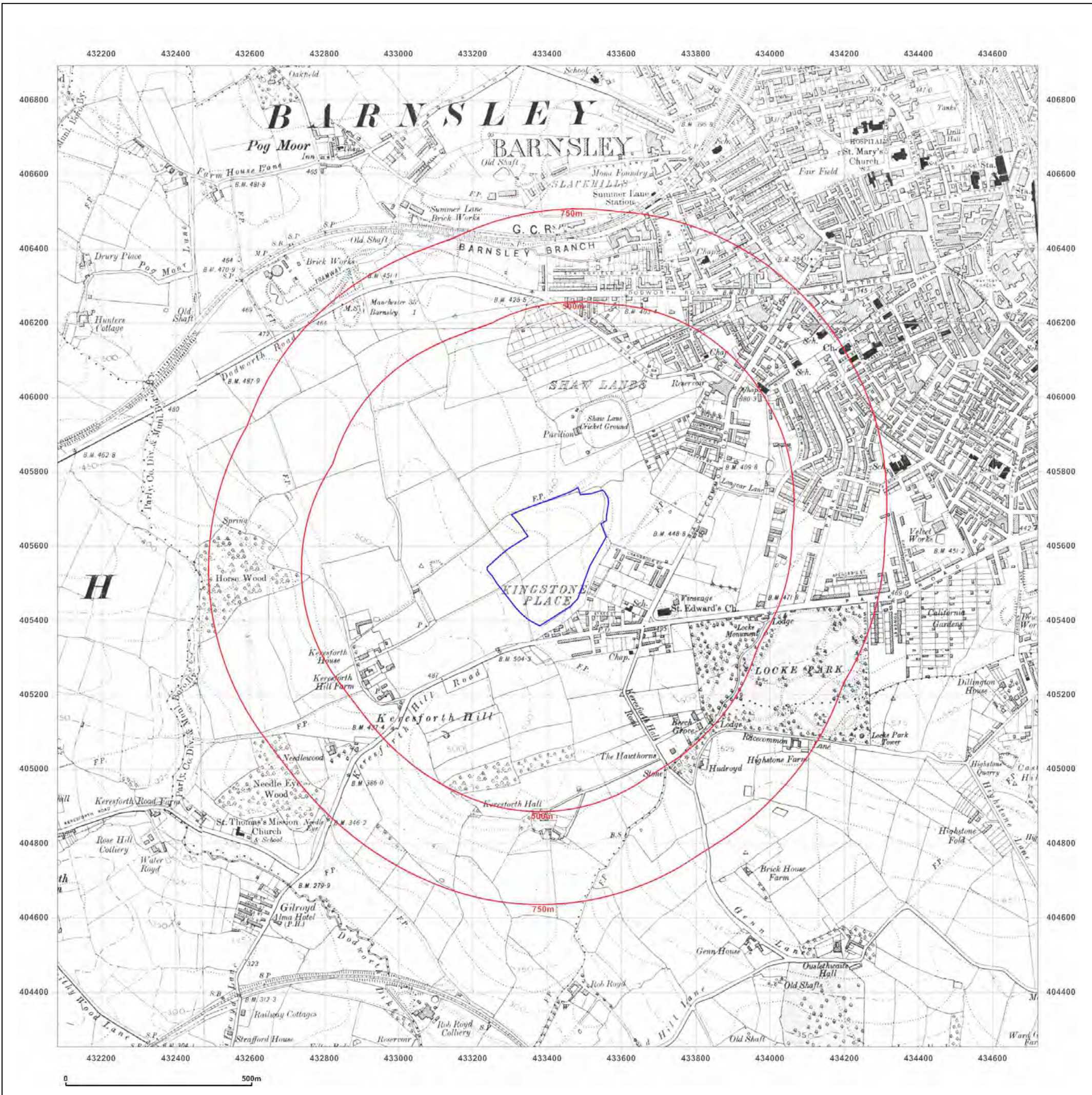
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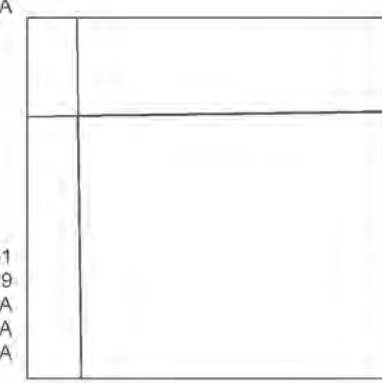
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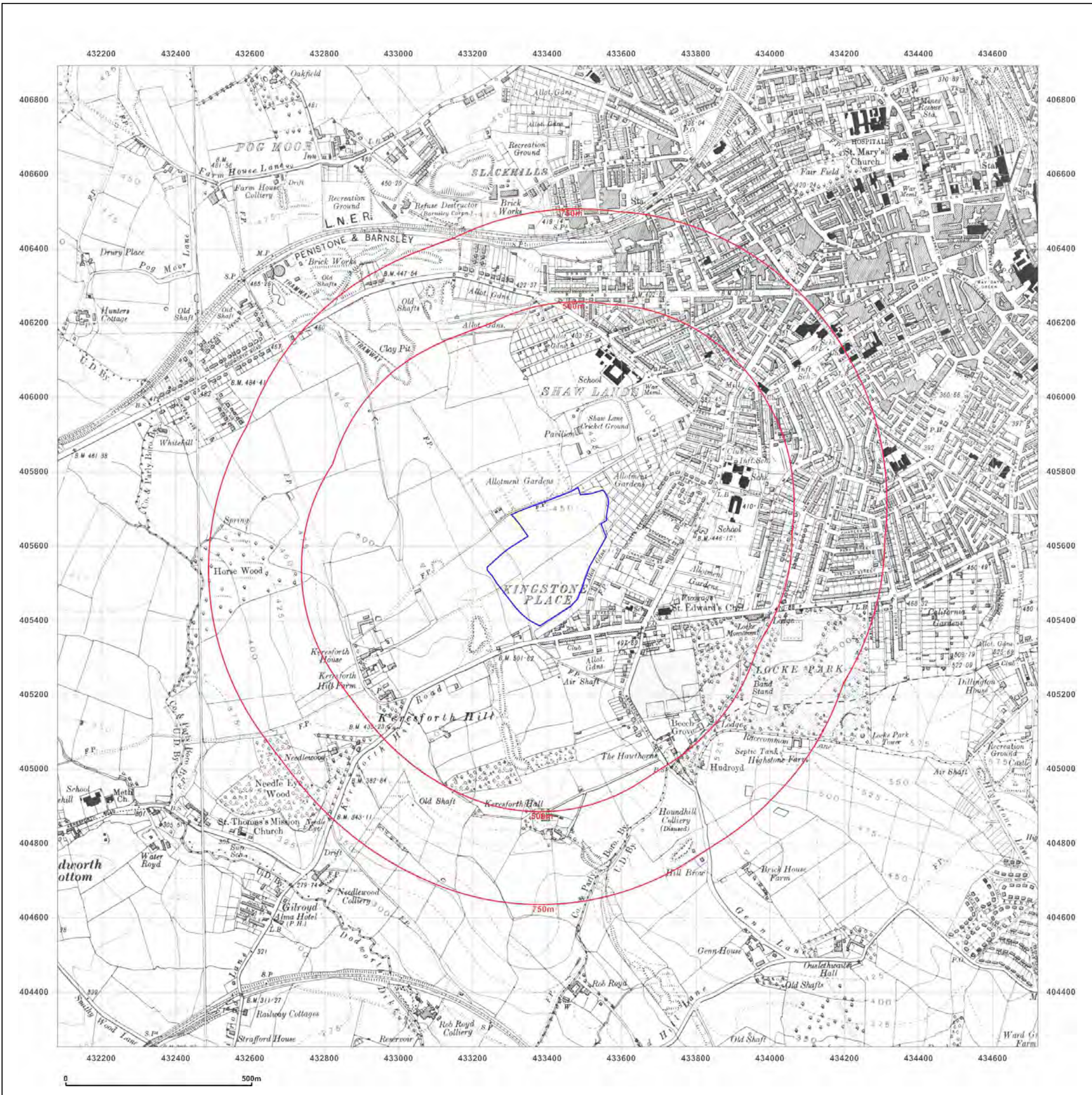
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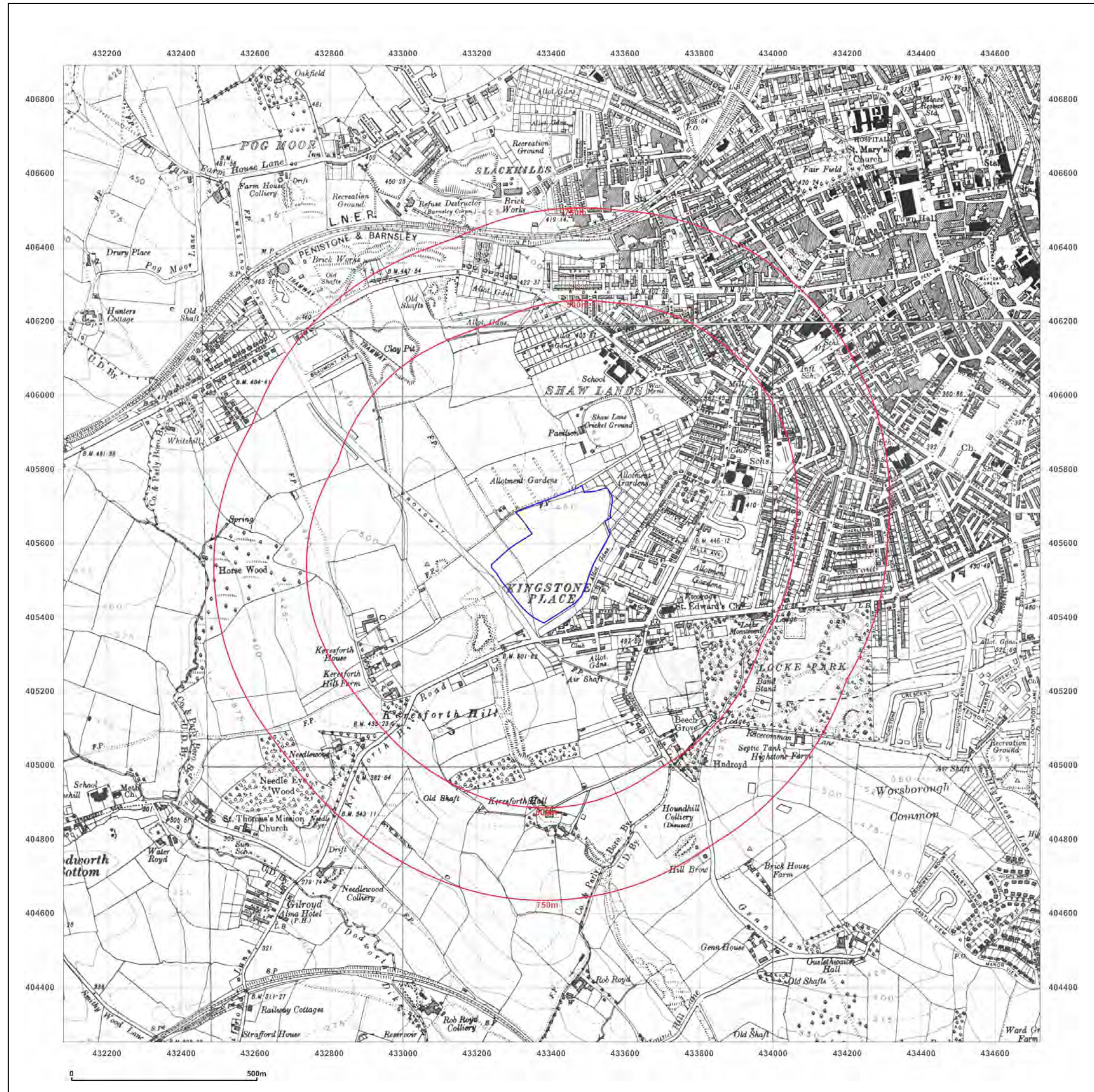
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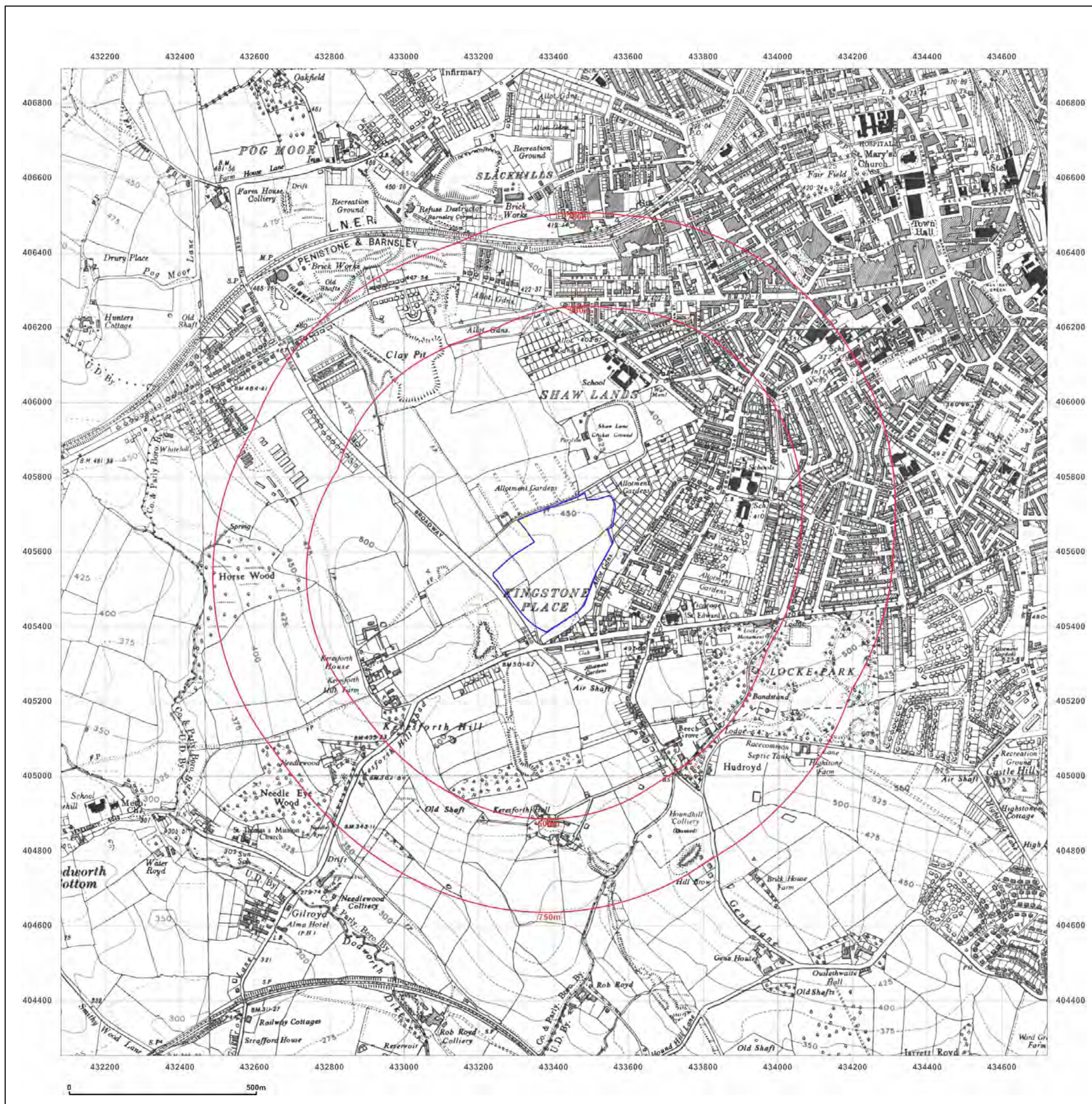


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Map Name: Provisional

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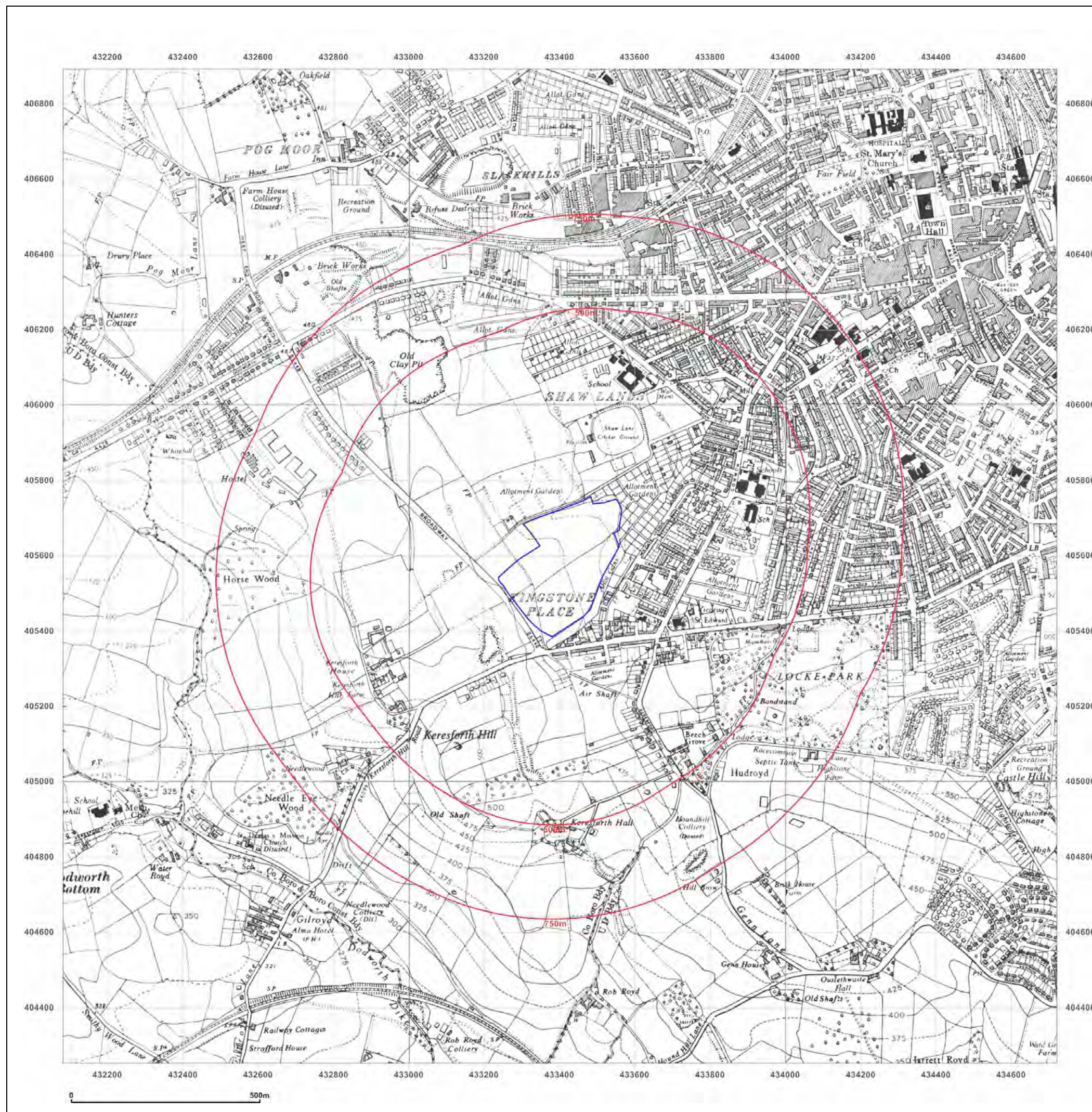
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Map Name: Provisional

Map date: 1965-1966

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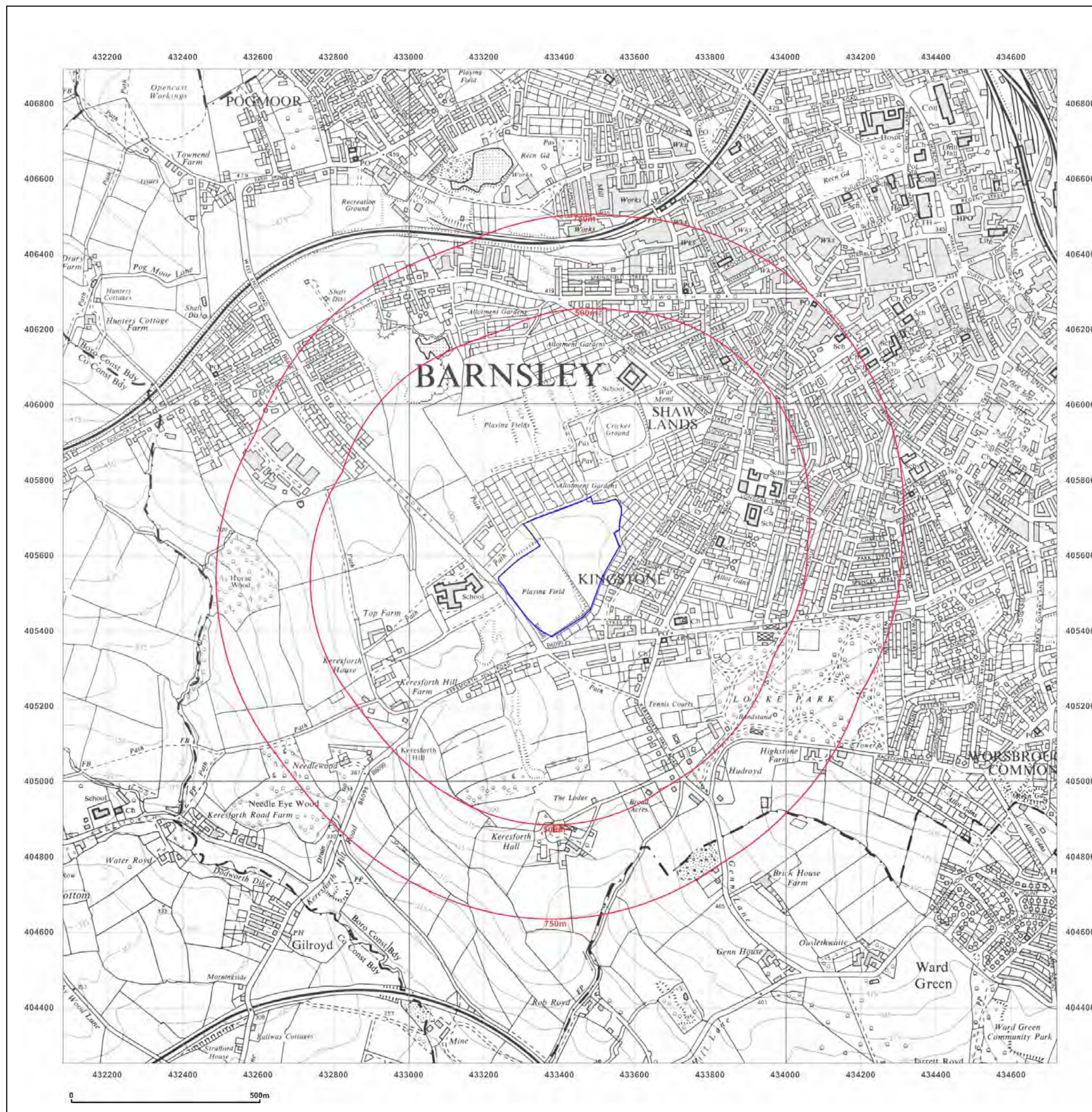
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Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1973-1977

