



**PHASE 1 ENVIRONMENTAL SITE
ASSESSMENT REPORT**

**210 CARLTON ROAD,
ATHERSLEY SOUTH, BARNSELY,
S17 2AP**

Prepared for:

Northern Town Planning Ltd

By:

ENVIROSOLUTION LTD

The Quay Suite 5

No. 12 Princess Docks

Liverpool Waters

Liverpool

L3 1DL

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EnviroSolution Ltd Document Verification

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Checked by	Gemma Lucas	Signature	



Executive Summary

The preliminary environmental site assessment indicates that the site can be classified as low risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be low.

However, during site preparation works, if any unexpected visual or olfactory evidence of contamination is encountered, it is recommended that the material is removed and stockpiled on site and advice is sought from a suitably qualified person (Environmental Consultant) on how to deal with the material. Testing of the material will be necessary to identify whether it is suitable for re-use on site or if it will have to be taken off-site for disposal.

In addition, to ensure that they do not come into contact with contaminated soils and groundwater, it is recommended that workers wear appropriate personal protective equipment (PPE) and that suitable Health and Safety procedures be adopted to ensure that ingestion of contaminated soils and groundwater is avoided (e.g. by washing hands prior to eating, drinking and smoking).

Disclaimer

This report has been prepared by EnviroSolution Ltd who has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant experienced in preparing reports of a similar scope.

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1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake a Phase 1 Environmental Site Assessment at a site located at 210 Carlton Road in Barnsley. This report was completed to inform plans for a residential development at the site.

1.2 Objectives

The objective of the preliminary environmental site assessment was:

1. To provide a summary of the environmental setting and historical land use of the site and immediate surrounding area.
2. To obtain information on the ground conditions present beneath the site.
3. To develop a conceptual site model and complete a generic quantitative risk assessment to identify any environmental risks and liabilities associated with ground conditions at the site.

1.3 Scope of Work

To achieve the objectives, the following scope of work was completed:

1. A desk-based study of the site comprising a review of available environmental information for the site such as geological and hydrogeological data and historical land use information.
2. A site walkover survey to assess on-site ground conditions, vegetation and signs of previous contamination.
3. Assessment of potential hazards and constraints during construction and longer term.

The scope of work was developed in accordance with the Environment Agency of England and Wales and Department for Environment Food and Rural Affairs (DEFRA) document 'Model Procedures for the Management of Land Contamination' Contaminated Land Report (CLR) 11, dated 2004 and BS10175:2011+A1:2013 'Investigation of Potentially Contaminated Sites – Code of Practice'.

1.4 Information Sources

Historical Ordnance Survey maps have been obtained from historical records, ranging from 1855 to 2018. These maps provide high quality information on historical site use.

The British Geological Survey Geoindex database has been used to provide information on geo-environmental aspects of the site and the immediate surrounding area such as geological, hydrogeological and hydrological data.

The Environment Agency website (www.gov.uk/government/organisations/environment-agency) and Magic website (www.magic.gov.uk) was also used to obtain environmental information.

Industry Profiles produced by the Department of the Environment were utilised to obtain information on processes, materials and wastes associated potential contaminative land uses near the site.

2 The Site

2.1 Site Location

The site is located at 210 Carlton Road, Athersley South, Barnsley, S71 2AP. The British National Grid Reference for the approximate site centre is GR: 435651 408595.

The site location is shown on **Figure 1** in **Appendix A**.

2.2 Site Description

The site description is aided by the completion of a site walkover survey, completed by EnviroSolution Ltd on 11th December 2018. The site photographs are included in **Appendix B**.

The site is irregular in shape and has an approximate area of 0.43 hectares. The site is largely open green space currently occupied by several small outbuildings and structures. The outbuildings are used for storage including vehicle parts, gas canisters and materials. All areas around the buildings and vehicles is covered in hardstanding which is in good condition.

The site is accessed via a 1.5m tall metal gate along Carlton Road. A small concreted track runs adjacent to no. 210 Carlton Road towards the site. The gate was unlocked at the time of the walkover.

The plot is located immediately to the rear of existing properties along Carlton Road. The site boundaries consist of 2m tall wooden fencing to the south and mature hedging and fencing on all other boundaries.

The surrounding land use is predominantly residential in nature.

There are no petrol filling stations located within 250m of the site.

The existing site plan is shown on **Figure 2** which is included in **Appendix A**.

2.3 Development Proposals

No detailed development plans have been provided to EnviroSolution. It is understood that the development is residential and is part of a larger housing allocation in the area.