Scale: 1:10,000

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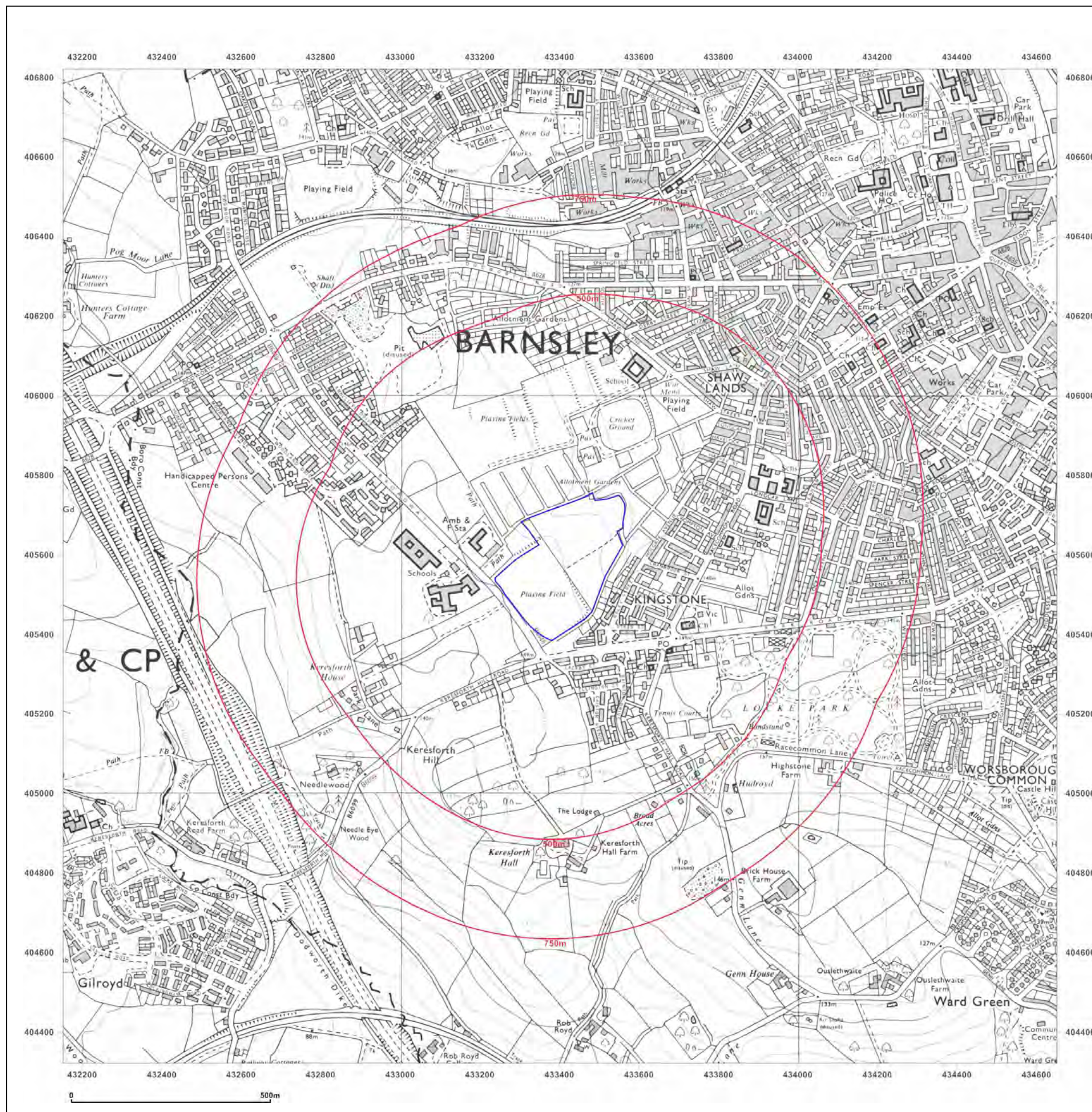
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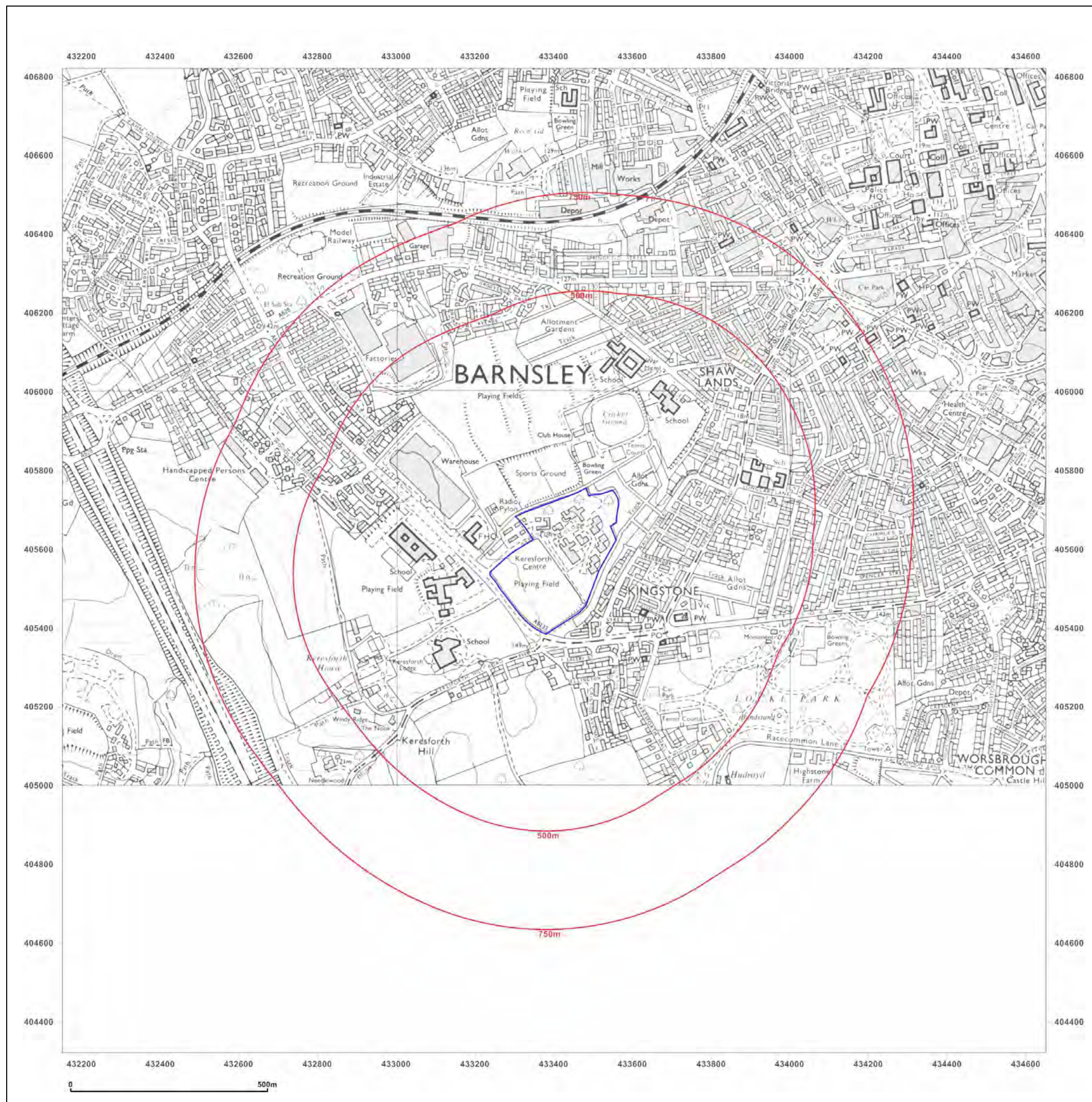


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Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name:	National Grid
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Scale: 1:10,000

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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

Printed at: 1:10,000



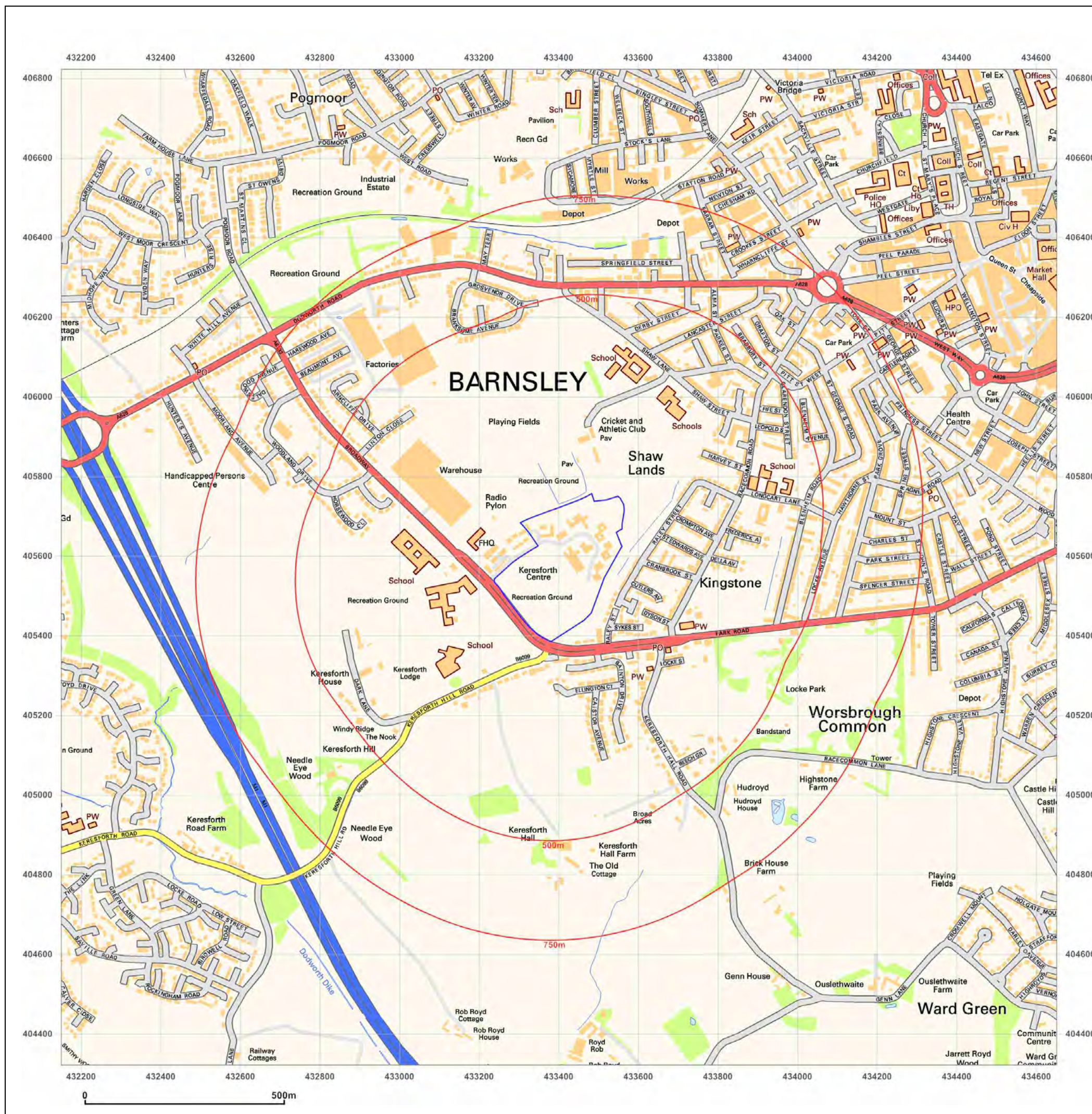
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
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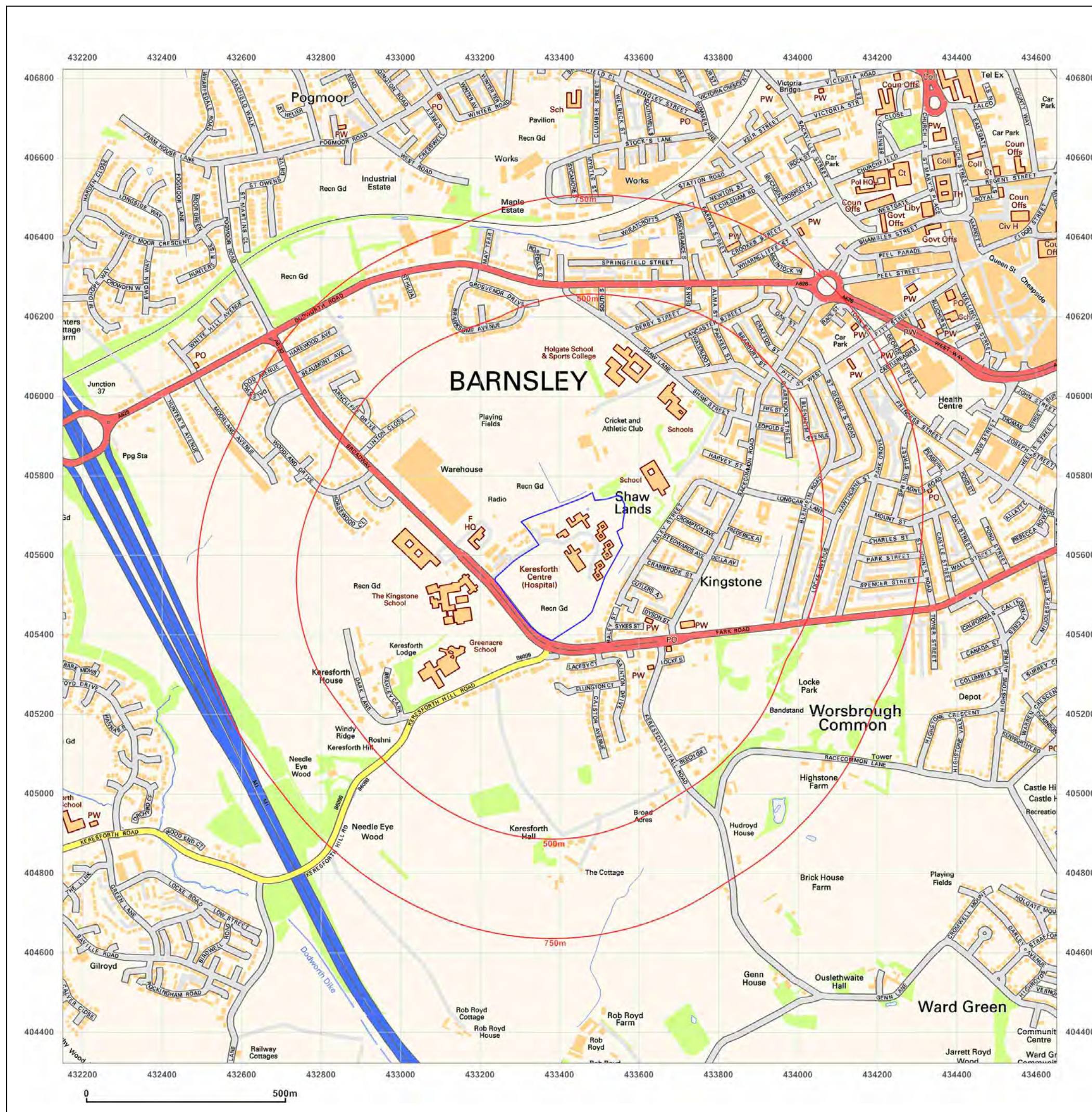
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 2020

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Printed at: 1:10,000



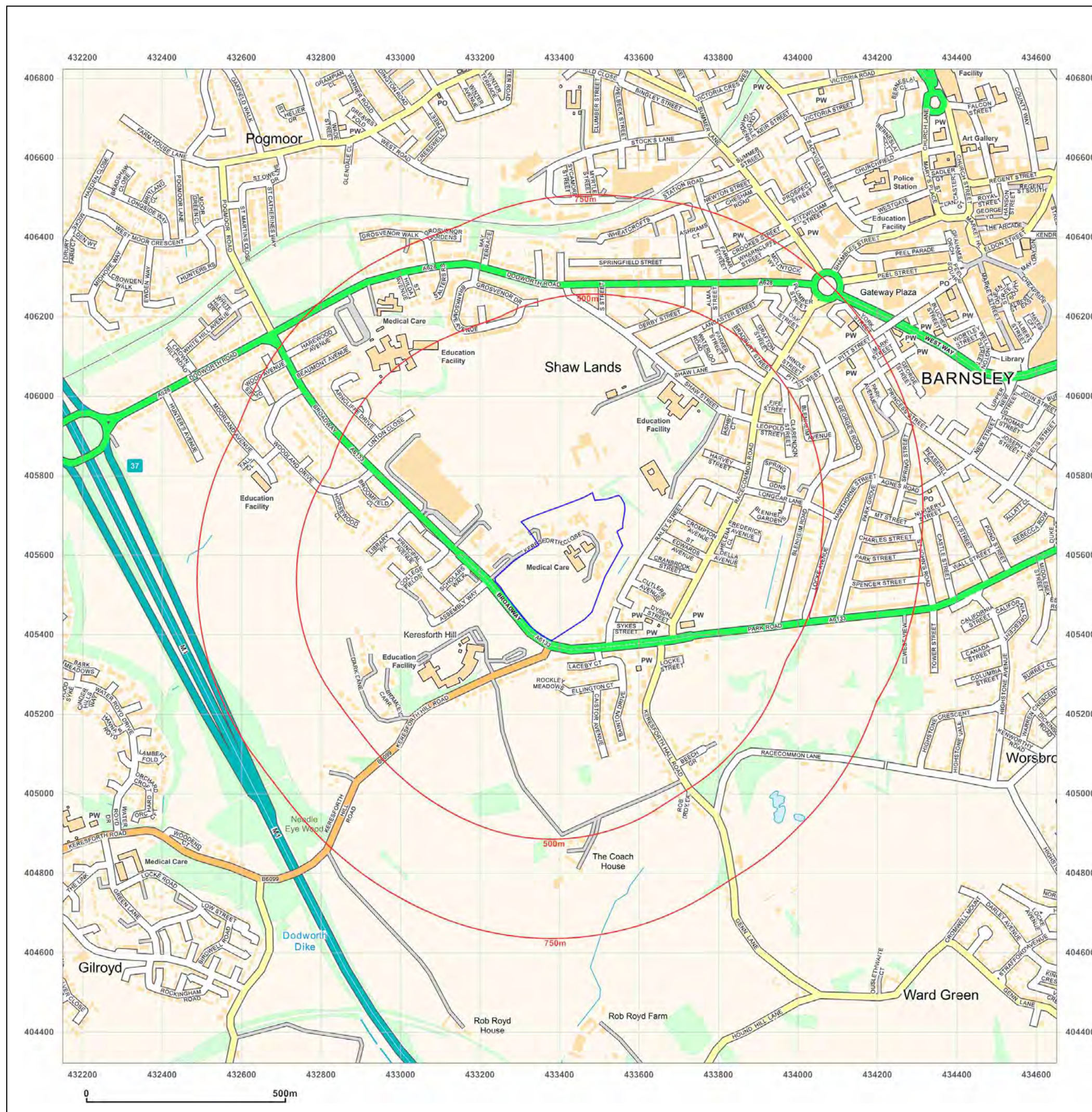
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: County Series

Map date: 1893

Scale: 1:2,500

Printed at: 1:2,500



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



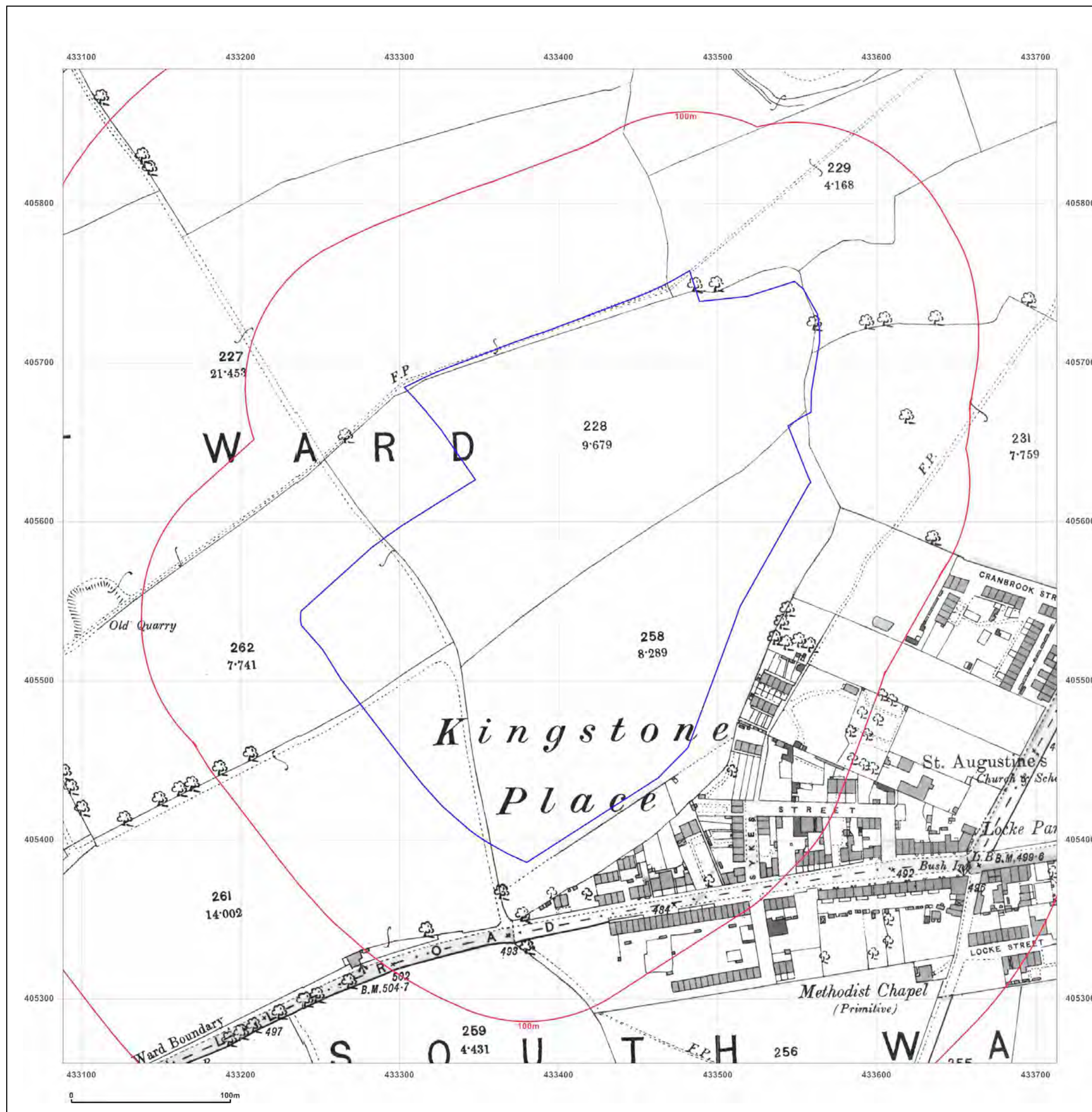
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Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: County Series

Map date: 1906

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Printed at: 1:2,500



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Edition N/A
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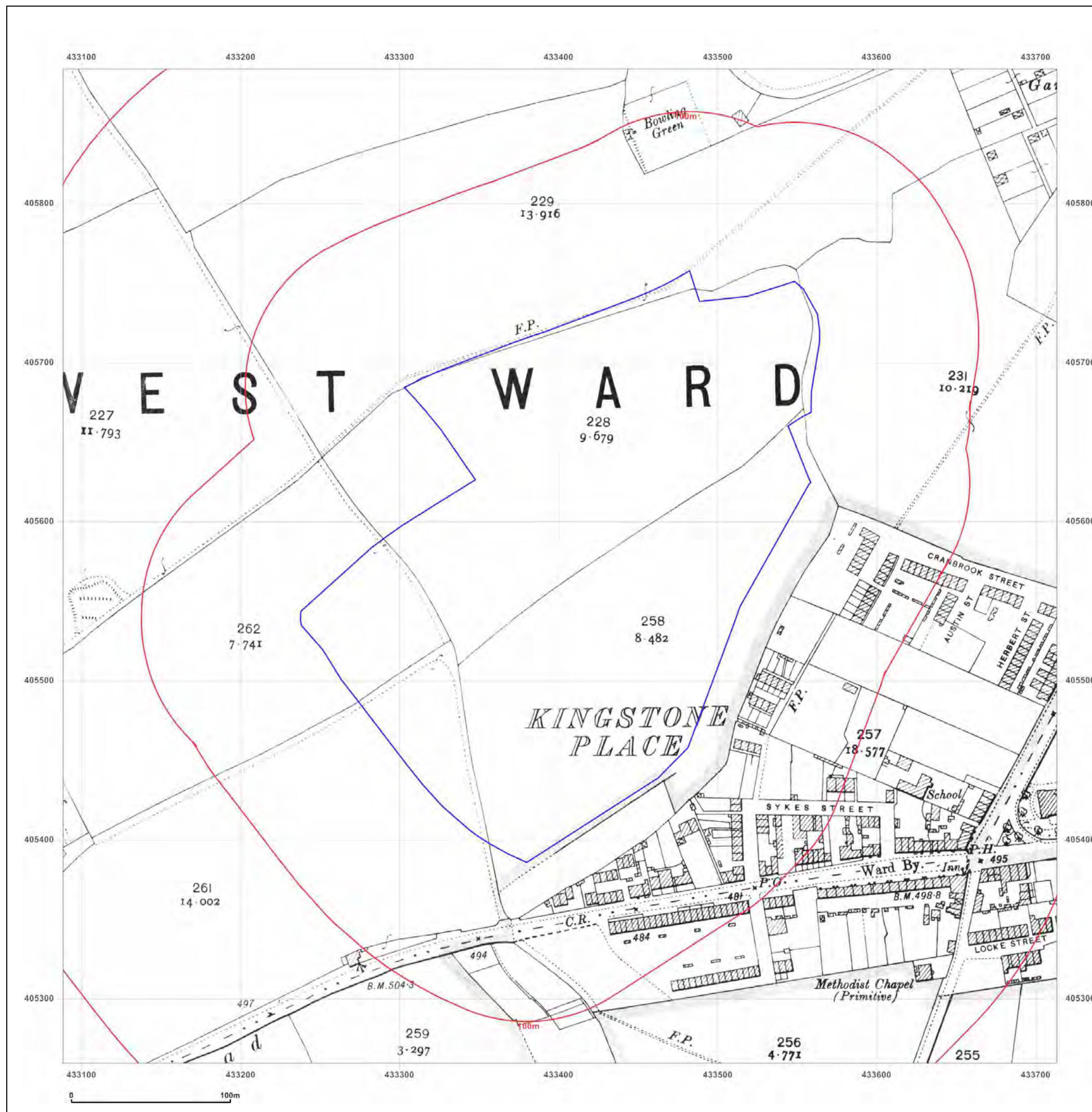
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

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Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1959
Revised 1959
Edition 1961
Copyright 1961
Levelled 1930



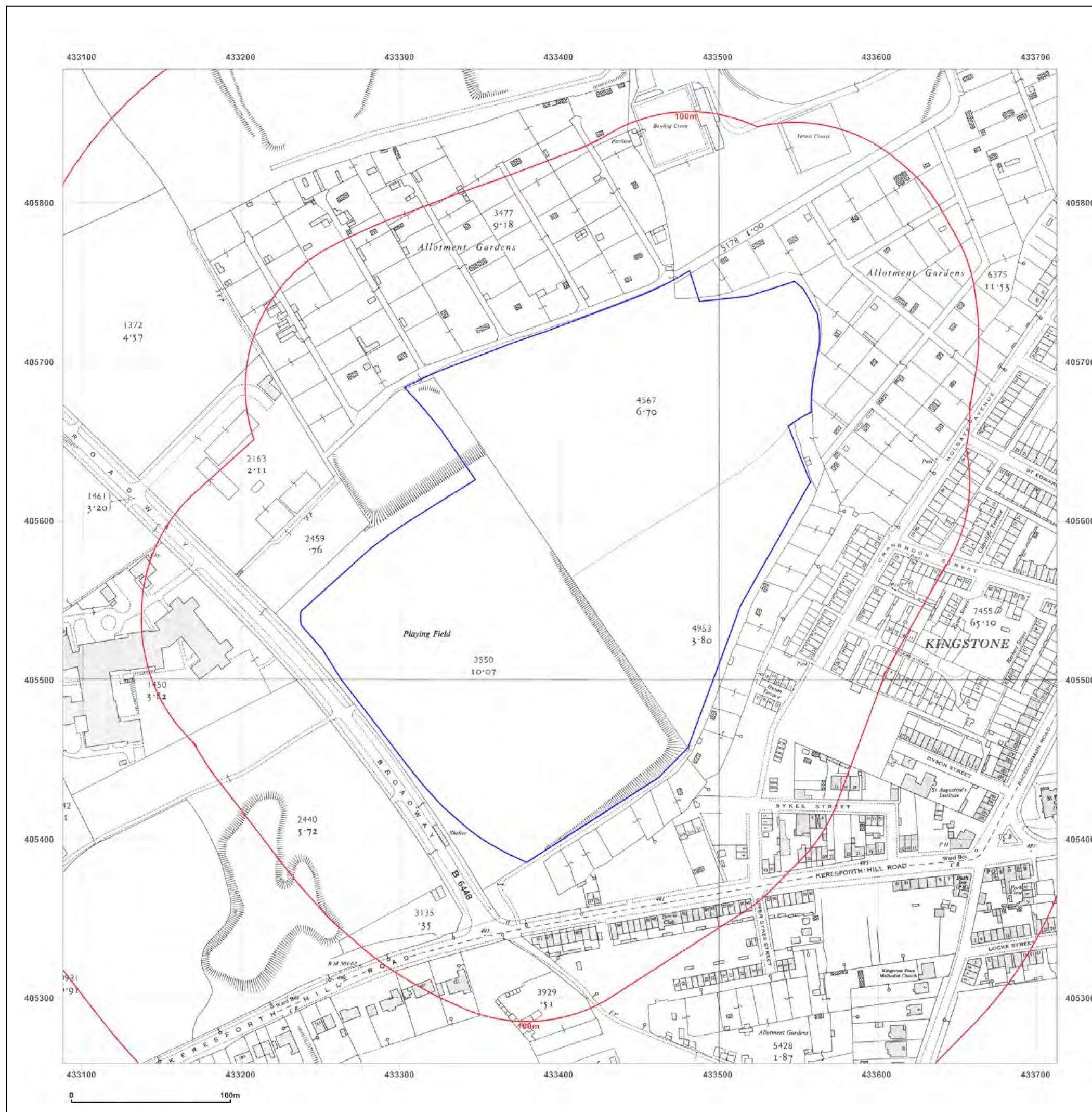
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1960

Scale: 1:1,250

Printed at: 1:2,000



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Revised 1959
Edition N/A
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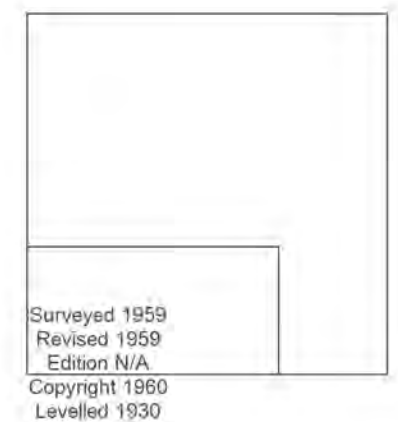
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Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1960

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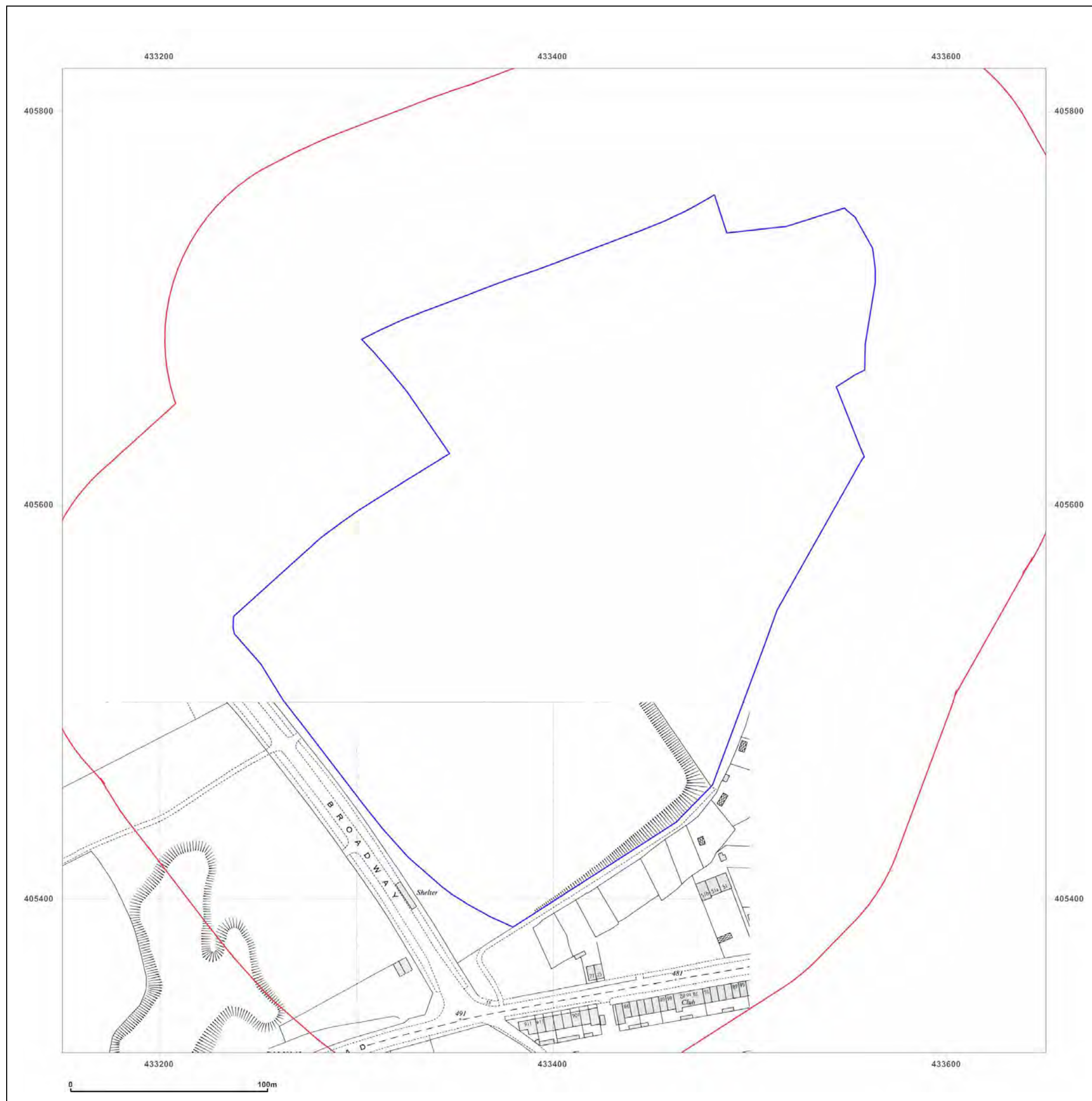


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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1969

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1959
Revised 1989
Edition N/A
Copyright 1971
Levelled 1963



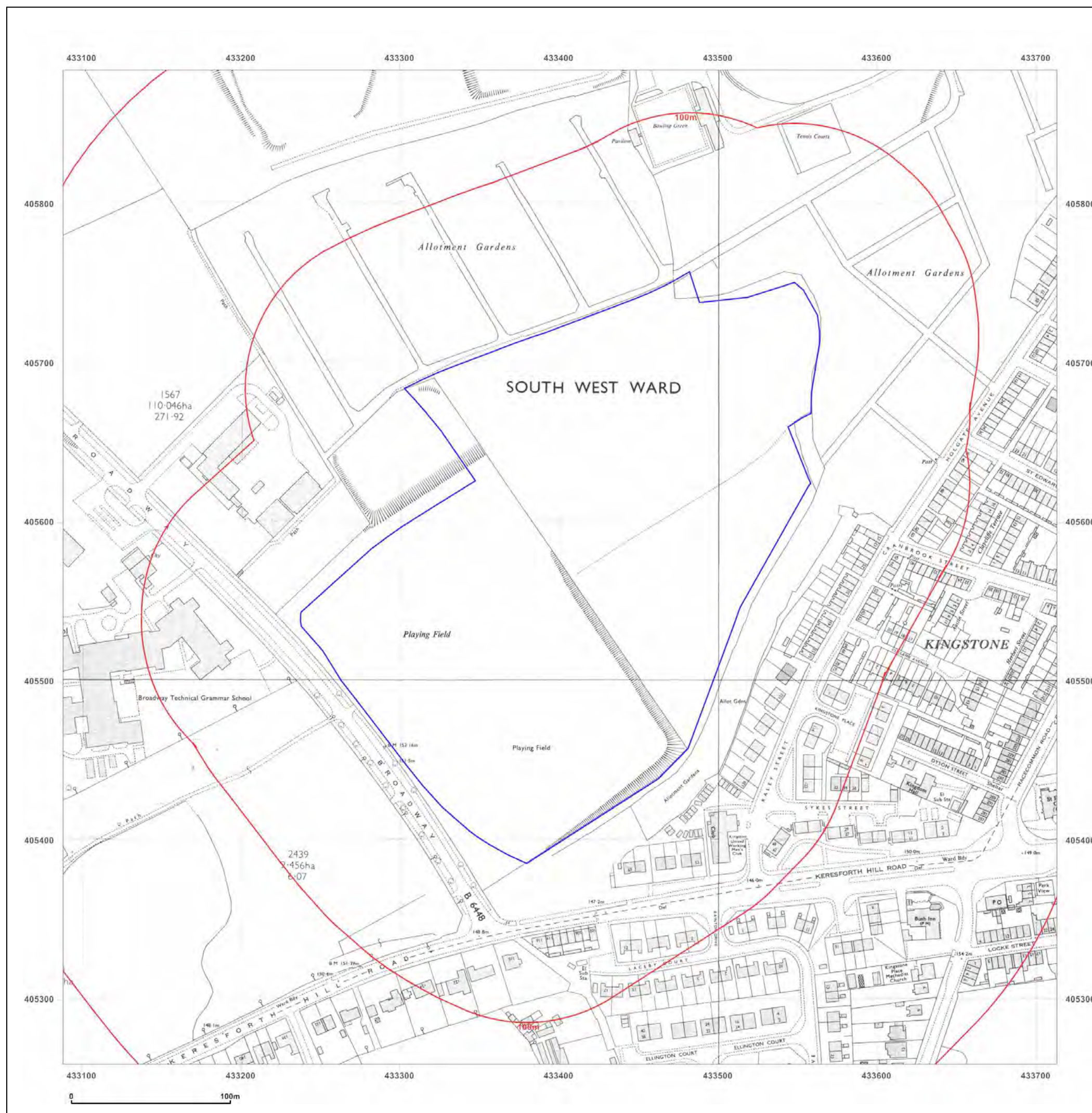
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1970-1974

Scale: 1:1,250

Printed at: 1:2,000



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Edition N/A
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Edition N/A
Copyright 1970
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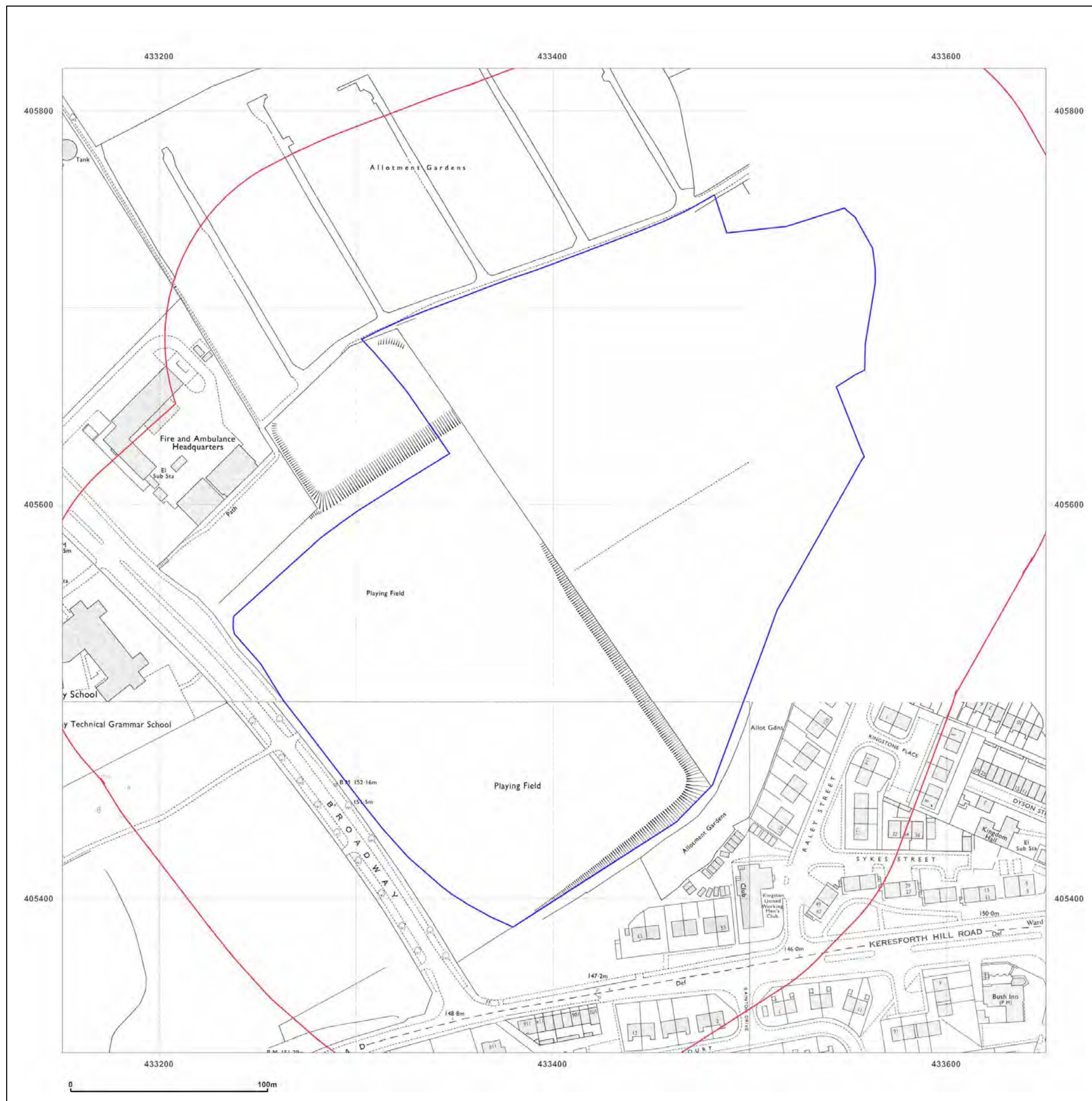


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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1978-1983

Scale: 1:1,250

Printed at: 1:2,000



Surveyed N/A
Revised N/A
Edition N/A
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Revised 1983
Edition N/A
Copyright 1983
Levelled 1963

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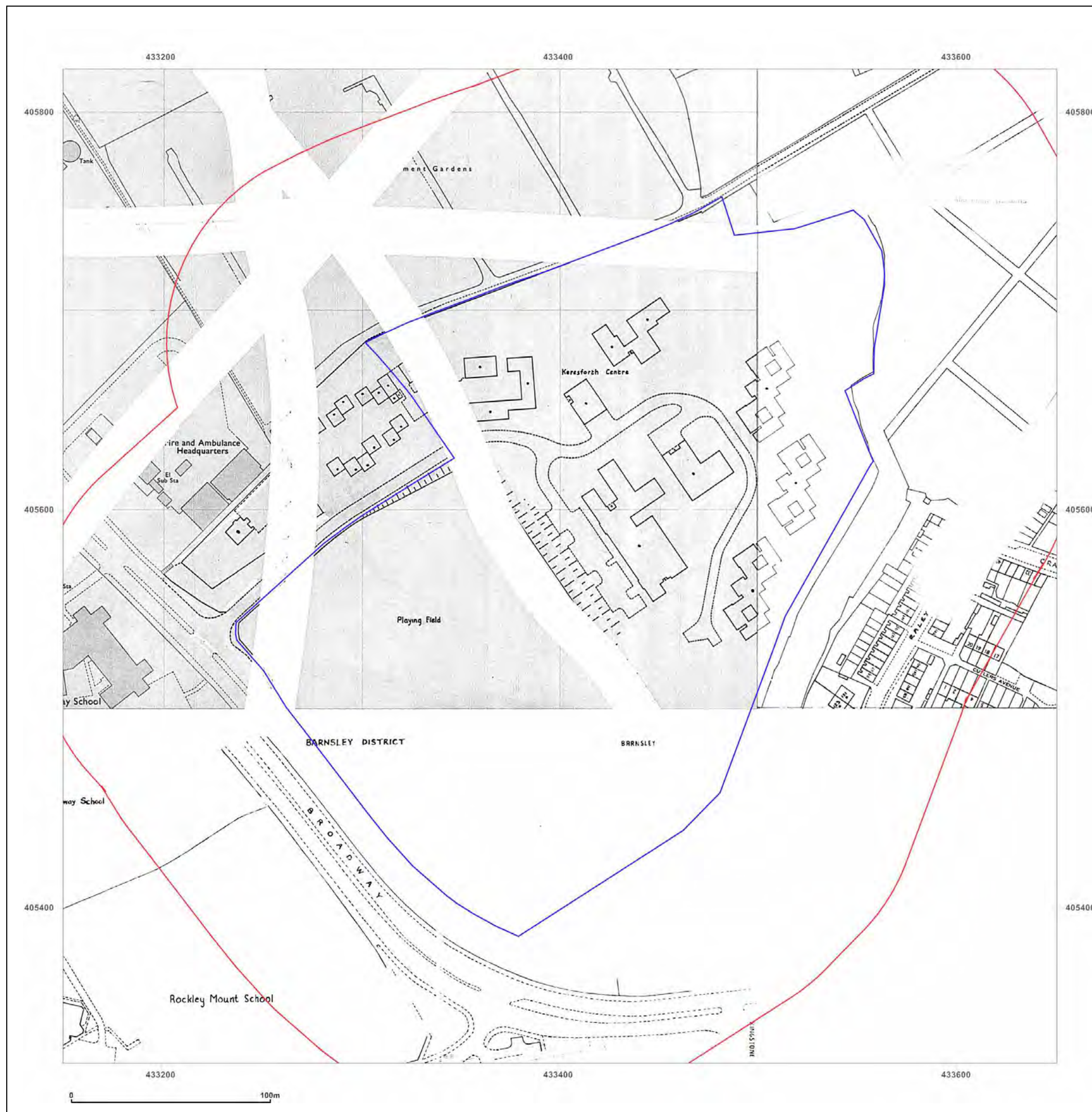


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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1983

Scale: 1:1,250

Printed at: 1:2,000



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Revised 1983
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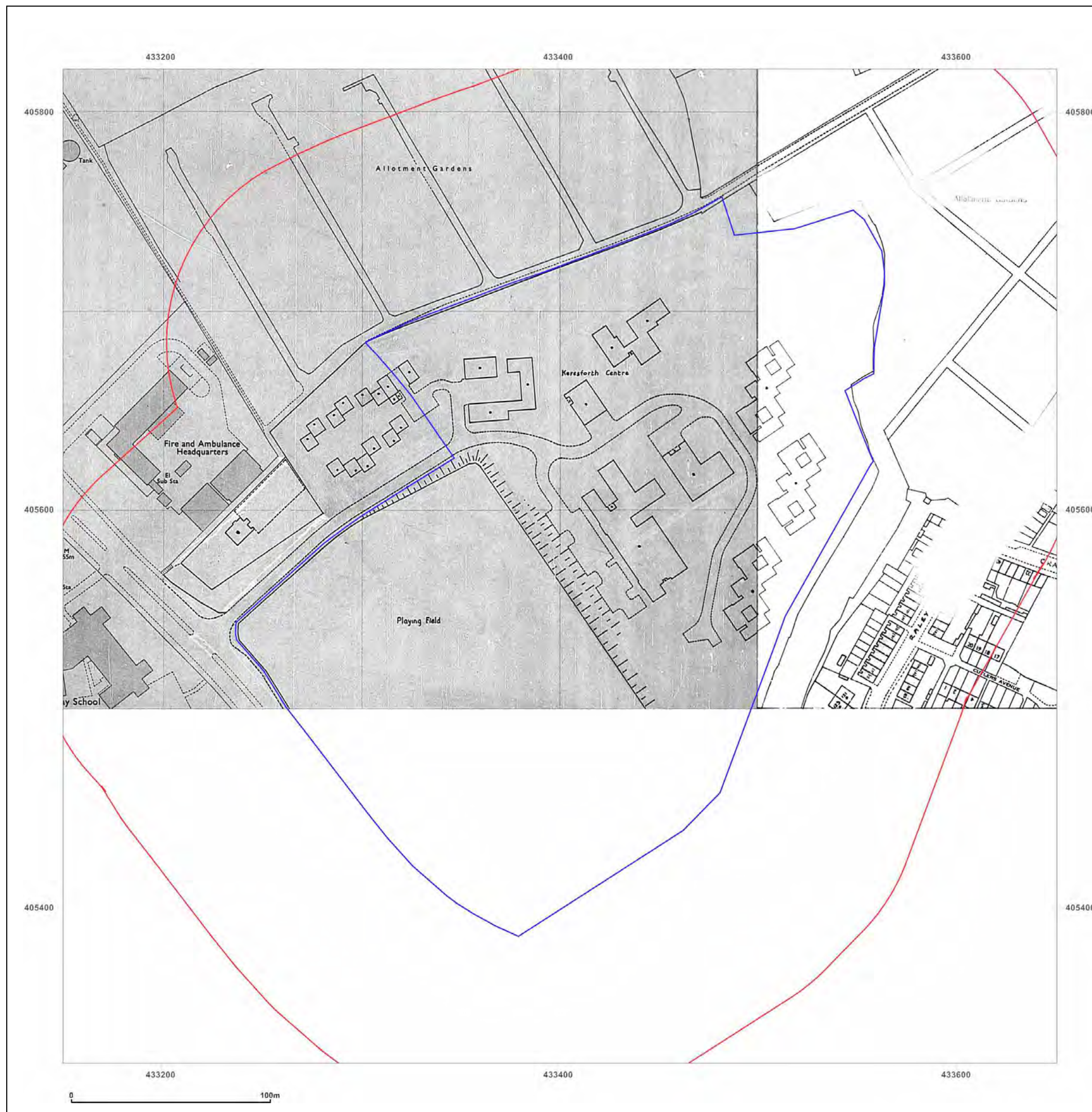