2.4 Site History

The development site and surrounding area has been reviewed with reference to historical Ordnance Survey (OS) maps. The history of the site and immediate surrounding area is summarised in Table 1. Copies of the historical OS maps are included in **Appendix C**. A search buffer of 250m has been used.

Table 1 - Historic Mapping Review

Date	Scale	On Site	Off Site
1855	1:10,560	The site lies within an open agricultural field.	St Helen's Well/ Farm 250m northeast. Athersley Wood 250m west. Spring Wood 260m east.
1892	1:2,500	No significant change.	No significant change.
1906	1:2,500	No significant change.	Small reservoir 130m southwest.
1931	1:2,500	No significant change.	Residential development 50m south of the site.
1962	1:2,500	210 Carlton Road built on the eastern side of the site.	Residential development along Carlton Road adjacent to the southern site boundary and 60m north.
1984	1:10,000	No significant change.	School constructed 80m northeast. Reservoir covered.
1993	1:10,000	Small outbuildings built on site.	No significant change.
2018	1:2,500	No significant change.	No significant change.

3 Environmental Setting

3.1 Geology

Geological maps of the area indicate the site is not directly underlain by superficial deposits.

An area of Made Ground is indicated approximately 30m east of the site, to the east of Carlton Road. This was likely placed to level the site for development.

The underlying bedrock is the Ackton Rock Member of the Pennine Middle Coal Measures Formation which is of Carboniferous age. Directly underlying the site is likely to be sandstone beds. The general formation generally comprises interbedded mudstones, siltstones and sandstone with seams of coal.

An inferred geological fault is located within 50m of the western site boundary. The fault trends NE-SW. the direction and magnitude of downthrow is unknown.

A copy of the geological maps is included in **Appendix D**.

3.2 Radon

The site lies within an elevated band of radon potential where it is estimated that between 3-5% of properties are above the action level (intermediate probability). Basic radon protective measures are required for the development.

3.3 Coal Mining Activity

The site falls within a coal mining area described as having minable coal deposits and lies within an area with a historic coal mining legacy. A review of the Coal Authority Interactive Viewer Map has shown the site does not fall within a Development High Risk Area. The Coal Authority hold no records to suggest there are, or could be shallow recorded or unrecorded mine workings beneath the site.

A copy of the Coal Authority Interactive Viewer Map is included in **Appendix E**.

3.4 Hydrogeology

The underlying bedrock is classified as a Secondary A Aquifer. This is defined as: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The groundwater vulnerability is designated as Minor Aquifer High.

The site is not located within a groundwater Source Protection Zone (SPZ).

There are no groundwater abstraction licenses located within 500m of the site.

A copy of the hydrogeological maps is included in **Appendix F**.

3.5 Hydrology

There are no significant water courses located within a 1km radius of the site.

No further surface water features have been identified within a 250m radius of the site.

3.6 Flood Risk

The site lies within a Flood Zone 1, low probability area, defined as land having a less than 1 in 1,000 annual probability of river or sea flooding.

3.7 Background Soil Chemistry

Values of background soil chemistry have been taken from the National Soil Inventory (NSI) and are summarised in Table 2 below.

Table 2 - Background Soil Chemistry

Substance	Concentration (mg/kg)
Arsenic	17.45
Cadmium	0.36
Chromium	61.14
Lead	63.44
Nickel	21.09

3.8 Waste Management Facilities

There are 6 no. current records of historic landfill sites located within a 1km search radius of the site. The landfill site information is presented in Table 3 below.

Table 3 - Historic Landfill Summary

Landfill Site	Operation Dates	Waste Type	Distance to Site
Rotherham Road	1985 – 1986	Inert	260m South
Monk Bretton Recreational Ground	1981 – 1983	Inert	475m South
Byron Drive	1982 – 1987	Inert	680m Southeast
Dalestone Works	No information	No information	740m West
Wakefield Road	1997 – 1997	No information	810m West
Wakefield Road	1981 – 1988	Industrial	920m Southwest

3.9 Environmental Permits, Incidents and Registers

There are no records of any sites located within a 500m radius of the site operating under an environmental permit.

There are no records of environmental pollution incidents occurring within a 500m radius of the site.

3.10 Designated Environmentally Sensitive Sites

Records of any designated environmentally sensitive sites located within a 1km radius of the site are summarised in Table 4 and shown on plans included in **Appendix H**.

Table 4 - Environmental Designations Summary

Features	Distance	Comments
Nitrate Vulnerable Zone	On Site	The site lies within the boundary of a Nitrate Vulnerable Zone for surface water.