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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

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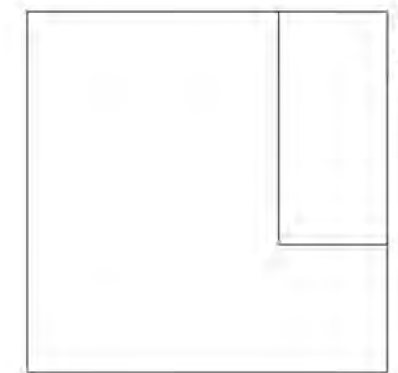
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Edition N/A
Copyright 1983
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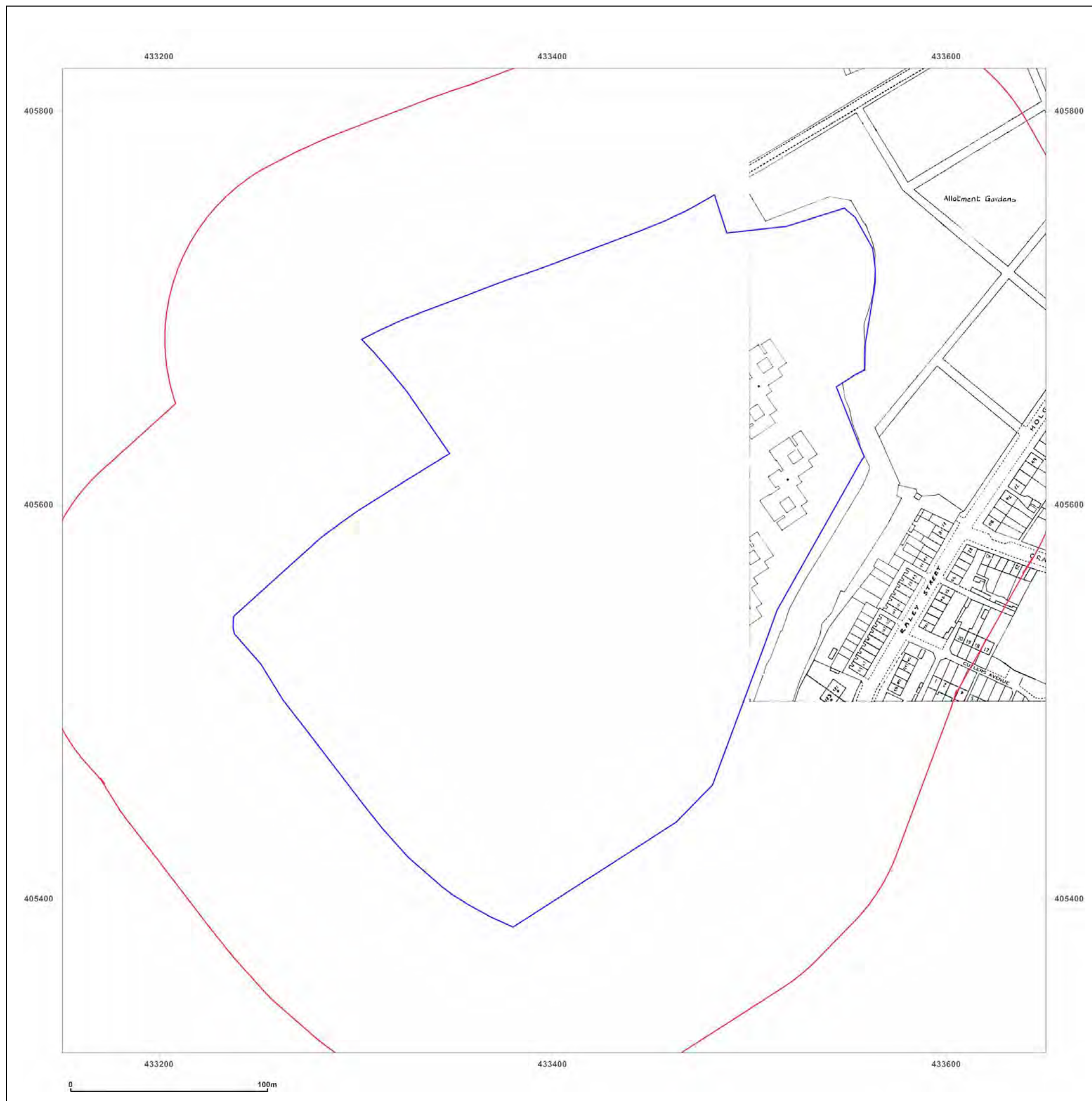


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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
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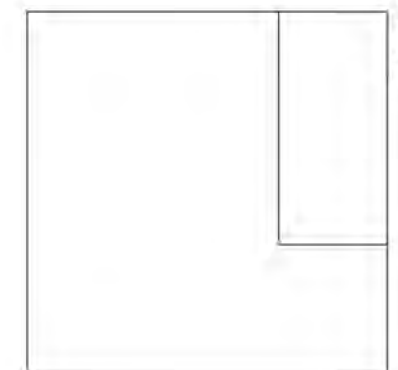
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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1989-1991

Scale: 1:1,250

Printed at: 1:2,000



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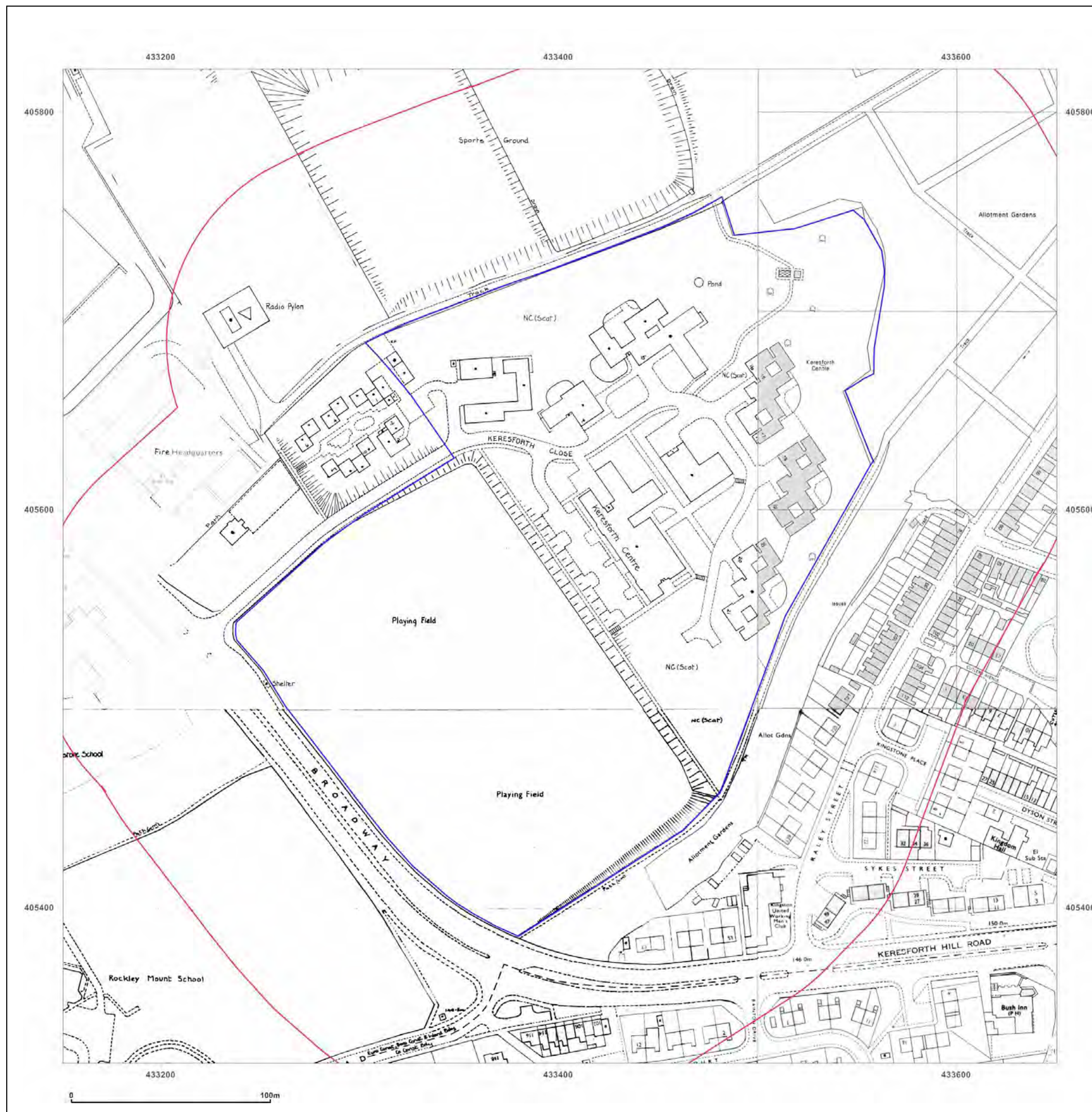


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Client Ref: WIE16416_Trinity_College_REQ_104690
Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1991-1993

Scale: 1:1,250

Printed at: 1:2,000



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Revised 1993
Edition N/A
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Report Ref: WTM1-6786593
Grid Ref: 433401, 405572

Map Name: National Grid

Map date: 1993

Scale: 1:1,250

Printed at: 1:2,000



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

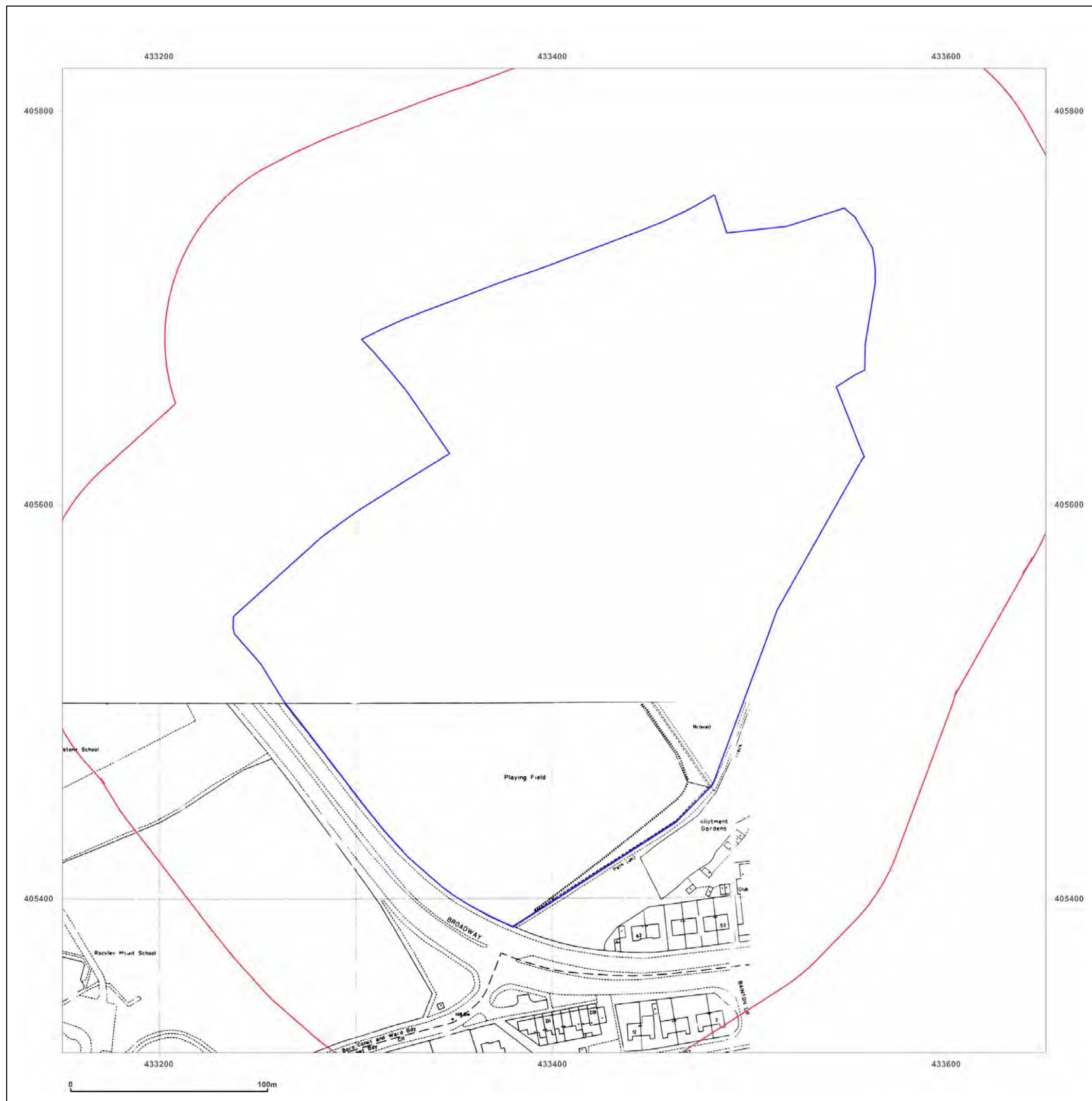


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Client Ref: WIE16416_Trinity_College_REQ_104690
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Grid Ref: 433401, 405572

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250

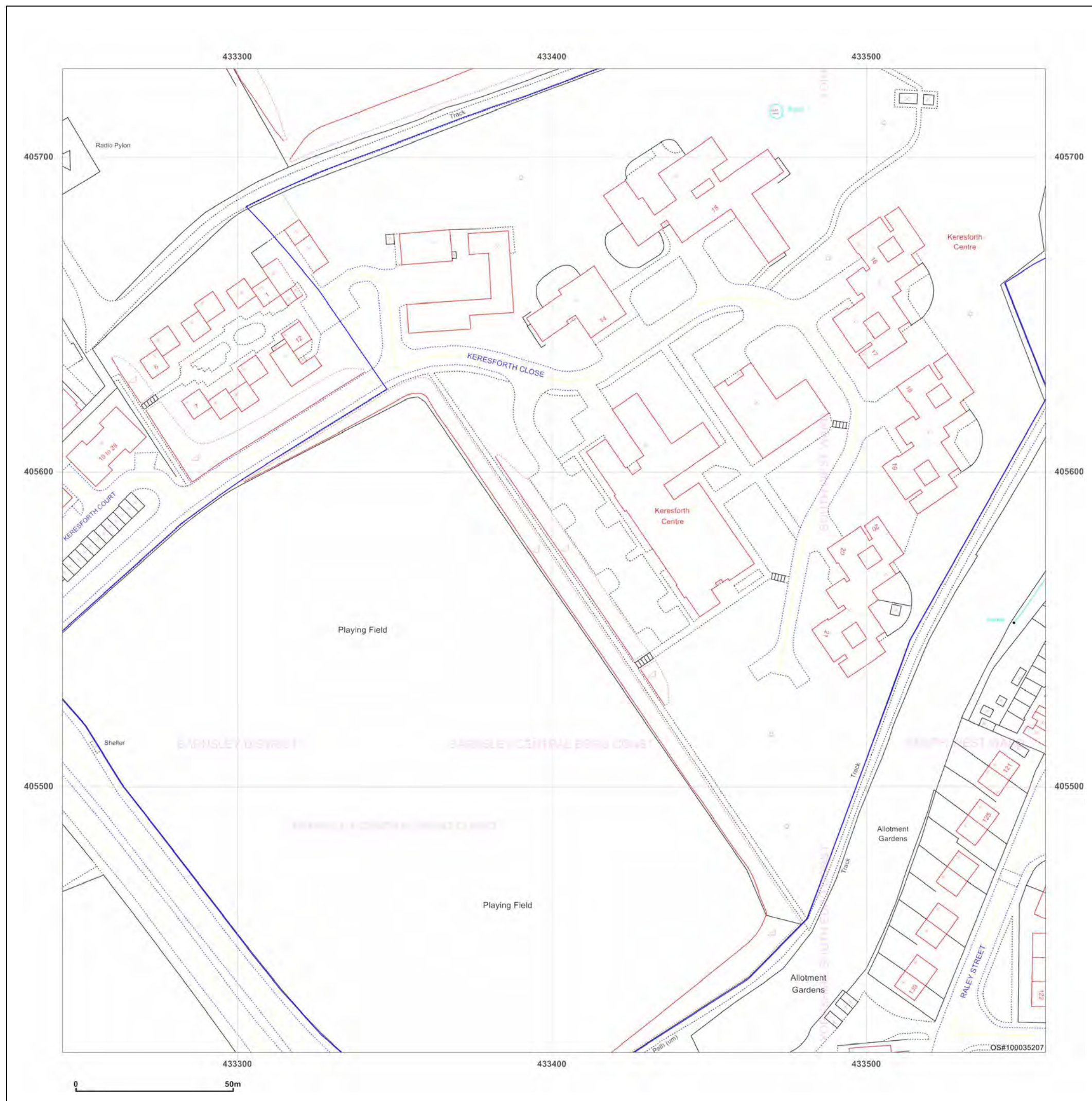


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1ST LINE DEFENCE



Detailed Unexploded Ordnance (UXO) Risk Assessment

Project Name	Keresford Close, Barnsley
Client	Waterman Infrastructure & Environment Ltd
Site Address	Keresford Close, Barnsley, S70 6RS
Report Reference	DA11373-00
Date	24/06/2020
Originator	CJ



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Unit 3, Maple Park, Essex Road, Hoddesdon, Herts. EN11 0EX
Tel: +44 (0)1992 245 020 info@1stlinedefence.co.uk

Executive Summary

Site Location and Description

The site is located in Barnsley, South Yorkshire. The site comprises a large portion of the Keresford Centre Hospital complex. The southern section of the site is occupied by a large undeveloped field, whilst the northern section of the site is occupied by several large multi-storey hospital structures, with areas of grass and tarmac roadway interspersed between the structures. A small hard-ground car park is located in-between at the centre of the site. The northern and north-western most sections of the site are occupied by a large area of grass and foliage. The site is bordered to the north by foliage adjacent to three large playing fields, to the east by allotment gardens and residential gardens adjacent to residential property on Raley Street. To the south the site is bound by Broadway road, and to the west by the remainder of Keresford Close adjacent to residential property.

The site is approximately centred on the OS grid reference: **SE 33443 05580**.

Proposed Works

The exact nature of the proposed works is not known at this stage, although it is understood the project will involve the construction of the Trinity Academy, comprising a large school building and associated sport and playing areas.

Geology and Bomb Penetration Depth

Site specific geotechnical information was not available to 1st Line Defence at the time of the production of this report. An assessment of maximum bomb penetration depth can be made once such data becomes available, or by a UXO specialist during on-site support.

It should be noted that the maximum depth that a bomb could reach may vary across a site and will be largely dependent on the specific underlying geological strata and its density.

UXO Risk Assessment

1st Line Defence has assessed that there is an overall **Low Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is an assessed **Negligible Risk** from Allied ordnance. This assessment is based on the following factors:

The Risk from German Aerial Delivered Ordnance

- During WWII the site was located within the County Borough of Barnsley. According to Official Home Office statistics, not a single bomb incident was recorded within this borough for the entirety of the war (**see Annex I**).
- Although this does not necessarily guarantee no bombs were dropped over Barnsley, the fact that none were recorded gives a strong indication of the unlikelihood any bomb incidents occurred within the site area.
- Corroborating these statistics are the available written records for the North-East Civil Defence Region, and West-Riding of Yorkshire, within which no reference to bombing incidents in the Barnsley region could be found.
- In addition, a geo data-set plotting bomb incidents in the West Riding of Yorkshire on the night of 13th/14th March 1941—the date of the largest Luftwaffe air raid within the region—does not record any bomb incidents in the vicinity of the site. The closest incident was a single HE bomb strike recorded approximately 1.42 km south-west of the site.
- As previously noted (see Section 11.7), high-resolution scans of WWII-era aerial photography of the site, would generally be utilised by 1st Line Defence to check for visual evidence of wartime bomb damage, such as craters or disturbed ground. This resource was made unavailable due to the Coronavirus epidemic. No absolute determination of the wartime conditions present on site can therefore be made.
- However, based on the negligible recorded bombing within the region, a confident assumption can be made on the low likelihood of sustained on-site bomb damage. Supporting this assumption is, again, local written record sets, within which no record of bomb damage within the site area could be found. In addition, no changes to structures surrounding the site, which could be indicative of bomb damage, were evident when comparing pre- and post-WWII OS mapping.
- As the site consisted largely of undeveloped open ground for the duration of the war, the ground cover is not considered to have been particularly favourable to the detection of UXO. However, this risk is considered to be significantly reduced in this instance by the lack of air raids recorded in the region and the negligible recorded bomb density sustained by the district. The risk from UXO on site is therefore considered to be low and is not considered to be elevated above the minimal residual level of risk for the district.

The Risk from Allied Ordnance

UXO Risk Assessment

- There is no evidence that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA. The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding aerial delivered ordnance.

Post-War Redevelopment

- Sections of the site have been significantly redeveloped post-war. Current satellite imagery indicates that whilst the southern section of the site has remained undeveloped land, several large multi-story hospital structures have been built within the northern section of the site. Tarmac road and car park space has also been built within the central part of the site.
- The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site.

Recommended Risk Mitigation Measures

The following risk mitigation measures are recommended to support the proposed works at the Keresford Close, Barnsley site.

All Works

- UXO Risk Management Plan
- Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

Glossary

Abbreviation	Definition
AA	Anti-Aircraft
AFS	Auxiliary Fire Service
AP	Anti-Personnel
ARP	Air Raid Precautions
DA	Delay-action
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
FP	Fire Pot
GM	G Mine (Parachute mine)
HAA	Heavy Anti-Aircraft
HE	High Explosive
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operation Centre
LAA	Light Anti-Aircraft
LCC	London County Council
LRRB	Long Range Rocket Bomb (V-2)
LSA	Land Service Ammunition
NFF	National Filling Factory
OB	Oil Bomb
PAC	Pilotless Aircraft (V-1)
PB	Phosphorous Bomb
PM	Parachute Mine
POW	Prisoner Of War
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RFC	Royal Flying Corps
RNAS	Royal Naval Air Service
ROF	Royal Ordnance Factory
SA	Small Arms
SAA	Small Arms Ammunition
SD2	Anti-personnel "Butterfly Bomb"
SIP	Self-Igniting Phosphorous
U/C	Unclassified bomb
UP	Unrotated Projectile (rocket)
USAAF	United States Army Air Force
UX	Unexploded
UXAA	Unexploded Anti-Aircraft
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	Flying Bomb (Doodlebug)
V-2	Long Range Rocket
WAAF	Women's Auxiliary Air Force
X	Exploded

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1st Line Defence Limited

Detailed Unexploded Ordnance (UXO) Risk Assessment

Site: Keresford Close, Barnsley

Client: Waterman Infrastructure & Environment Ltd

1. Introduction

1.1. Background

1st Line Defence has been commissioned by Waterman Infrastructure & Environment Ltd to conduct a Detailed Unexploded Ordnance (UXO) Risk Assessment for the works proposed at the Keresford Close, Barnsley site.

Buried UXO can present a significant risk to construction works and development projects. The discovery of a suspect device during works can cause considerable disruption to operations as well as cause unwanted delays and expense.

UXO in the UK can originate from three principal sources:

1. Munitions resulting from wartime activities including German bombing in WWI and WWII, long range shelling, and defensive activities.
2. Munitions deposited as a result of military training and exercises.
3. Munitions lost, burnt, buried or otherwise discarded either deliberately, accidentally, or ineffectively.

This report will assess the potential factors that may contribute to the risk of UXO contamination. If an elevated risk is identified at the site, this report will recommend appropriate mitigation measures, in order to reduce the risk to as low as is reasonably practicable. Detailed analysis and evidence will be provided to ensure an understanding of the basis for the assessed risk level and any recommendations.

This report complies with the guidelines outlined in *CIRIA C681*, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry.'

2. Method Statement

2.1. Report Objectives

The aim of this report is to conduct a comprehensive assessment of the potential risk from UXO at Keresford Close, Barnsley. The report will also recommend appropriate site and work-specific risk mitigation measures to reduce the risk from explosive ordnance during the envisaged works to a level that is as low as reasonably practicable.

2.2. Risk Assessment Process

1st Line Defence has undertaken a five-step process for assessing the risk of UXO contamination:

1. The likelihood that the site was contaminated with UXO.
2. The likelihood that UXO remains on the site.
3. The likelihood that UXO may be encountered during the proposed works.
4. The likelihood that UXO may be initiated.
5. The consequences of initiating or encountering UXO.

In order to address the above, 1st Line Defence has taken into consideration the following factors:

- Evidence of WWI and WWII German aerial delivered bombing as well as the legacy of Allied occupation.
- The nature and conditions of the site during WWII.
- The extent of post-war development and UXO clearance operations on site.
- The scope and nature of the proposed works and the maximum assessed bomb penetration depth.
- The nature of ordnance that may have contaminated the proposed site area.

2.3. Sources of Information

Every reasonable effort has been made to ensure that relevant evidence has been consulted and presented in order to produce a thorough and comprehensible report for the client. To achieve this the following, which includes military records and archive material held in the public domain, have been accessed:

- The National Archives, The Barnsley Archives and Discovery Centre, and Wakefield Archives
- Historical mapping datasets.
- Historic England National Monuments Record.
- Relevant information supplied by Waterman Infrastructure & Environment Ltd .
- Available material from 33 Engineer Regiment (EOD) Archive (now 28 Regt).
- 1st Line Defence's extensive historical archives, library and UXO geo-datasets.
- Open sources such as published books and internet resources.

Research involved a visit to The National Archives and Wakefield Archives.

3. Background to Bombing Records

3.1. General Considerations of Historical Research

This desktop assessment is based largely upon analysis of historical evidence. Every reasonable effort has been made to locate and present significant and pertinent information. 1st Line Defence cannot be held accountable for any changes to the assessed risk level or risk mitigation measures, based on documentation or other data that may come to light at a later date, or which was not available to 1st Line Defence during the production of this report.

It is often problematic and sometimes impossible to verify the completeness and accuracy of WWII-era records. As a consequence, conclusions as to the exact location and nature of a UXO risk can rarely be quantified and are, to a degree, subjective. To counter this, a range of sources have been consulted, presented and analysed. The same methodology is applied to each report during the risk assessment process. 1st Line Defence cannot be held responsible for any inaccuracies or the incompleteness in available historical information.

3.2. German Bombing Records

During WWII, bombing records were generally gathered locally by the police, Air Raid Precaution (ARP) wardens and military personnel. These records typically contained information such as the date, the location, the amount of damage caused and the types of bombs that had fallen during an air raid. This information was made either through direct observation or post-raid surveys. The Ministry of Home Security Bomb Census Organisation would then receive this information, which was plotted onto maps, charts, and tracing sheets by regional technical officers. The collective record set (regional bomb census mapping and locally gathered incidents records) would then be processed and summarised into reports by the Ministry of Home Security Research and Experiments Branch. The latter were tasked with providing the government 'a complete picture of air raid patterns, types of weapons used and damage caused- in particular to strategic services and installations such as railways, shipyards, factories and public utilities.'¹

The quality, detail and nature of record keeping could vary considerably between provincial towns, boroughs and cities. No two areas identically collated or recorded data. While some local authorities maintained records with a methodical approach, sources in certain areas can be considerably more vague, dispersed, and narrower in scope. In addition, the immediate priority was mostly focused on assisting casualties and minimising damage at the time. As a result, some records can be incomplete and contradictory. Furthermore, many records were even damaged or destroyed in subsequent air raids. Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are therefore not always reliable. Whereas records of attacks on military or strategic targets were often maintained separately and have not always survived.

3.3. Allied Records

During WWII, considerable areas of land were requisitioned by the War Office for the purpose of defence, training, munitions production and the construction of airfields. Records relating to military features vary and some may remain censored. Within urban environments datasets will be consulted detailing the location of munition production as well as wartime air and land defences. In rural locations it may be possible to obtain plans of military establishments, such as airfields, as well as training logs, record books, plans and personal memoirs. As with bombing records, every reasonable effort will be made to access records of, and ascertain any evidence of, military land use. However, there are occasions where such evidence is not available, as records may not be accessible, have been lost/destroyed, or simply were not kept in the first place.

¹ <http://www.nationalarchives.gov.uk/help-with-your-research/research-guides/bomb-census-survey-records-1940-1945/>.

4. UK Regulatory Environment and Guidelines

4.1. General

There is no formal obligation requiring a UXO risk assessment to be undertaken for construction projects in the UK, nor is there any specific legislation stipulating the management or mitigation of UXO risk. However, it is implicit in the legislation outlined below that those responsible for intrusive works (archaeology, site investigation, drilling, piling, excavation etc.) should undertake a comprehensive and robust assessment of the potential risks to employees and that mitigation measures are implemented to address any identified hazards.

4.2. CDM Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM 2015) define the responsibilities of parties involved in the construction of temporary or permanent structures.

The CDM 2015 establishes a duty of care extending from clients, principle co-ordinators, designers, and contractors to those working on, or affected by, a project. Those responsible for construction projects may therefore be accountable for the personal or proprietary loss of third parties, if correct health and safety procedure has not been applied.

Although the CDM does not specifically reference UXO, the risk presented by such items is both within the scope and purpose of the legislation. It is therefore implied that there is an obligation for parties to:

- Provide an appropriate assessment of potential UXO risks at the site (or ensure such an assessment is completed by others).
- Put in place appropriate risk mitigation measures if necessary.
- Supply all parties with information relevant to the risks presented by the project.
- Ensure the preparation of a suitably robust emergency response plan.

4.3. The 1974 Health and Safety at Work etc. Act

All employers have a responsibility under the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999, to ensure the health and safety of their employees and third parties, so far as is reasonably practicable and conduct suitable and sufficient risk assessments.

4.4. CIRIA C681

In 2009, the Construction Industry Research and Information Association (CIRIA) produced a guide to the risk posed by UXO to the UK construction industry (CIRIA C681). CIRIA is a neutral, independent and not-for-profit body, linking organisations with common interests and facilitating a range of collaborative activities that help improve the industry.

The publication provides the UK construction industry with a defined process for the management of risks associated with UXO from WWI and WWII aerial bombardment. It is also broadly applicable to the risks from other forms of UXO that might be encountered. It focuses on construction professionals' needs, particularly if there is a suspected item of UXO on site, and covers issues such as what to expect from a UXO specialist. The guidance also helps clients to fulfil their legal duty under CDM 2015 to provide designers and contractors with project specific health and safety information needed to identify hazards and risks associated with the design and construction work. This report conforms to

this CIRIA guidance and to the various recommendations for good practice referenced therein. It is recommended that this document is acquired and studied where possible to allow a better understanding of the background to both the risk assessment process and the UXO issue in the UK in general.

4.5. Additional Legislation

In the event of a casualty resulting from the failure of an employer/client to address the risks relating to UXO, the organisation may be criminally liable under the Corporate Manslaughter and Corporate Homicide Act 2007.

5. The Role of Commercial UXO Contractors and The Authorities

5.1. Commercial UXO Specialists

The role of a UXO Specialist (often referred to as UXO Consultant or UXO Contractor) such as 1st Line Defence, is defined in CIRIA C681 as the provision of expert knowledge and guidance to the client on the most appropriate and cost-effective approach to UXO risk management at a site.

The principal role of UXO Specialists is to provide the client with an appropriate assessment of the risk posed by UXO for a specific project, and identify and carry out suitable methodology for the mitigation of any identified risks to reduce them to an acceptable level.

The requirement for a UXO Specialist should ideally be identified in the initial stages of a project, and it is recommended that this occur prior to the start of any detailed design. This will enable the client to budget for expenditure that may be required to address the risks from UXO, and may enable the project team to identify appropriate techniques to eliminate or reduce potential risks through considered design, without the need for UXO specific mitigation measures. The UXO Specialist should have suitable qualifications, levels of competency and insurances.

Please note 1st Line Defence has the capability to provide a complete range of required UXO risk mitigation services, in order to reduce a risk to as low as reasonably practicable. This can involve the provision of both ground investigation, and where appropriate, UXO clearance services.

5.2. The Authorities

The police have a responsibility to co-ordinate the emergency services in the event of an ordnance-related incident at a construction site. Upon inspection they may impose a safety cordon, order an evacuation, and call the military authorities Joint Services Explosive Ordnance Disposal Operation Centre (JSEODOC) to arrange for investigation and/or disposal. Within the Metropolitan Police Operational Area, SO15 EOD will be tasked to any discovery of suspected UXO. The request for Explosive Officer (Expo) support is well understood and practiced by all Metropolitan Boroughs. The requirement for any additional assets will then be coordinated by the Expo if required.

In the absence of a UXO specialist, police officers will usually employ such precautionary safety measures, thereby causing works to cease, and possibly requiring the evacuation of neighbouring businesses and properties.

The priority given to the police request will depend on the EOD teams judgement of the nature of the UXO risk, the location, people and assets at risk, as well as the availability of resources. The speed of response varies; authorities may respond immediately or in some cases it may take several days for the item of ordnance to be dealt with. Depending on the on-site risk assessment the item of ordnance may be removed from the site and/or destroyed by a controlled explosion.

Following the removal of an item of UXO, the military authorities will only undertake further investigations or clearances in high-risk situations. If there are regular UXO finds on a site the JSEODOC may not treat each occurrence as an emergency and will recommend the construction company puts in place alternative procedures, such as the appointment of a commercial contractor to manage the situation.

6. The Site

6.1. Site Location

The site is located in Barnsley, South Yorkshire. The site is bordered to the north by foliage adjacent to three large playing fields, to the east by allotment gardens and residential gardens adjacent to residential property on Raley Street. To the south the site is bound by Broadway road, and to the west by the remainder of Keresford Close adjacent to residential property.

The site is approximately centred on the OS grid reference: **SE 33443 05580**.

Site location maps are presented in **Annex A**.

6.2. Site Description

The site comprises a large portion of the Keresford Centre Hospital complex. The southern section of the site is occupied by a large undeveloped field, whilst the northern section of the site is occupied by several large multi-storey hospital structures, with areas of grass and tarmac roadway interspersed between the structures. A small hard-ground car park is located in-between at the centre of the site. The northern and north-western most sections of the site are occupied by a large area of grass and foliage.

A recent aerial photograph and site plan are presented in **Annex B** and **Annex C** respectively.

7. Scope of the Proposed Works

7.1. General

The exact nature of the proposed works is not known at this stage, although it is understood the project will involve the construction of the Trinity Academy, comprising a large school building and associated sport and playing areas.

8. Ground Conditions

8.1. General Geology

The British Geological Survey (BGS) map shows the bedrock geology of the site to be underlain by Pennine Middle Coal Measures Formation - Mudstone, Siltstone and Sandstone. Sedimentary Bedrock formed approximately 310 to 318 million years ago in the Carboniferous Period.

8.2. Site Specific Geology

Site-specific geotechnical data was not available during the production of this report.

9. Site History

9.1. Introduction

The purpose of this section is to identify the composition of the site pre and post-WWII. It is important to establish the historical use of the site, as this may indicate the site's relation to potential sources of UXO as well as help with determining factors such as the land use, groundcover, likely frequency of access and signs of bomb damage.

9.2. Ordnance Survey Historical Maps

Relevant historical maps were obtained for this report and are presented in **Annex D**. See below for a summary of the site history shown on acquired mapping.

Pre-WWII		
Date	Scale	Description
1931	1:2500	Pre-WWII OS mapping indicates that the site was occupied by undeveloped open ground located in a suburban-rural district. Four large fields are either mostly or partially included within the site boundary, separated by a fence. The site is bordered to the north by <i>Allotment Gardens</i> , to the east and south by <i>Allotment Gardens</i> adjacent to residential gardens and property, and to the west by a continuation of undeveloped open land. Approximately 35m north-east of the site boundary is <i>Shaw Lawn Cricket Ground</i> .

Post-WWII		
Date	Scale	Description
1960	1:1250	Post-WWII OS mapping indicates no major structural developments occurred within the site boundary, which remains occupied by undeveloped open ground. However, the site is only occupied by three separate fields as opposed to the previous four. Structural developments have occurred in the vicinity of the site - most prominently a large road, Broadway road, was constructed immediately south-west of the site. Large sections of terraced residential housing have also been constructed to the south-east of the site.

10. Introduction to German Aerial Delivered Ordnance

10.1. General

During WWI and WWII, the UK was subjected to bombing which often resulted in extensive damage to city centres, docks, rail infrastructure and industrial areas. The poor accuracy of WWII targeting technology and the nature of bombing techniques often resulted in neighbouring areas to targets sustaining collateral damage.

In addition to raids which concentrated on specific targets, indiscriminate bombing of large areas also took place. This occurred most prominently in the London 'Blitz', though affected many other towns and cities. As discussed in the following sections, a proportion of the bombs dropped on the UK did not detonate as designed. Although extensive efforts were made to locate and deal with these UXBs at the time, many still remain buried and can present a potential risk to construction projects.

The main focus of research for this section of the report will concern German aerial delivered ordnance dropped during WWII, although WWI bombing will also be considered.

10.2. Generic Types of WWII German Aerial Delivered Ordnance

To provide an informed assessment of the hazards posed by any items of unexploded ordnance that may remain in situ on site, the table below provides information on the types of German aerial delivered ordnance most commonly used by the Luftwaffe during WWII. Images and brief summaries of the characteristics of these items of ordnance are listed in **Annex E**.

Generic Types of WWII German Aerial Delivered Ordnance		
Type	Frequency	Likelihood of detection
High Explosive (HE) bombs	In terms of weight of ordnance dropped, HE bombs were the most frequently deployed by the Luftwaffe during WWII.	Although efforts were made to identify the presence of unexploded ordnance following an air raid, often the damage and destruction caused by detonated bombs made observation of UXB entry holes impossible. The entry hole of an unexploded bomb can be as little as 20cm in diameter and was easily overlooked in certain ground conditions (see Annex F). Furthermore, ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded smaller bomb. UXBs therefore present the greatest risk to present-day intrusive works.
1kg Incendiary bombs (IB)	In terms of the number of weapons dropped, small IBs were the most numerous. Millions of these were dropped throughout WWII.	IBs had very limited penetration capability and in urban areas would often have been located in post-raid surveys. If they failed to initiate and fell in water, on soft vegetated ground, or bombed rubble, they could easily go unnoticed.
Large Incendiary bombs (IB)	These were not as common as the 1kg IBs, although they were more frequently deployed than PMs and AP bomblets.	If large IBs did penetrate the ground, complete combustion did not always occur and in such cases they could remain a risk to intrusive works.
Aerial or Parachute mines (PM)	These were deployed less frequently than HE and IBs due to size, cost and the difficulty of deployment.	If functioning correctly, PMs would generally have had a slow rate of descent and were very unlikely to have penetrated the ground. Where the parachute failed, mines would have simply shattered on impact if the main charge failed to explode. There have been extreme cases when these items have been found unexploded. However, in these scenarios, the ground was either extremely soft or the munition fell into water.
Anti-personnel (AP) bomblets	These were not commonly used and are generally considered to pose a low risk to most works in the UK.	SD2 bomblets were packed into containers holding between 6 and 108 submunitions. They had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.

10.3. Failure Rate of German Aerial Delivered Ordnance

It has been estimated that 10% of WWII German aerial delivered HE bombs failed to explode as designed. Reasons for why such weapons might have failed to function as designed include:

- Malfunction of the fuze or gain mechanism (manufacturing fault, sabotage by forced labour or faulty installation).
- Many were fitted with a clockwork mechanism that could become immobilised on impact.
- Failure of the bomber aircraft to arm the bombs due to human error or an equipment defect.
- Jettisoning the bomb before it was armed or from a very low altitude. This most likely occurred if the bomber aircraft was under attack or crashing.

From 1940 to 1945, bomb disposal teams reportedly dealt with a total of 50,000 explosive items of 50kg, over 7,000 anti-aircraft projectiles and 300,000 beach mines. Unexploded ordnance is still regularly encountered across the UK, see press articles in **Annex G**.

10.4. UXB Ground Penetration

An important consideration when assessing the risk from a UXB is the likely maximum depth of burial. There are several factors which determine the depth that an unexploded bomb will penetrate:

- Mass and shape of bomb.
- Height of release.
- Velocity and angle of bomb.
- Nature of the ground cover.
- Underlying geology.

Geology is perhaps the most important variable. If the ground is soft, there is a greater potential of deeper penetration. For example, peat and alluvium are easier to penetrate than gravel and sand, whereas layers of hard strata will significantly retard and may stop the trajectory of a UXB.

10.4.1. The J-Curve Effect

J-curve is the term used to describe the characteristic curve commonly followed by an aerial delivered bomb dropped from height after it penetrates the ground. Typically, as the bomb is slowed by its passage through underlying soils, its trajectory curves towards the surface. Many UXBs are found with their nose cone pointing upwards as a result of this effect. More importantly, however, is the resulting horizontal offset from the point of entry. This is typically a distance of about one third of the bomb's penetration depth, but can be higher in certain conditions (see **Annex F**).

10.4.2. WWII UXB Ground Penetration Studies

During WWII the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1,328 bombs as reported by bomb disposal (BD) teams. Conclusions were drawn predicting the likely average and maximum depths of penetration of different sized bombs in different geological strata.

For example, the largest common German bomb (500kg) had a likely concluded penetration depth of 6m in sand or gravel but 11m in clay. The maximum observed depth for a 500kg bomb was 11.4m and for a 1,000kg bomb 12.8m. Theoretical calculations suggested that significantly greater penetration depths were probable.

10.4.3. Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the site of proposed works the following parameters have been used:

- WWII geology – Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone.
- Impact angle and velocity – 10-15° from vertical and 270 metres per second.
- Bomb mass and configuration – The 500kg SC HE bomb, without retarder units or armour piercing nose (this was the largest of the common bombs used against Britain).

It has not been possible to determine maximum bomb penetration capabilities at this stage due to the lack of site-specific geotechnical information currently available. An assessment can be made once further information becomes available or by an UXO Specialist on-site.

10.5. V-Weapons

Hitler's 'V-weapon' campaign began from mid-1944. It used newly developed unmanned cruise missiles and rockets. The V-1, known as the *flying bomb* or *pilotless aircraft*, and the V-2, a long range rocket, were launched from bases in Germany and occupied Europe. A total of 9,251 V-1s and 1,115 V-2s were recorded in the United Kingdom.

Although these weapons caused considerable damage, their range was limited by their position of deployment across Europe and as a result the vast majority of V-weapon strikes were directed against targets in the south-east of England, predominantly in the London Boroughs and Home Counties. This limitation of capability meant targets in Yorkshire were generally too far to be considered for V-weapon strikes by the Luftwaffe.

The risk from V-weapons is therefore considered negligible and will not be further addressed in this report.

11. The Likelihood of Contamination from German Aerial Delivered UXBs

11.1. World War I

During WWI Britain was targeted and bombed by Zeppelin Airships, as well as Gotha and Giant fixed-wing aircraft. A WWI map of air raids and naval bombardments across England is presented in **Annex H**. This source does not record any WWI bombing incidents to have affected Barnsley.

WWI bombs were generally smaller and dropped from a lower altitude than those used in WWII. This resulted in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress. For these reasons there is a limited risk that UXBs passed undiscovered in the urban environment. When combined with the relative infrequency of attacks and an overall low bombing density, the risk from WWI UXBs is considered low and will not be further addressed in this report.

11.2. World War II Bombing of Barnsley

The Luftwaffe's main objective for the attacks on Britain was to inhibit the country's economic and military capability. To achieve this they targeted airfields, depots, docks, warehouses, wharves, railway lines, factories, and power stations. As the war progressed the Luftwaffe bombing campaign expanded to include the indiscriminate bombing of civilian areas in an attempt to subvert public morale.

During WWII the site was located within the County Borough of Barnsley, which sustained an overall negligible density of bombing—no bomb incidents were recorded within the Borough in Home Office Bombing Statistics—as represented by bomb density data figures, see **Annex I**. The small town of Barnsley was likely not a significant priority for the Luftwaffe, mainly due to the lack of industrial and military targets within the city, but also due to the presence of more high-profile, heavily industrialised cities in Yorkshire, such as Sheffield and Leeds.

Records of bombing incidents in the civilian areas of the County Borough of Barnsley were typically collected by Air Raid Precautions wardens and collated by Civil Defence personnel. Some other organisations, such as port and railway authorities, maintained separate records. Records would be in the form of typed or hand written incident notes, maps and statistics. Bombing data was carefully analysed, not only due to the requirement to identify those parts of the country most needing assistance, but also in an attempt to find patterns in the Germans' bombing strategy in order to predict where future raids might take place.

Records of bombing incidents are presented in the following sections.

11.3. WWII Home Office Bombing Statistics

The following table summarises the quantity of German aerial delivered bombs (excluding 1kg incendiaries and anti-personnel bombs) dropped on the County Borough of Barnsley between 1940 and 1945.

Record of German Ordnance Dropped on the County Borough of Barnsley		
Area Acreage		7,817
Weapons	High Explosive bombs (all types)	0
	Parachute mines	0
	Oil bombs	0
	Phosphorus bombs	0
	Fire pots	0
	Pilotless aircraft (V-1)	0
	Long range rocket bombs (V-2)	0
Total		0
Number of Items per 1,000 acres		0

Source: Home Office Statistics

This table does not include UXO found during or after WWII.

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. Although the risk relating to IBs is lesser than that relating to larger HE bombs, they were similarly designed to inflict damage and injury. Anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous. Although Home Office statistics did not record these types of ordnance, both should not be overlooked when assessing the general risk to personnel and equipment.

11.4. North-Eastern Regional Bomb Census Reports

Bomb census reports compiled by the Research and Experiments Branch of the Ministry of Home Security during WWII were consulted at The National Archives. These reports recorded information such as the date, time, type and damage caused by bomb incidents for a selected time period in the region and are therefore not often comprehensive. No bombing incidents within the site boundary or its wider vicinity could be found recorded within these reports

11.5. West Yorkshire Bomb Incident Geo-Data Set 14th/15th March 1941

This in-house google earth layer is based upon the records created by the West Riding County Council and the Leeds City Fire Brigade, held by West Yorkshire Archive Service. The 14th/15th March 1941 saw the worst bombing raid over the whole of the West Riding of Yorkshire; with Leeds, Castleford and the Huddersfield area being targeted in particular. This data set logs these incidents as accurately as possible based on the available information. See **Annex J**

West Yorkshire Bomb Incident Geo-Data Set – Annex J	
Date Range	Comments
14 th /15 th March 1941	No incidents within the site boundary or the wider vicinity. The closest incident was a HE bomb strike recorded approximately 1.42 km south-west of the site. This incident occurred on the 3 rd March 1941, in the town of Dodworth.

11.6. West Riding of Yorkshire Local Written Records

Written records were obtained from Wakefield Archives. These reports recorded information such as the date, time, type and damage caused by bomb incidents for a selected time period in the region and are therefore not often comprehensive. No bombing incidents within the site boundary or its wider vicinity could be found recorded within these reports

11.7. WWII-Era Aerial Photography

During every detailed UXO risk assessment efforts will be made by 1st Line Defence to obtain WWII-era imagery for the site area. However, it has not been possible to obtain high-resolution scans of WWII-era aerial photography for this site on this occasion. This is because our primary source for historical aerial photography, the National Monuments Record (Historic England), is currently closed due to restrictions related to the Coronavirus pandemic.

Due to the site's open nature during wartime and the lack of bombing recorded in the region, the absence of historic aerial imagery is however not anticipated to have a significant impact on this assessment.

11.8. Abandoned Bombs

A post air-raid survey of buildings, facilities, and installations would have included a search for evidence of bomb entry holes. If evidence of an entry hole was encountered, Bomb Disposal Officer Teams would normally have been requested to attempt to locate, render safe, and dispose of the bomb. Occasionally, evidence of UXBs was discovered but due to a relatively benign position, access problems, or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an 'abandoned bomb'.

Given the inaccuracy of WWII records, and the fact that these bombs were 'abandoned', their locations cannot be considered definitive or the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded.

1st Line Defence holds no records of officially registered abandoned bombs at or near the site of the proposed works.

11.9. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (EOD) (now 29 Regt) is currently facing considerable delay. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. A database of known disposal/clearance tasks has been referred to which does not make reference to such instances occurring within the site of proposed works. If any relevant information is received at a later date Waterman Infrastructure & Environment Ltd will be advised.

11.10. Evaluation of German Aerial Delivered UXO Records

Factors	Conclusion
Density of Bombing <i>It is important to consider the bombing density when assessing the possibility that UXBs remain in an area. High bombing density could allow for error in record keeping due to extreme damage caused to the area.</i>	During WWII the site was located within the County Borough of Barnsley. According to Official Home Office statistics, not a single bomb incident was recorded within this bough for the entirety of the war (See Annex I). Although this does not necessarily guarantee no bombs were dropped over Barnsley, the fact that none were recorded gives a strong indication of the unlikelihood that any bomb incidents occurred within the site area. Corroborating these statistics are written records for the North-East Civil Defence Region, and West-Riding of Yorkshire, within which no reference to bombing incidents in the Barnsley region could be found. Moreover, a geo data-set plotting bomb incidents in the West Riding of Yorkshire on the night of 13th/14th March 1941—the date of the largest Luftwaffe air raid within the region—does not record any bomb incidents remotely in the vicinity of the site. The closest incident was a HE bomb strike recorded approximately 1.4km south-west of the site.
Damage <i>If buildings or structures on a site sustained bomb or fire damage, any resulting rubble and debris could have obscured the entry holes of unexploded bombs dropped during the same or later raids. Similarly, a high explosive bomb strike in an area of open agricultural land will have caused soil disturbance, increasing the risk that a UXB entry hole would be overlooked.</i>	As previously noted (see Section 11.7), high-resolution scans of WWII-era aerial photography of the site, which would generally be utilised to check for visual evidence of wartime bomb damage, such as craters or disturbed ground, was made unavailable due to the Coronavirus epidemic. No absolute determinations of the wartime conditions present on site can therefore be made. However, based on the negligible recorded bombing within the region, an assumption can be made on the low likelihood of sustained on-site bomb damage. Supporting this assumption is, again, local written record sets, within which no record of bomb damage within the site area could be found.
Ground Cover <i>The nature of the ground cover present during WWII would have a substantial influence on any visual indication that may indicate UXO being present.</i>	As the site consisted largely of undeveloped open ground for the duration of the war, the ground cover is not considered to have been favourable to the detection of UXO. UXO entry holes, which could be as small as 20cm in diameter for a 50kg HE bomb, may have been obscured by the vegetation present within the site and its surrounds. However, this risk is considered to be significantly reduced in this instance by the limited number of air raids recorded in the region and the negligible recorded bomb density sustained by the district
Access Frequency <i>UXO in locations where access was irregular would have a greater chance of passing unnoticed than at those that were regularly occupied. The importance of a site to the war effort is also an important consideration as such sites are likely to have been both frequently visited and subject to post-raid checks for evidence of UXO.</i>	The site is not anticipated to have experienced regular access throughout the war as it primarily comprised of open undeveloped ground. Although, it is anticipated that the site may have been subject to some degree of observation given that the site was bound by a roadway.
Bomb Failure Rate	There is no evidence to suggest that the bomb failure rate in the locality of the site would have been dissimilar to the 10% normally used.
Abandoned Bombs	1st Line Defence holds no records of abandoned bombs at or within the site vicinity.

Bombing Decoy sites	1 st Line Defence could find no evidence of bombing decoy sites within the site vicinity.
Bomb Disposal Tasks	1 st Line Defence could find no evidence of bomb disposal tasks within the site boundary and immediate area.

12. Introduction to Allied Explosive Ordnance

12.1. General

Many areas across the UK may be at risk from Allied UXO because of both wartime and peacetime military use. Typical military activities and uses that may have led to a legacy of military UXO at a site include former minefields, home guard positions, anti-aircraft emplacements, training and firing ranges, military camps, as well as weapons manufacture and storage areas.

Although land formerly used by the military was usually subject to clearance before returned to civilian use, items of UXO are sometimes discovered and can present a potential risk to construction projects.

It should be highlighted that there is no evidence that the site formerly had any military occupation or usage that could have led to contamination with such items of Allied ordnance. Despite this, urban areas, such as the location of the site, can be at risk from buried unexploded anti-aircraft projectiles fired during WWII – as addressed below.

12.2. Defending the UK From Aerial Attack

During WWII the War Office employed a number of defence tactics against the Luftwaffe from bombing major towns, cities, manufacturing areas, ports and airfields. These can be divided into passive and active defences (examples are provided in the table below).

Active Defences	Passive Defences
• Anti-aircraft gun emplacements to engage enemy aircraft. • Fighter aircraft to act as interceptors. • Rockets and missiles were used later during WWII.	• Blackouts and camouflaging to hinder the identification of Luftwaffe targets. • Decoy sites were located away from targets and used dummy buildings and lighting to replicate urban, military, or industrial areas. • Barrage balloons forced enemy aircraft to greater altitudes. • Searchlights were often used to track and divert adversary bomber crews during night raids.

Active defences such as anti-aircraft artillery present a greater risk of UXO contamination than passive defences. Unexploded ordnance resulting from dogfights and fighter interceptors is rarely encountered and difficult to accurately qualify.

12.2.1. Anti-Aircraft Artillery (AAA)

During WWII three main types of gun sites existed: heavy anti-aircraft (HAA), light anti-aircraft (LAA) and 'Z' batteries (ZAA). If the projectiles and rockets fired from these guns failed to explode or strike an aircraft they would descend back to land. The table below provides further information on the operation and ordnance associated with these type of weapons.

Anti-Aircraft Artillery				
Item	Description			
HAA	These large calibre guns such as the 3.7" QF (Quick Firing) were used to engage high flying enemy bombers. They often fired large HE projectiles, which were usually initiated by integral fuzes, triggered by impact, area, time delay or a combination of aforementioned mechanisms.			
LAA	These mobile guns were intended to engage fast, low flying aircraft. They were typically rotated between locations on the perimeters of towns and strategically important industrial works. As they could be moved to new positions with relative ease when required, records of their locations are limited. The most numerous of these were the 40mm Bofors gun which could fire up to 120 x 40mm HE projectiles per minute to over 1,800m.			
Variations in HAA and LSA Ammunition	Gun type	Calibre	Shell Weight	Shell Dimensions
	3.0 Inch	76mm	7.3kg	76mm x 356mm
	3.7 Inch	94mm	12.7kg	94mm x 438mm
	4.5 Inch	114mm	24.7kg	114mm x 578mm
	40mm	40mm	0.9kg	40mm x 311mm
Z-AA	The three inch unrotated rocket/projectile known as the UP-3 had initially been developed for the Royal Navy. The UP-3 was also used in ground-based single and 128-round launchers known as "Z" batteries. The rocket, containing a high explosive warhead was often propelled by cordite.			

The closest recorded HAA to the site was located approximately 10km south of the site, however the range of a projectile can be up to 15km. The site would also have been in range of mobile light anti-aircraft guns.

The conditions in which anti-aircraft projectiles may have fallen unnoticed within a site area are analogous to those regarding aerial delivered ordnance. Unexploded anti-aircraft projectiles could essentially have fallen indiscriminately anywhere within range of the guns. The chance of such items being observed, reported and removed during the war depends on factors such as land use, ground cover, damage and frequency of access – the same factors that govern whether evidence of a UXB is likely to have been noted. More information about these factors with regards to this particular site can be found in the German Aerial Delivered Ordnance section of this report.

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at **Annex K**.

13. The Likelihood of Contamination from Allied Ordnance

13.1. Introduction

There are several factors that may serve to either affirm, increase, or decrease the level of risk within a site with a history of military usage. Such factors are typically dependent upon the proximity of the proposed area of works to training activities, munition productions and storage, as well as its function across the years.

This section will examine the history of the proposed site and assess to what degree, if any, the site could have become contaminated as a result of the military use of the surrounding area.

13.2. Evaluation of Contamination Risk from Allied UXO

1st Line Defence has considered the following potential sources of Allied ordnance contamination:

Sources of Allied UXO Contamination	Conclusion
Military Camps <i>Military camps present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training.</i>	1 st Line Defence could find no evidence of a military camp within the site.
Anti-Aircraft Defences <i>Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.</i>	1 st Line Defence could find no evidence of Anti-Aircraft defences such as a HAA or LAA gun emplacement occupying or bordering the site. The closest HAA was located approximately 10km north-east of the site, however the range of a projectile can be up to 15km. The conditions in which HAA or LAA projectiles may have fallen unnoticed within a site footprint are analogous to those regarding German aerial delivered ordnance.
Home Guard Activity <i>The Home Guard regularly undertook training and ordnance practice in open areas, as well as burying ordnance as part of anti-invasion defences.</i>	1 st Line Defence has no evidence of any Home Guard activities on the site.
Defensive Positions <i>Defensive positions suggest the presence of military activity, which is often indicative of ordnance storage, usage or disposal.</i>	There is no evidence of any defensive features formerly located on or bordering the site footprint.
Training or firing ranges <i>Areas of ordnance training saw historical ordnance usage in large numbers, often with inadequate disposal of expended and live items. The presence of these ranges significantly impact on the risk of encountering items of ordnance in their vicinity.</i>	There is no evidence of such features affecting the site.

Defensive Minefields <i>Minefields were placed in strategic areas to defend the country in the event of a German invasion. Minefields were not always cleared with an appropriate level of vigilance.</i>	There is no evidence of defensive minefields affecting the site.
Ordnance Manufacture <i>Ordnance manufacture indicates an increased chance that items of ordnance were stored, or disposed of, within a location.</i>	No information of ordnance being stored, produced, or disposed of within the proposed site could be found.
Military Related Airfields <i>Military airfields present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training or bombing practice.</i>	The site was not situated within the perimeters or vicinity of a military airfield.

14. The Likelihood of UXO Contamination Summary

The following table assesses the likelihood that the site was contaminated by items of German aerial delivered and Allied ordnance. Factors such as the risk of UXO initiation, remaining, and encountering will be discussed later in the report.

UXO Contamination Summary	
Quality of the Historical Record	The research has evaluated pre- and post-WWII Ordnance Survey maps, Home Office Bombing Statistics, written records for the North-East Civil Defence Region and West-Riding of Yorkshire, and an in-house geo bomb plot data-set for West Yorkshire. The Covid-19 pandemic has resulted in the closure of the majority of archives and record offices in England. As such, the usual sources for records including photography and more localised records, have been inaccessible. Nevertheless, the evidence acquired is considered to be satisfactory in providing a risk level in the case of this site.
German Aerial Delivered Ordnance	- During WWII the site was located within the County Borough of Barnsley. According to Official Home Office statistics, not a single bomb incident was recorded within this borough for the entirety of the war (see Annex I). - Although this does not necessarily guarantee no bombs were dropped over Barnsley, the fact that none were recorded gives a strong indication of the unlikelihood any bomb incidents occurred within the site area. - Corroborating these statistics are the available written records for the North-East Civil Defence Region, and West-Riding of Yorkshire, within which no reference to bombing incidents in the Barnsley region could be found. - In addition, a geo data-set plotting bomb incidents in the West Riding of Yorkshire on the night of 13th/14th March 1941—the date of the largest Luftwaffe air raid within the region—does not record any bomb incidents in the vicinity of the site. The closest incident was a single HE bomb strike recorded approximately 1.42 km south-west of the site. - As previously noted (see Section 11.7), high-resolution scans of WWII-era aerial photography of the site, would generally be utilised by 1st Line Defence to check for visual evidence of wartime bomb damage, such as craters or disturbed ground. This resource was made unavailable due to the Coronavirus epidemic. No

	absolute determination of the wartime conditions present on site can therefore be made. • However, based on the negligible recorded bombing within the region, a confident assumption can be made on the low likelihood of sustained on-site bomb damage. Supporting this assumption is, again, local written record sets, within which no record of bomb damage within the site area could be found. In addition, no changes to structures surrounding the site, which could be indicative of bomb damage, were evident when comparing pre- and post-WWII OS mapping. • As the site consisted largely of undeveloped open ground for the duration of the war, the ground cover is not considered to have been particularly favourable to the detection of UXO. However, this risk is considered to be significantly reduced in this instance by the lack of air raids recorded in the region and the negligible recorded bomb density sustained by the district. The risk from UXO on site is therefore considered to be low and is not considered to be elevated above the minimal residual level of risk for the district.
Allied Ordnance	• There is no evidence that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA. The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are analogous to those regarding aerial delivered ordnance.

15. The Likelihood that UXO Remains

15.1. Introduction

It is important to consider the extent to which any explosive ordnance clearance (EOC) activities or extensive ground works have occurred on site. This may indicate previous ordnance contamination or reduce the risk that ordnance remains undiscovered.

15.2. UXO Clearance

1st Line Defence has found no evidence in the public domain or within internal records that any official ordnance clearance operations have taken place on site. Note however that we have not received confirmation of this fact from the 33 EOD Regiment Archive (now part of 29 Regt). It should also be noted that in addition to 29 Regt archival information, 1st Line Defence also do not currently have access to data that may be relevant including 5131(BD)SQN Archive, SD Training Technical Advisory Section (TAS) and MACA Records (bomb disposal callouts).

If such information is available at a later date, it is recommended that it be reviewed as it will assist with understanding both levels and types of contamination likely to be present, and may indicate risk reduction in certain areas.

15.3. Post-War Redevelopment

Sections of the site have been significantly redeveloped post-war. Current satellite imagery indicates that whilst the southern section of the site has remained undeveloped land, several large multi-story hospital structures have been built within the northern section of the site. Tarmac road and car park space has also been built within the central part of the site.

The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. Within the footprints of post-WWII redevelopments, the risk

from shallow-buried UXO (especially 1kg German incendiaries and British AA projectiles) should have been encountered/removed during initial excavations. However, the risk from deep-buried German UXBs will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

16. The Likelihood of UXO Encounter

16.1. Introduction

For UXO to pose a risk at a site, there should be a means by which any potential UXO might be encountered on that site.

The likelihood of encountering UXO on the site of proposed would depend on various factors, such as the type of UXO that might be present and the intrusive works planned on site. In most cases, UXO is more likely to be present below surface (buried) than on surface.

In general, the greater the extent and depth of intrusive works, the greater the risk of encountering. The most likely scenarios under which items of UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Generally speaking, the risk of encountering any type of UXO will be minimal for any works planned within the footprint and down to the depth of post-war foundations and excavations.

16.2. Encountering Aerial Delivered Ordnance

Since an aerial delivered bomb may come to rest at any depth between just below ground level and its maximum penetration depth, there is a chance that such an item (if present) could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level as well as at depth.

17. The Likelihood of UXO Initiation

17.1. Introduction

UXO does not spontaneously explode. Older UXO devices will require an external event/energy to create the conditions for detonation to occur. The likelihood that a device will function can depend on a number of factors including the type of weaponry, its age and the amount of energy it is struck with.

17.2. Initiating Aerial Delivered Ordnance

Unexploded bombs do not spontaneously explode. All high explosive filling requires significant energy to create the conditions for detonation to occur.

In recent decades, there have been a number of incidents in Europe where Allied UXBs have detonated, and incidents where fatalities have resulted.. There have been several hypotheses as to the reason why the issue is more prevalent in mainland Europe – reasons could include the significantly greater number of bombs dropped by the Allied forces on occupied Europe, the preferred use by the Allies of mechanical rather than electrical fuzes, and perhaps just good fortune. The risk from UXO in the UK is also being treated very seriously in many sectors of the construction industry, and proactive risk mitigation efforts will also have affected the lack of detonations in the UK.

There are certain construction activities which make initiation more likely, and several potential initiation mechanisms must be considered:

UXB Initiation	
Direct Impact	Unless the fuze or fuze pocket is struck, there needs to be a significant impact e.g. from piling or large and violent mechanical excavation, onto the main body of the weapon to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.
Re-starting the Clock	A small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion would have taken place within the fuze mechanism over the last 70+ years that would prevent clockwork mechanisms from functioning. Nevertheless, it was reported that the clockwork fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-start.
Friction Impact	The most likely scenario resulting in the detonation of a UXB is friction impact initiating the shock-sensitive fuze explosive. The combined effects of seasonal changes in temperature and general degradation over time can cause explosive compounds to crystallise and extrude out from the main body of the bomb. It may only require a limited amount of energy to initiate the extruded explosive which could detonate the main charge.

18. Consequences of Initiation/Encounter

18.1. Introduction

The repercussions of the inadvertent detonation of UXO during intrusive ground works, or if an item or ordnance is interfered with or disturbed, are potentially profound, both in terms of human and financial cost. A serious risk to life and limb, damage to plant and total site shutdown during follow-up investigations are potential outcomes. However, if appropriate risk mitigation measures are put in place, the chances of initiating an item of UXO during ground works is comparatively low.

The consequences of encountering UXO can be particularly notable in the case of high-profile sites (such as airports and train stations) where it is necessary to evacuate the public from the surrounding area. A site may be closed for anything from a few hours to a week with potentially significant cost in lost time. It should be noted that even the discovery of suspected or possible item of UXO during intrusive works (if handled solely through the authorities), may also involve significant loss of production

18.2. Consequences of Detonation

When considering the potential consequences of a detonation, it is necessary to identify the significant receptors that may be affected. The receptors that may potentially be at risk from a UXO detonation on a construction site will vary depending on the site specific conditions but can be summarised as follows:

- People – site workers, local residents and general public.
- Plant and equipment – construction plant on site.
- Services – subsurface gas, electricity, telecommunications.
- Structures – not only visible damage to above ground buildings, but potentially damage to foundations and the weakening of support structures.
- Environment – introduction of potentially contaminating materials.

19. 1st Line Defence Risk Assessment

19.1. Risk Assessment Stages

Taking into account the quality of the historical evidence, the assessment of the overall risk from unexploded ordnance is based on the following five considerations:

1. That the site was contaminated with unexploded ordnance.
2. That unexploded ordnance remains on site.
3. That such items will be encountered during the proposed works.
4. That ordnance may be initiated by the works operations.
5. The consequences of encountering or initiating ordnance.

19.2. Assessed Risk Level

1st Line Defence has assessed that there is an overall **Low Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is an assessed **Negligible Risk** from Allied ordnance.

Ordnance Type	Risk Level			
	Negligible	Low	Medium	High
German Unexploded HE Bombs		✓		
German 1kg Incendiary Bombs		✓		
Allied Anti-Aircraft Artillery Projectiles		✓		
Allied Land Service and Small Arms Ammunition	✓			

Please note – although the risk from unexploded ordnance on this site has been assessed as ‘Low’, this does not mean there is ‘no’ risk of encountering UXO. This report has been undertaken with due diligence, and all reasonable care has been taken to access and analyse relevant historical information. By necessity, when dealing historical evidence, and when making assessments of UXO risk, various assumptions have to be made which we have discussed and justified throughout this report. Our reports take a common-sense and practical approach to the assessment of risk, and we strive to be reasonable and pragmatic in our conclusions.

It should however be stressed that if any suspect items are encountered during the proposed works, 1st Line Defence should be contacted for advice/assistance, and to re-assess the risk where necessary. The mitigation measures outlined in the next section are recommended as a minimum precaution to alert ground personnel to the history of the site, what to look out for, and what measures to take in the event that a suspect item is encountered. It should also be noted that the conclusions of this report are based on the scope of works outlined in the ‘Proposed Works’ section of this report. Should the scope of works change or additional works be proposed, 1st Line Defence should be contacted to re-evaluate the risk.

20. Proposed Risk Mitigation Methodology

20.1. General

The following risk mitigation measures are recommended to support the proposed works at Keresford Close, Barnsley:

Type of Work	Recommended Mitigation Measure
All Works	• UXO Risk Management Plan It is recommended that a site-specific plan for the management of UXO risk be written for this site. This plan should be kept on site and be referred to in the event that a suspect item of UXO is encountered at any stage of the project. It should detail the steps to be taken in the event of such a discovery, considering elements such as communication, raising the alarm, nominated responsible persons etc. Contact 1st Line Defence for help/more information. • Site Specific UXO Awareness Briefings to all personnel conducting intrusive works. As a minimum precaution, all personnel working on the site should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.

In making this assessment and recommending these risk mitigation measures, if known, the works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, 1st Line Defence should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

1st Line Defence Limited

24/06/2020

This Report has been produced in compliance with the Construction Industry Research and Information Association (CIRIA) C681 guidelines for the writing of Detailed UXO Risk Assessments.

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Ref: **DA11373-00**

Source: Google Maps

 **Approximate site boundary**





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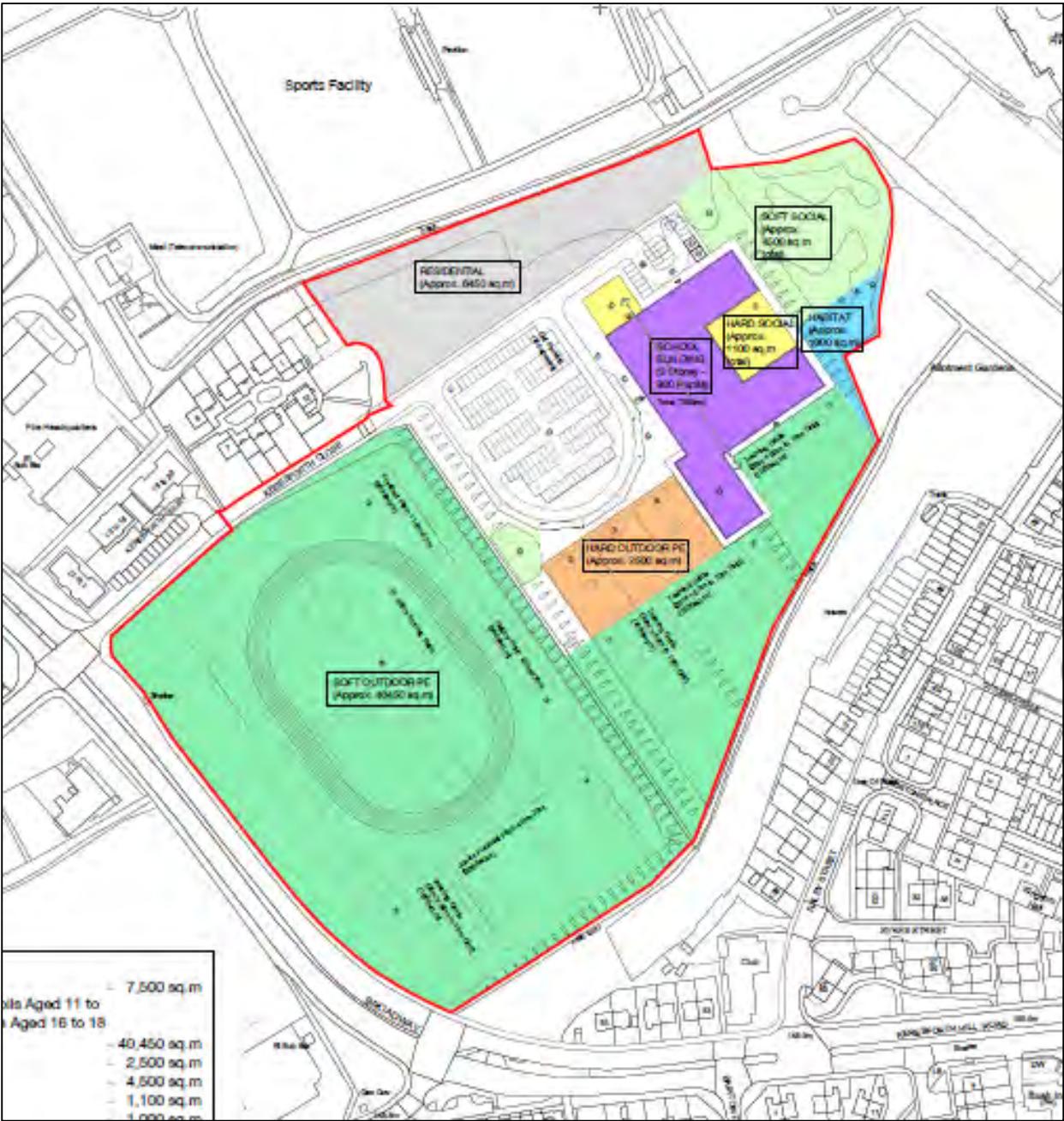
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Ref: **DA11373-00**

Source: Google Earth™ Mapping Services

 **Approximate site boundary**





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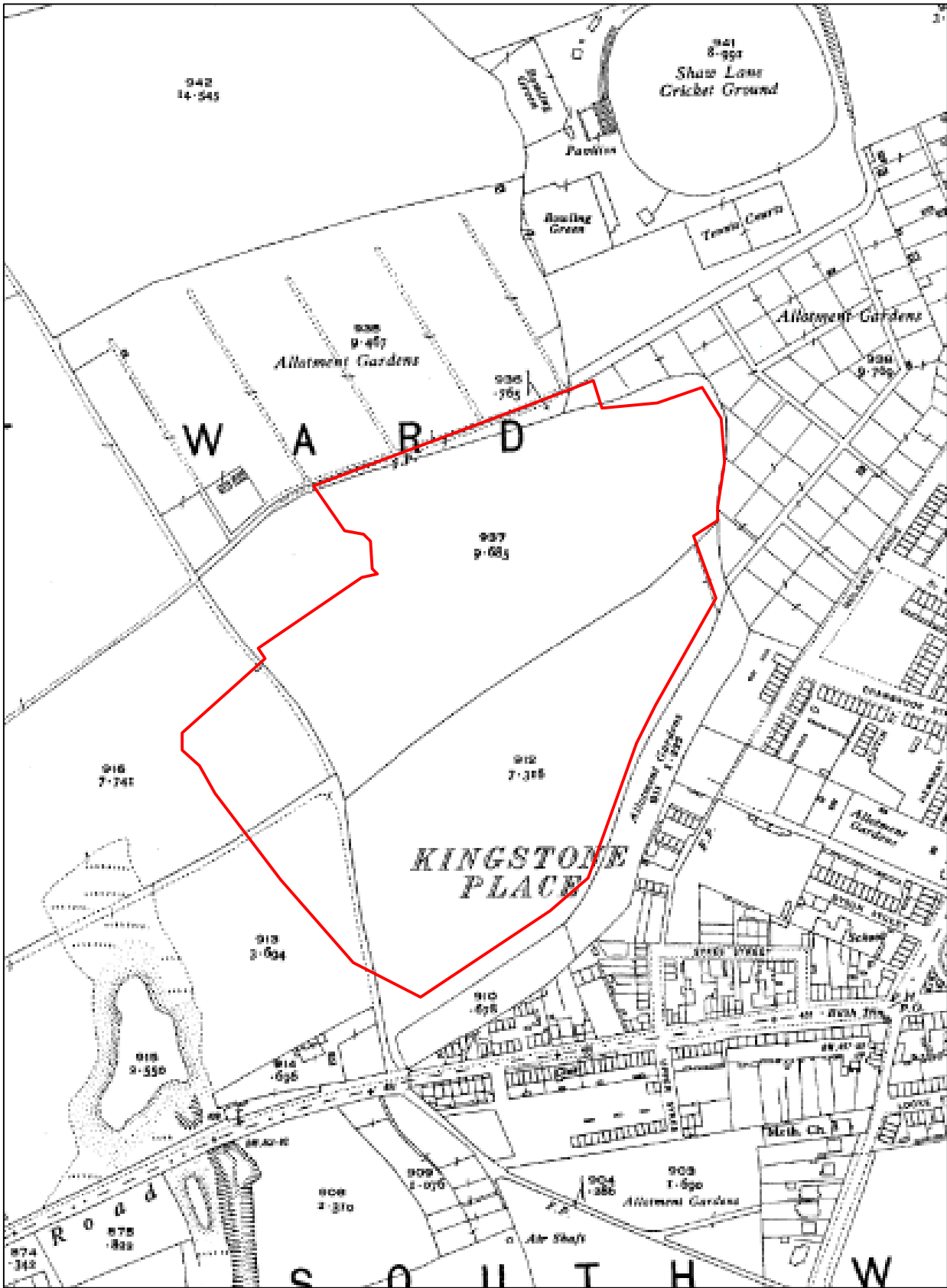
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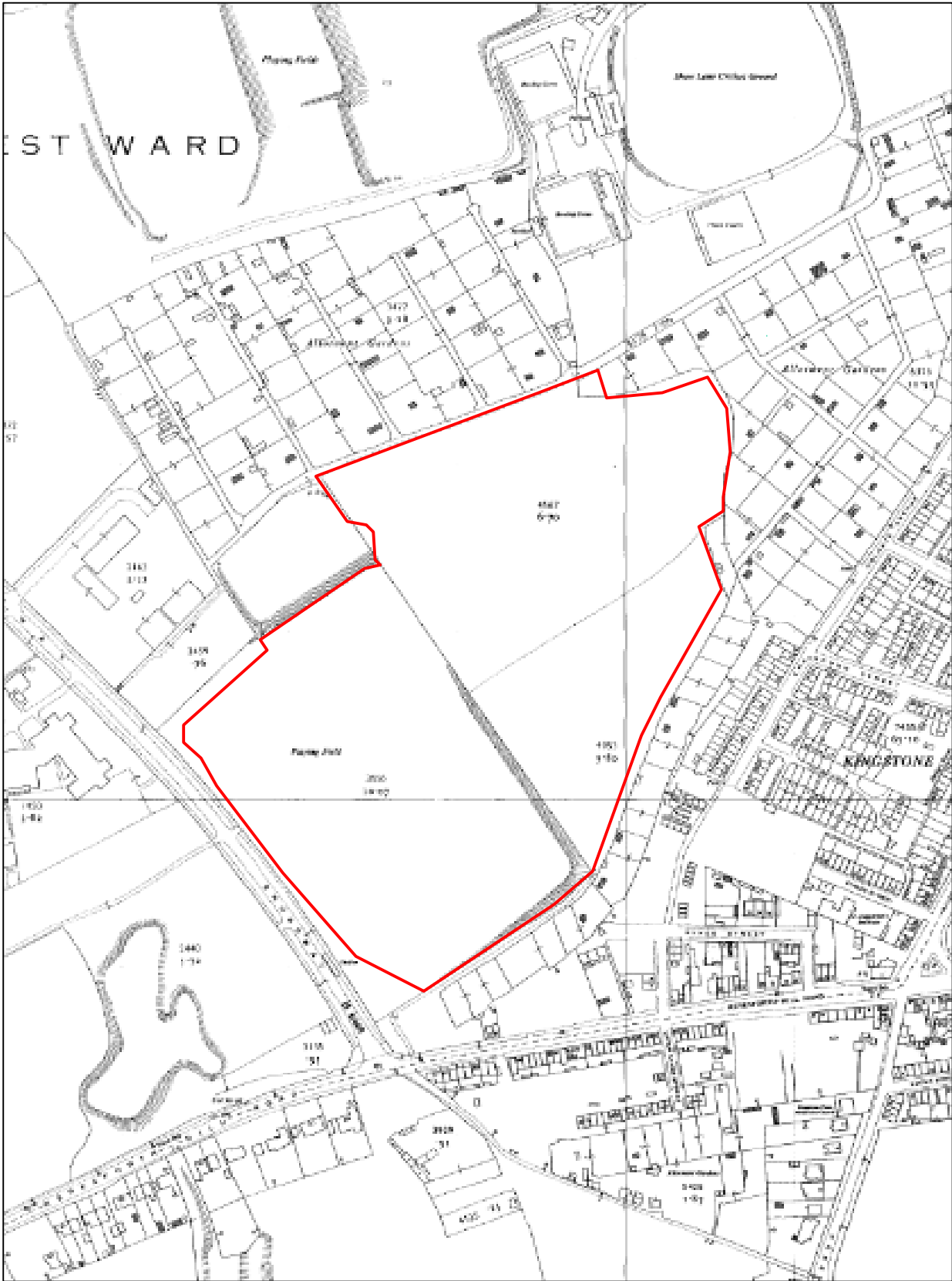
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Ref: **DA11373-00**

Source: Landmark Maps

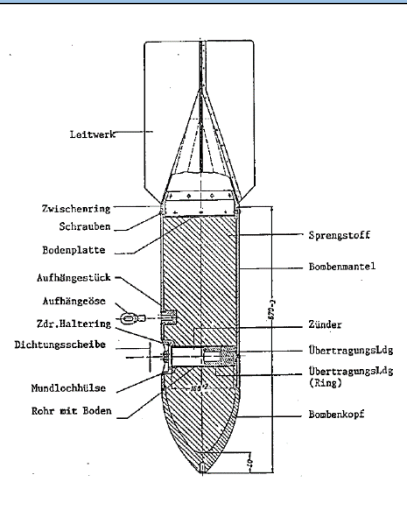
 **Approximate site boundary**



Examples of German Air-Delivered Ordnance

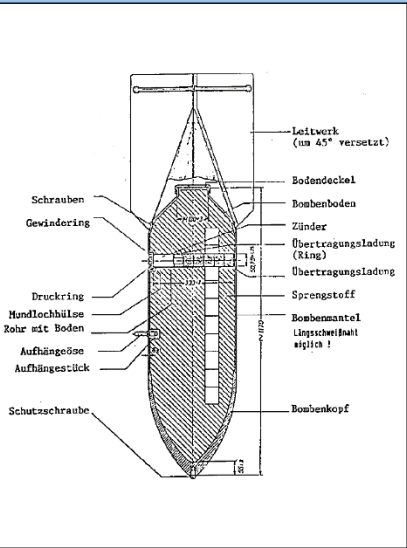
SC 50kg High Explosive Bomb

Bomb Weight	40-54kg (88-119lb)
Explosive Weight	25kg (55lb)
Fuze Type	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions	1,090 x 280mm (42.9 x 11.0in)
Body Diameter	200mm (7.87in)
Use	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.



SC 250kg High Explosive Bomb

Bomb Weight	245-256kg (540-564lb)
Explosive Weight	125-130kg (276-287lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)
Body Diameter	368mm (14.5in)
Use	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.
Remarks	It could be carried by almost all German bomber aircraft, and was used to notable effect by the Junkers Ju-87 Stuka (Sturzkampfflugzeug or dive-bomber).

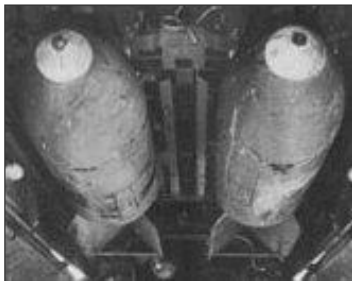
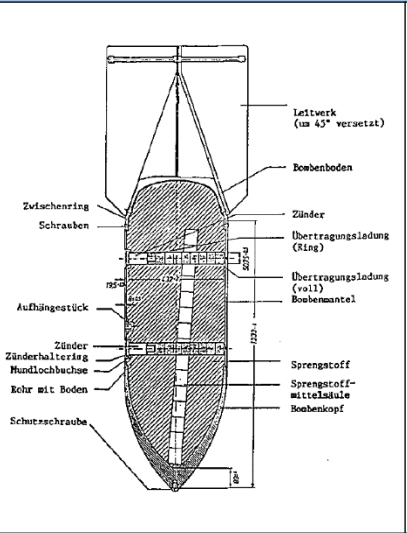


SC250 bomb being loaded onto German bomber



SC 500kg High Explosive Bomb

Bomb Weight	480-520kg (1,058-1,146lb)
Explosive Weight	250-260kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Bomb Dimensions	1957 x 640mm (77 x 25.2in)
Body Diameter	470mm (18.5in)
Use	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.
Remarks	40/60 or 50/50 Amatol TNT, trialene. Bombs recovered with Trialen filling have cylindrical paper wrapped pellets 1-15/16 in. in length and diameter forming



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Project: **Keresford Close, Barnsley**

Ref: **DA11373-00**

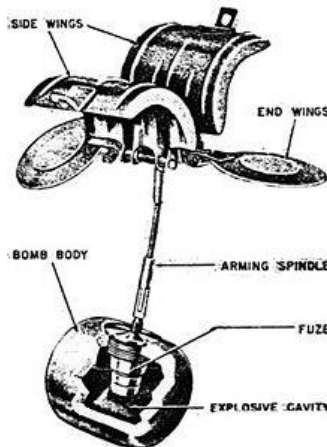
Source: Various sources

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Examples of German Air-Delivered Ordnance

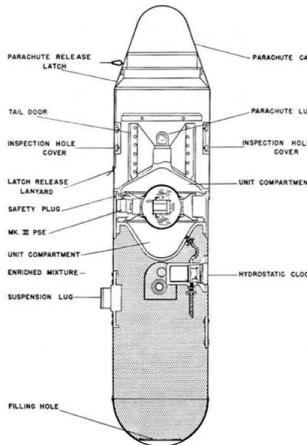
SD2 Anti-Personnel ‘Butterfly Bomb’

Bomb Weight	Approx. 2kg (4.41lb)
Explosive Weight	Approx. 7.5oz (225 grams) of Amatol surrounded by a layer of bituminous composition.
Fuze Type	41 fuze (time) , 67 fuze (clockwork time delay) or 70 fuze (anti-handling device)
Body Diameter	3in (7.62 cm) diameter, 3.1in (7.874) long
Use	Designed as an anti-personnel/ fragmentation weapon. They were delivered by air, being dropped in containers of 23-144 sub-munitions that opened at a predetermined height, thus scattering the bombs.
Remarks	Very rare. First used against Ipswich in 1940, but were also dropped on Kingston upon Hull, Grimsby and Cleethorpes in June 1943, amongst various other targets in UK. As the bombs fell the outer case flicked open by springs which caused four light metal drogues with a protruding 5 inch steel cable to deploy in the form of a parachute & wind vane which armed the device as it span.

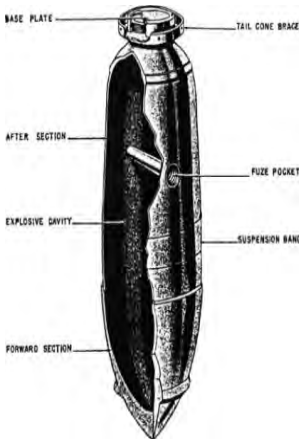




Parachute Mine (Luftmine B / LMB)

Bomb Weight	Approx. 990kg (2176lb)		
Explosive Weight	Approx. 705kg (1,554lb)		
Fuze Type	Impact/ Time delay / hydrostatic pressure fuze		
Dimensions	2.64m x 0.64m (3.04m with parachute housing)		
Use	Against civilian, military and industrial targets. Used as blast bombs and designed to detonate above ground level to maximise damage to a wider area.		
Remarks	Deployed a parachute when dropped in order to control its descent. Had the potential to cause extensive damage in a 100m radius.		

SC 1000kg

Bomb Weight	Approx. 993-1027kg (2,189-2,264lb)		
Explosive Weight	Approx. 530-620kg (1168-1367lb)		
Fuze Type	Electrical impact/mechanical time delay fuze.		
Filling	Mixture of 40% amatol and 60% TNT, but when used as an anti-shipping bomb it was filled with Trialen 105, a mixture of 15% RDX, 70% TNT and 15% aluminium powder.		
Bomb Dimensions	2800 x 654mm (110 x 25.8in)		
Body Diameter	654mm (18.5in)		
Use	SC type bombs are General Purpose Bombs used primarily for general demolition work. Constructed of parallel walls with comparatively heavy noses. They are usually of three piece welded construction		



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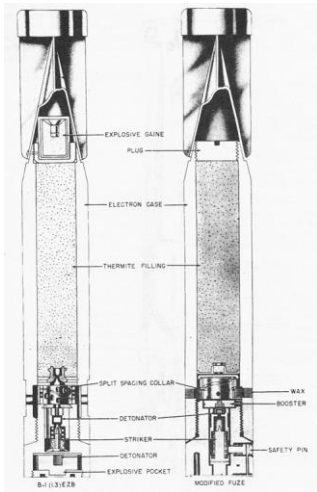
Source: Various sources

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German Incendiary Bombs

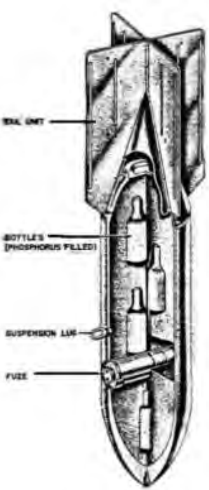
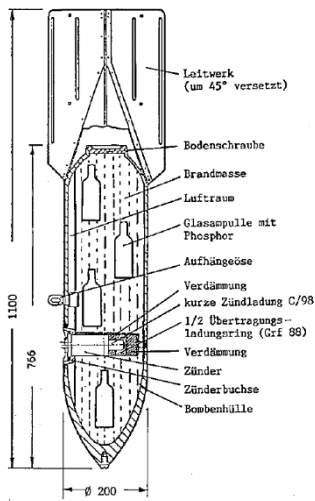
1kg Incendiary Bomb

Bomb Weight	Approx. 1.0 - 1.3kg (2.2 and 2.9lb)
Explosive Weight	Approx. 680g (1.5lb) Thermit 8-15gm Explosive Nitropenta
Fuze Type	Impact fuze
Bomb Dimensions	350 x 50mm (13.8 x 1.97in)
Body Diameter	50mm (1.97in)
Use	As incendiary – dropped in clusters on towns and industrial complexes
Remarks	Magnesium alloy case. Sometimes fitted with high explosive charge. The body is a cylindrical alloy casting threaded internally at the nose to receive the fuze holder and fuze.



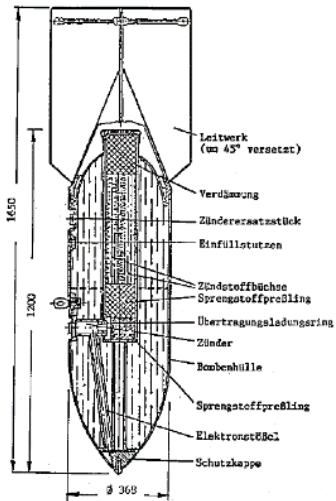
C50 A Incendiary Bomb

Bomb Weight	Approx. 41kg (90.4lb)
Explosive Weight	Approx. 0.03kg (0.066lb)
Incendiary Filling	12kg (25.5lb) liquid filling with phosphor igniters in glass phials. Benzine 85%; Phosphorus 4%; Pure Rubber 10%
Fuze Type	Electrical impact fuze
Bomb Dimensions	1,100 x 280mm (43.2 x 8in)
Use	Against any targets where an incendiary effect is required
Remarks	Early fill was a phosphorous/carbon disulphide incendiary mixture



Flam C-250 Oil Bomb

Bomb Weight	Approx. 125kg (276lb)
Explosive Weight	Approx. 1kg (2.2lb)
Fuze Type	Super-fast electrical impact fuze
Filling	Mixture of 30% petrol and 70% crude oil
Bomb Dimensions	1,650 x 512.2mm (65 x 20.2in)
Body Diameter	368mm (14.5in)
Use	Often used for surprise attacks on ground troops, against troop barracks and industrial installations. Thin casing – not designed for ground penetration



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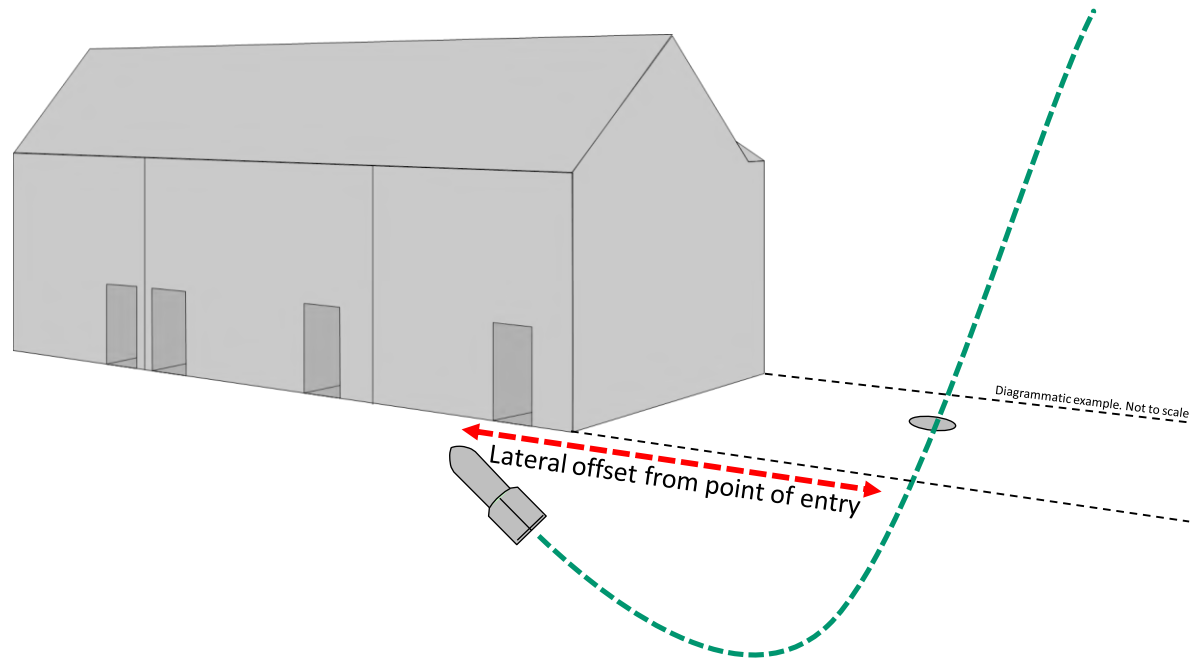
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Client: **Waterman Group**

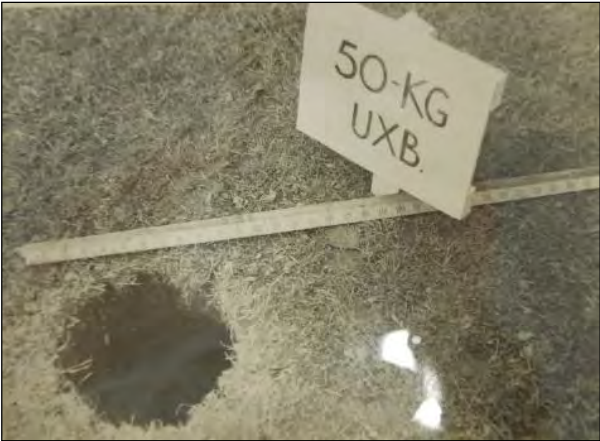
Project: **Keresford Close, Barnsley**

Ref: **DA11373-00**

Source: Various sources



Top: J-curve Effect - Due to angle of entry, unexploded bombs would often end their trajectory at a lateral offset from point of entry, often ending up beneath adjacent extant structures/sites. The photograph above shows 250kg bomb found in Bermondsey pointing upwards, demonstrating 'J-curve'



One of the most common scenarios for UXO going unnoticed was when a UXB fell into a 'bomb site' (such as the area shown **Top Left**), the entry hole of the bomb obscured by any debris and rubble present. Note that the entry hole of a 50kg UXB could be as little as 20cm in diameter (**Left**).



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BBC
NEWS

Bermondsey bomb: World War Two device safely removed



RUPERT FREEMAN

An unexploded World War Two bomb found in south London has been driven away safely under police and Army escort.

The 500lb (250kg) device was found on a building site in Grange Walk, Bermondsey on Monday.

March 2015

BBC
NEWS

Bethnal Green WW2 bomb: Experts remove unexploded device



CROWN COPYRIGHT

An unexploded World War Two bomb that prompted the evacuation of 700 people in east London has been made safe and removed by the military.

Families spent the night in a school hall after the 500lb bomb was found in the basement of a building site on Temple Street, in Bethnal Green, on Monday afternoon.

A 200m (650ft) exclusion zone was set up around the device.

August 2016

BBC
NEWS

Bath WW2 bomb scare: Device defused, police say



EPA

A 500lb World War Two bomb found on the site of a former school in Bath has been defused and made safe.

The discovery of the bomb on Thursday led to the evacuation of hundreds of homes and many road closures in the Lansdown area of the city.

A cordon around the site was lifted on Friday evening, more than 24 hours after residents were asked to leave their homes.

May 2016

BBC
NEWS

London City Airport reopens after WW2 bomb moved



London City Airport has reopened after an unexploded 500kg World War Two bomb was safely moved from the area.

The device was discovered at the King George V Dock on Sunday during planned work at the east London airport.

All flights were cancelled on Monday after an exclusion zone was put in place, with the closure affecting up to 16,000 passengers and nearby residents being evacuated from their homes.

May 2015



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Source: BBC News

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BASF has confirmed that an explosive device, most likely a World War II-era bomb, caused the blast that left one person injured Tuesday at a plant construction site in Germany.

The explosion was reported at BASF's Ludwigshafen toluene diisocyanate (TDI) plant, which recently broke ground for a 300,000 metric tons per year TDI production plant and other construction to expand its facilities.



BASF Provides Some Details

Responding to a request from *PaintSquare News* for more information on Wednesday (Feb. 27), BASF's manager of media relations and corporate communications Europe, Ursula von Stetten, wrote in an email, "So here [are] the facts: The detonation took place at 10:00 a.m. One person was injured; the injury is not serious. He will be kept in the hospital for some days.

"Cause of the detonation was an explosive device, presumably a bomb deriving from the Second World War. The device detonated when grounding work was done. No details on [a] delay [are] available. At the moment, the exact circumstances of the incident are [being] evaluated."

1st March 2013

SPiegel ONLINE

Blast Kills One
World War II Bomb Explodes on German Motorway

A highway construction worker in Germany accidentally struck an unexploded World War II bomb, causing an explosion which killed him and wrecked several passing cars.



A World War II bomb has exploded during construction work on a German highway, killing one worker and injuring several motorists who were driving past, police said.

The worker had been cutting through the road surface near the south-western town of Aschaffenburg when his machine struck the bomb and triggered it. Police said they weren't sure yet what type of bomb it was. "The explosion seems to have been too small for it to have been an aircraft bomb," a police spokesman said.

23rd October 2006

WWII bomb injures 17 at Hattingen construction site



Seventeen people were injured on Friday when a construction crew unwittingly detonated a buried World War II-era bomb in Hattingen.

An excavator apparently drove over a 250-kilogramme (550 pound) American bomb, damaging surrounding buildings. Most of the injured suffered auditory trauma from the blast, and the excavator operator suffered injuries to his hands, police in the German state of North Rhine-Westphalia said.

"The hole was astoundingly small for such a large bomb full of so many explosives," Armin Gebhard, head of the Arnsberg department for military ordnance removal, told *The Local*. "But of course it damaged all the surrounding buildings too. We are really happy it wasn't worse."

19th September 2013



World War II bomb kills three in Germany



A special commission is investigating the causes of the explosion, while prosecutors are considering whether the team leader should face charges of manslaughter through culpable negligence, the BBC's Oana Lungescu reports from Berlin.

The blast happened an hour before the defusing operation was due to start.

Officials said the three men who died were experienced sappers, or combat engineers, who over 20 years had defused up to 700 bombs.

More than 7,000 people were immediately evacuated when the 500kg bomb was found. Several schools, a kindergarten and local companies remain closed.

2nd June 2010



June 2006



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Unexploded Second World War bomb discovered under Somerset footpath

By Western Daily Press | Posted: January 21, 2014



The unexploded bomb was found in Somerset.

Comments (2)

No unexploded bomb dropped in Britain during the Second World War has finally been discovered – underneath a popular footpath in Somerset.

Report this article



21 August 2014 Last updated at 15:01

Unexploded WW2 bomb found at Kenfig Pool, Bridgend



Dean Smith believes the shell was made in Germany

Bomb experts have been called to a south Wales nature reserve after an unexploded World War Two shell was discovered by a walker in Bridgend.

Dean Smith, 38, of Pyle, was walking near Kenfig Pool on Saturday when he saw a tin sticking out of the sand.

He reached down to pick it up, but ending up falling and landed with the 25-long (6.6m) bomb on top of him.

The site has been cordoned off by police and the Royal Logistics Corps will carry out a controlled explosion.

Related Stories

'Panic' as dog nearly thrown grenade

WW2 bomb found at wind farm exploded

WWII bomb found in kitchen cupboard

Mortar thought to be from WWII found on Oshawa's Camp-X grounds

August 24, 2016 | 5:42 am



What is believed to be a World War II mortar has been discovered in south Oshawa. A man out in Intrepid Park, the site of the Camp-X Second World War training grounds, discovered the round with his metal detector on Tuesday evening. Durham police are held the scene overnight awaiting military officials from Trenton to come and properly detonate the mortar.

Holiday beach cordoned off after landslide sends more than a THOUSAND Second World War bombs and rockets tumbling onto the sands

- Bad weather led to ground movement which exposed the huge arsenal at Mableton, East Riding
- A dog walker stumbled across the deadly find on Saturday and 15 controlled explosions were carried out
- Rockets, mortar bombs and 25-pounder bombs were recovered after they were fired into the cliffs by RAF aircraft during the war
- Most of the devices were dummy rounds used for bombing practice but contain enough explosives to cause terrible injuries



Bomb Beach Alley: Rockets were found after a landslide on Mableton beach in 2012

Unexploded bomb found in farmer's field

17 May 2016



A live Second World War mortar shell was blown up by Army experts after a farmer found it in his field. The discovery was made in the field alongside the A20 between Folkestone and Dover.

The mortar shell, which was around a foot long and 3in in diameter, was around 50ft from the main road.

The farmer alerted police and PC Trevor Moody and PCSO Michelle Brady went to the field.

PC Moody contacted the Army who sent in a bomb disposal unit.

An Army officer confirmed the live shell was from the Second World War and was packed with high explosives.

They moved it a safe distance away from the A20 and carried out a controlled explosion.

PC Moody said: "Given that we live in an area that saw much action during the Second World War, it is not uncommon for us to be alerted about unexploded bombs."

The incident was on Thursday.

Click here for more news from Kent.

Royal Navy bomb disposal experts remove a World War Two shell discovered in a nature reserve

- A World War Two bomb was discovered in a Plymouth nature reserve
- Amateur metal detector found the shell and partially dug it up
- Royal Navy experts carried the explosive away before disposing of it

By VALERIE EDWARDS FOR MAILONLINE
PUBLISHED: 01:29, 12 January 2016 | UPDATED: 09:51, 12 January 2016

A World War Two bomb was reportedly found at Efford Nature Reserve in Plymouth after a member of the public was metal detecting and partially dug it up.

The Royal Navy Bomb Disposal team was called in to remove the bomb and police have closed off Military Lane, with the possibility of Military Road also being closed.

Police were called at around 1.30pm yesterday after what appeared to be a shell was discovered and partially dug up near Military Lane, Efford.



Army bomb disposal team called to Blacksole Bridge in Herne Bay

by Aidan Barlow a.barlow@thetimes.co.uk

08 July 2015

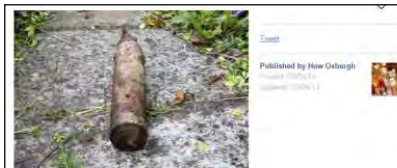
It was like a scene from Dad's Army when Army bomb disposal experts found wartime explosives made by the Home Guard in makeshift bottles.

A team was called to the Blacksole Bridge in Herne Bay after the wartime bombs were found.

The team from the Royal Logistics Corps set up a 30 metre exclusion zone for pedestrians around the railway embankment after the suspected homemade phosphorous bombs were found.



The scene at Blacksole Bridge after wartime explosives were found in the railway cutting



Unexploded bomb found in Axminster

Update: The bomb disposal unit has made the device safe and the road has re-opened

Six homes have been evacuated today after the discovery of an unexploded device in Axminster.

A Royal Navy bomb disposal team have been called to the scene after a 'historic German device' was discovered in a garden.

Police have set up a 20m cordon around the garden in Alexandra Road and evacuated homes in the surrounding area as a precaution.

Storms and floods unearth unexploded wartime bombs

By Claire Marshall
BBC Environment Correspondent

There has been a dramatic increase in the number of wartime bombs unearthed because of the winter storms and flooding.

Bomb disposal teams in the South West have dealt with double the number of unexploded ordnance than in the same period last year.

Since mid-December, the Royal Navy's Southern Dive Unit has recovered or disposed of 244 items of ordnance.

During the same period last year, they dealt with just 108 items.



The storms have unearthed a lethal past

Almost 70 years after the end of WWII, the legacy of that conflict continues to turn up on beaches and harbours around Britain.

Unexploded shells, bombs and mines continue to be discovered every year, and the Royal Navy's Southern Dive Unit is tasked with making these devices safe.

In areas of responsibility stretches for some 2,200 miles (1,400 miles), it begins from the highest point in Hull and proceeds seaward to the territorial limit, and then runs clockwise around the British Isles - including the Isle of Wight, Channel Islands, and Isles of Scilly - to finish in Liverpool.

Related Stories

Armed forces recovered by storms

Land Service Ammunition (LSA) resulting from historic military activity is commonly encountered across the UK by the public and construction industry alike. Such finds are much more common in rural areas than in urban environments, and can often be anticipated in areas such as former RAF stations or ranges. However, many such items are encountered entirely by surprise where the landowner or developer has no knowledge of any previous military use of the land.



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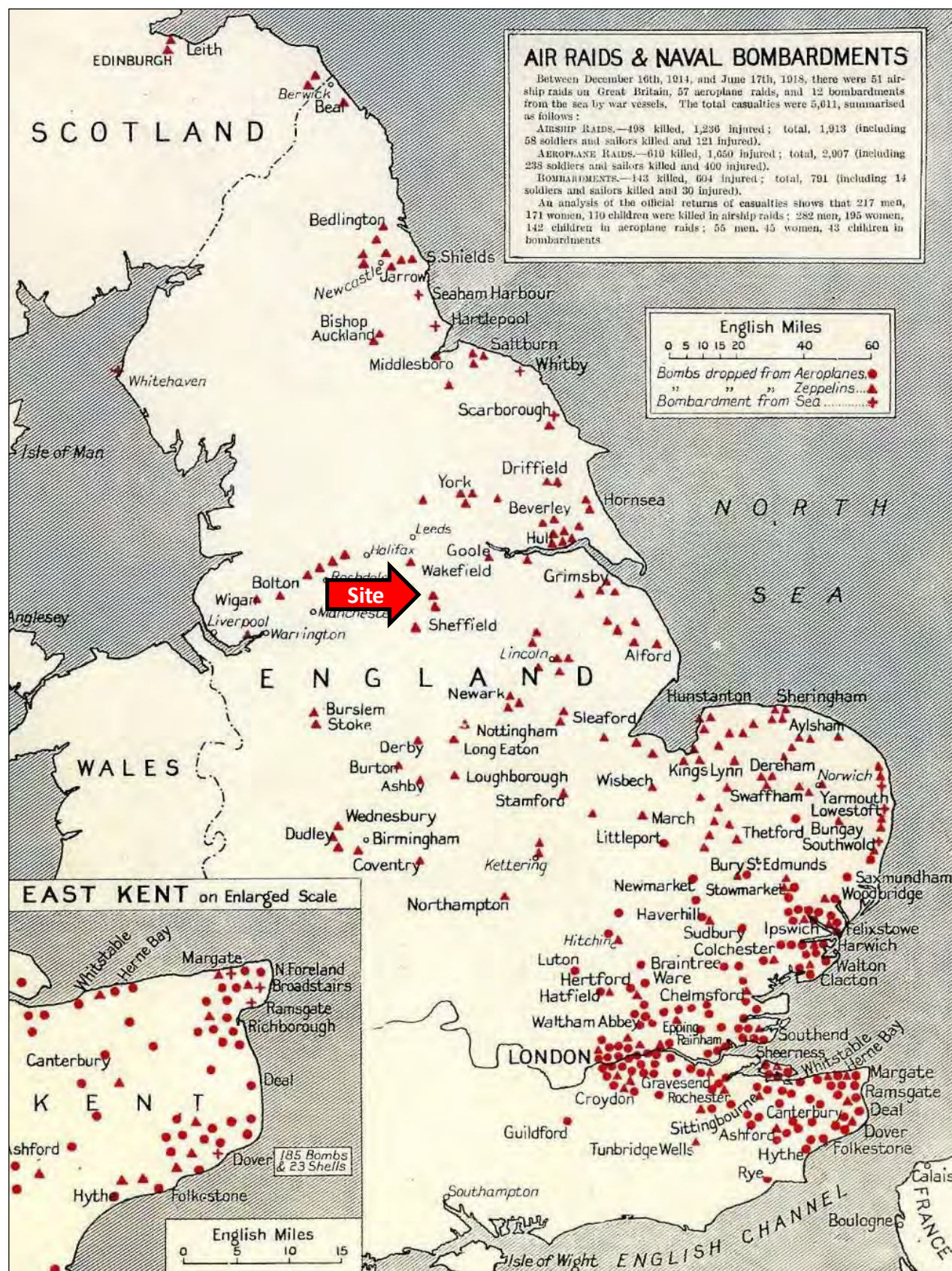
Client: Waterman Group

Project: Keresford Close, Barnsley

Ref: DA11373-00

Source: Various news sources

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Ref: **DA11373-00**

Source: J. Morris, *German Air Raids on Britain*



WEST RIDING (YORKSHIRE)	A.P.M. Acreage	H. R.	F. R.	G. R.	P. R.	F. P.	P. A. G.	L. R. R. R.	Total No.	St. lbs. from Sept. '41	No. per 1000 Acre
County Boroughs											
Barnsley C.B.	7817								-		-



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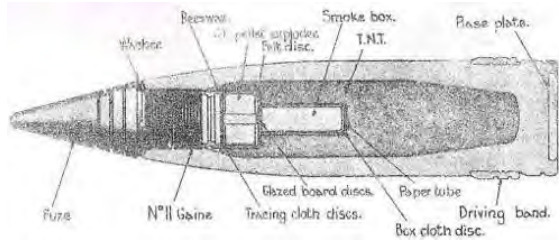
Source: In-House Data



Examples of Anti-Aircraft Projectiles

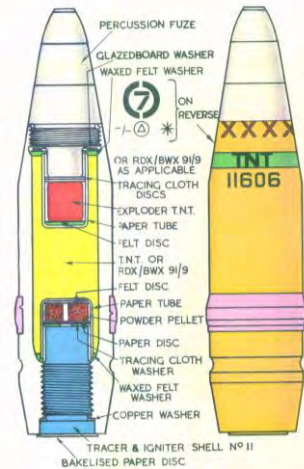
3.7 Inch QF Anti-Aircraft Projectile

Projectile Weight	28lb (12.6 kg)
Explosive Weight	2.52lbs
Fuze Type	Mechanical Time Fuze
Dimensions	3.7in x 14.7in (94mm x 360mm)
Rate of Fire	10 to 20 rounds per minute
Use	The 3.7in AA Mks 1-3 were the standard Heavy Anti-Aircraft guns of the British Army.
Ceiling	30,000ft to 59,000ft



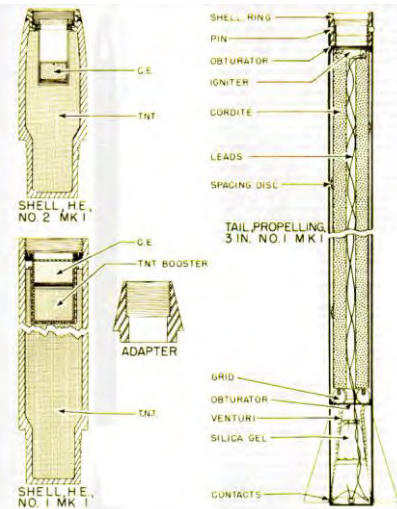
40mm Bofors Projectile

Projectile Weight	1.96lb (0.86kg)
Explosive Weight	300g (0.6lb)
Fuze Type	Impact Fuze
Rate of Fire	120 rounds per minute
Projectile Dimensions	40 x 180mm
Ceiling	23,000ft (7000m)
Remarks	Light quick fire high explosive anti-aircraft projectile. Each projectile fitted with small tracer element. If no target hit, shell would explode when tracer burnt out. Designed to engage aircraft flying below 2,000ft



3in Unrotated Projectile (UP) Anti-Aircraft Rocket ("Z" Battery)

HE Projectile Weight	3.4kg (7.6lb)
Explosive Weight	0.96kg (2.13lb)
Filling	High Explosive – TNT. Fitted with aerial burst fuzing
Dimensions of projectile	236 x 83mm (9.29 x 3.25in)
Remarks	As a short range rocket-firing anti-aircraft weapon developed for the Royal Navy. It was used extensively by British ships during the early days of World War II. The UP was also used in ground-based single and 128-round launchers known as Z Batteries. Shell consists of a steel cylinder reduced in diameter at the base and threaded externally to screw into the shell ring of the rocket motor



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E. Risk Rating Matrix

Table E.1: Risk rating for contaminated land qualitative risk assessment

Level of Severity	Likelihood		
	Most Likely	Reasonably Foreseeable	Unlikely
Acute harm or severe chronic harm. Direct pollution of sensitive water receptors or serious pollution of other water bodies.	High	High	Low
Harm from long-term exposure. Slight pollution of sensitive receptors or pollution of other water bodies.	Medium	Medium	Low
No significant harm in either short or long term. No pollution of water that is likely to affect sensitive receptors. No more than slight pollution of other water bodies.	Low	Low	Low

F. Environmental Receptors

The Contaminated Land Statutory Guidance has a four category system that considers harm to human health, controlled waters, flora and fauna, property, livestock and crops. The Categories are broadly defined as follows:

- 1 Contaminated Land – similar to land where it is known that significant harm has been caused or significant harm is being caused
- 2 Contaminated Land – no significant harm being caused but there is a significant possibility for significant harm to be caused in the future
- 3 Not Contaminated Land – there may be harm being caused but no significant possibility for significant harm to be caused in the future
- 4 Not Contaminated Land – no pollutant linkage, normal levels of contaminants and no significant harm being caused and no significant possibility for significant harm to be caused in the future.

Table F.1: Significant pollution to controlled waters

Pollution of controlled waters

Under Section 78A(9) of Part 2A the term “pollution of controlled waters means the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter. The term “controlled waters” in relation to England has the same meaning as in Part 3 of the Water Resources Act 1991, except that “ground waters” does not include water contained in underground strata but above the saturation zones. (Paragraph 4.36)

Given that the Part 2A regime seeks to identify and deal with significant pollution (rather than lesser levels of pollution), the local authority should seek to focus on pollution which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) which may result in damage to material property; or (iii) which may impair or interfere with amenities and other legitimate uses of the environment. (Paragraph 4.37).

Significant pollution of controlled waters

Paragraph 4.38 states that “The following types of pollution should be considered to constitute significant pollution of controlled waters:

- (a) Pollution equivalent to “environmental damage” to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations;
- (b) Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use;
- (c) A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway;
- (d) Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC)5”.

Paragraph 4.39 states that “In some circumstances, the local authority may consider that the following types of pollution may constitute significant pollution: (a) significant concentrations⁶ of hazardous substances or non-hazardous pollutants in groundwater; or (b) significant concentrations of priority hazardous substances, priority substances or other specific polluting substances in surface water; at an appropriate, risk based compliance point. The local authority should only conclude that pollution is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 (of the Contaminated Land Statutory Guidance). This would normally mean that the authority should conclude that less serious forms of pollution are not significant. In such cases the authority should consult the Environment Agency”.

The following types of circumstance should not be considered to be contaminated land on water pollution grounds:

- (a) The fact that substances are merely entering water and none of the conditions for considering that significant pollution is being caused set out in paragraphs 4.38 and 4.39 above are being met.

Significant pollution of controlled waters

- (b) The fact that land is causing a discharge that is not discernible at a location immediately downstream or down-gradient of the land (when compared to upstream or up-gradient concentrations).
- (c) Substances entering water in compliance with a discharge authorised under the Environmental Permitting Regulations.

Significant pollution of controlled waters is being caused

In deciding whether significant pollution of controlled waters is being caused, the local authority should consider that this test is only met where it is satisfied that the substances in question are continuing to enter controlled waters; or that they have already entered the waters and are likely to do so again in such a manner that past and likely future entry in effect constitutes ongoing pollution. For these purposes, the local authority should:

- (a) Regard substances as having entered controlled waters where they are dissolved or suspended in those waters, or (if they are immiscible with water) they have direct contact with those waters on or beneath the surface of the water.
- (b) Take the term “continuing to enter” to mean any measurable entry of the substance(s) into controlled waters additional to any which has already occurred.
- (c) Take the term “likely to do so again” to mean more likely than not to occur again.

Land should not be determined as contaminated land on grounds that significant pollution of controlled waters is being caused where: (a) the relevant substance(s) are already present in controlled waters; (b) entry into controlled waters of the substance(s) from land has ceased; and (c) it is not likely that further entry will take place.

Significant Possibility of Significant Pollution of Controlled Waters

In deciding whether or not a significant possibility of significant pollution of controlled waters exists, the local authority should first understand the possibility of significant pollution of controlled waters posed by the land, and the levels of certainty/uncertainty attached to that understanding, before it goes on to decide whether or not that possibility is significant. The term “possibility of significant pollution of controlled waters” means the estimated likelihood that significant pollution of controlled waters might occur. In assessing the possibility of significant pollution of controlled waters from land, the local authority should act in accordance with the advice on risk assessment in Section 3 and the guidance in this sub-section.

In deciding whether the possibility of significant pollution of controlled waters is significant the local authority should bear in mind that Part 2A makes the decision a positive legal test. In other words, for particular land to meet the test the authority needs reasonably to believe that there is a significant possibility of such pollution, rather than to demonstrate that there is not.

Before making its decision on whether a given possibility of significant pollution of controlled waters is significant, the local authority should consider:

- (a) The estimated likelihood that the potential significant pollution of controlled waters would become manifest; the strength of evidence underlying the estimate; and the level of uncertainty underlying the estimate;
- (b) The estimated impact of the potential significant pollution if it did occur. This should include consideration of whether the pollution would be likely to cause a breach of European water legislation or make a major contribution to such a breach;
- (c) The estimated timescale over which the significant pollution might become manifest;
- (d) The authority’s initial estimate of whether remediation is feasible, and if so what it would involve and the extent to which it might provide a solution to the problem; how long it would take; what benefit it would be likely to bring; and whether the benefits would outweigh the costs and any impacts on local society or the environment from taking action.

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

Table F.2: Significant harm to human health, ecological systems and property

Relevant types of receptor	Significant harm	Significant possibility of significant harm
Human beings	The following health effects should always be considered to constitute significant harm to human health: death; life threatening diseases (eg cancers); other diseases likely to have serious impacts on health; serious injury; birth defects; and impairment of reproductive functions. Other health effects may be considered by the local authority to constitute significant harm. For example, a wide range of conditions may or may not constitute significant harm (alone or in combination) including: physical injury; gastrointestinal disturbances; respiratory tract effects; cardiovascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. In deciding whether or not a particular form of harm is significant harm, the local authority should consider the seriousness of the harm in question: including the impact on the health, and quality of life, of any person suffering the harm; and the scale of the harm. The authority should only conclude that harm is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 of the Contaminated Land Statutory Guidance.	The risk posed by one or more relevant contaminant linkage(s) relating to the land comprises: (a) The estimated likelihood that significant harm might occur to an identified receptor, taking account of the current use of the land in question. (b) The estimated impact if the significant harm did occur – i.e. the nature of the harm, the seriousness of the harm to any person who might suffer it, and (where relevant) the extent of the harm in terms of how many people might suffer it. In estimating the likelihood that a specific form of significant harm might occur the local authority should, among other things, consider: (a) The estimated probability that the significant harm might occur: (i) if the land continues to be used as it is currently being used; and (ii) where relevant, if the land were to be used in a different way (or ways) in the future having regard to the guidance on “current use” in Section 3 of the Contaminated Land Statutory Guidance. (b) The strength of evidence underlying the risk estimate. It should also consider the key assumptions on which the estimate of likelihood is based, and the level of uncertainty underlying the estimate.
Any ecological system, or living organism forming part of such a system, within a location which is: a site of special scientific interest (under section 28 of the Wildlife and Countryside Act (WCA) 1981 (as amended) and Part 4 of the Natural Environment and Rural Communities Act 2006 (as amended));	The following types of harm should be considered to be significant harm: - harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or - harm which significantly affects any species of special interest within that location and which	Conditions would exist for considering that a significant possibility of significant harm exists to a relevant ecological receptor where the local authority considers that: significant harm of that description is more likely than not to result from the contaminant linkage in question; or

Relevant types of receptor	Significant harm	Significant possibility of significant harm
- a national nature reserve (under Section 35 of the WCA 1981 (as amended)); - a marine nature reserve (under Section 36 of the WCA 1981 (as amended)); - an area of special protection for birds (under Section 3 of the WCA 1981 (as amended)); - a “European site” within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2010 (as amended); - any habitat or site afforded policy protection under Section 15 of The National Planning Policy Framework (NPPF) on conserving and enhancing the natural environment (i.e. possible Special Areas of Conservation, potential Special Protection Areas and listed or proposed Ramsar sites); or - any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949.	endangers the long-term maintenance of the population of that species at that location. In the case of European sites, harm should also be considered to be significant harm if it endangers the favourable conservation status of natural habitats at such locations or species typically found there. In deciding what constitutes such harm, the local authority should have regard to the advice of Natural England and to the requirements of the Conservation of Habitats and Species Regulations 2010 (as amended).	there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. Any assessment made for these purposes should take into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.
Property in the form of: - crops, including timber; - produce grown domestically, or on allotments, for consumption - livestock; - other owned or domesticated animals; - wild animals which are the subject of shooting or fishing rights.	For crops, a substantial diminution in yield or other substantial loss in their value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. The local authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss. In the Guidance states that this description of significant harm is referred to as an “animal or crop effect”.	Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question, taking into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.
Property in the form of buildings.	Structural failure, substantial	Conditions would exist for

Appendices

Relevant types of receptor	Significant harm	Significant possibility of significant harm
For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables.	damage or substantial interference with any right of occupation. The local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended. In the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled. The Guidance states that this description of significant harm is referred to as a 'building effect'.	considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question during the expected economic life of the building (or in the case of a scheduled Ancient Monument the foreseeable future), taking into account relevant information for that type of contaminant linkage.

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UK and Ireland Office Locations