4 Preliminary Conceptual Site Model

4.1 Introduction

To assess the environmental risks present, a preliminary conceptual model has been developed for the site. This model has been developed using best practice guidelines in conjunction with the current assessment framework considering the development proposals. This preliminary conceptual model is based on desk-based information (e.g. historical OS data and data sourced from the EA, Geoindex and Magic databases).

4.2 UK Assessment Framework

Current UK legislation on contaminated land is governed by Part IIA of the Environmental Protection Act (EPA) 1990 which is retrospectively inserted by Section 57 of the Environmental Act 1995.

The legislation introduces the concept of a “suitable for use” approach to the re-use of contaminated sites, requiring remedial action where unacceptable risks to human health or the environment are identified, considering both the use of the land and its environmental setting, endorsing the principal of site-specific risk assessment.

The legislation provides a definition of “contaminated land” as:

“any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

- significant harm is being caused or there is a significant possibility of such harm being caused; or*
- significant pollution of controlled waters is being, or is likely to be caused”.*

Further guidance is included within the legislation as to the nature of harm to be classified as significant, and what constitutes the significant possibility of significant harm. To prove that significant harm is being caused, a significant pollutant linkage must be established, using a source-pathway-receptor model. This model comprises three elements:

Source – the key pollutant hazards associated with the site

Receptor – the key targets at risk from the sources

Pathway – the means by which the contaminant can cause harm to the receptor

If a significant pollutant linkage is to be established, all three elements must be present, with a contaminant capable of causing harm, a receptor sensitive to that contaminant and a pathway linking them.

4.3 Potential Contamination Sources

Historically, the site has remained as an undeveloped parcel of land set within a residential area, to the rear of properties along Carlton Road. Several outbuildings exist on site which appear to have multiple uses. It is thought that the buildings were used for storage, vehicle repair and vegetable growing.

Should materials have been spilled or stored incorrectly in the garage, they could impact on the shallow soils. Upon the walkover survey it was noted that all areas around the garage and areas accessed by vehicles was covered in concrete hardstanding. It is considered unlikely that any minor contaminants will have infiltrated to the natural soils.

The historic landfill sites identified in Section 3.8 can be discounted as potential contaminant sources due to the distance from the site. The closest historic landfill site is Rotherham Road which is 260m away. This landfill accepted inert waste only and is unlikely to pollute the soils in the vicinity of the development site.

4.4 Receptors

The potential receptors considered to be at risk from soil and groundwater contamination associated with the site are summarised in Table 6 below:

Table 6 - Receptor Description

Receptor	Details
Human (On Site)	- Construction workers - Future site users - Site visitors
Human (Off Site)	- Adjacent site users
Controlled Waters	- Secondary A Aquifer
Building/ construction materials	- Foundations and buried services

4.5 Pathways

The potential exposure pathways linking contamination with the receptors identified above are summarised in Table 7 below:

Table 7 - Exposure Pathways Summary

Receptor	Details of Exposure Pathway
Human (on-site)	- Direct ingestion of contaminated soil/groundwater - Dermal contact with soil/groundwater - Inhalation of gases and vapours
Human (off-site)	- Inhalation of fibres and particulates

Receptor	Details of Exposure Pathway
	- Inhalation of migrating gases and vapours
Controlled waters	- Vertical and lateral migration of dissolved phase contaminants via preferential pathways to Aquifers - Lateral migration and surface water run-off to water courses
Building/construction	- Buried materials/services - Contact with contaminated soil and/or groundwater

4.6 Potential Pollution Linkages

4.6.1 Human Health

The proposed development comprises the construction of an unspecified number of residential dwellings. It is assumed that these properties include associated soft landscaping to the rear and front vehicular parking. This can be considered a sensitive end use.

The presence of buildings and hardstanding would eliminate the risk of exposure, via the dermal contact and ingestion pathways to future site users to any ground contamination that may remain following development.

There could be a potential risk of exposure to any ground contamination that remains following redevelopment in the proposed areas of soft landscaping (i.e. gardens), to future site users, via all possible exposure pathways.

Any ground gases (i.e. methane and carbon dioxide) that are present within the soils beneath the site could potentially ingress into the buildings through preferential pathways (e.g. service entry points). Therefore, there would be a risk of exposure via inhalation to future site users.

There is the potential for construction workers and adjacent land users to be exposed to soil and groundwater contamination during site redevelopment. However, the use of appropriate PPE and the adoption of suitable Health and Safety methods will help to reduce the risks posed to human health during this work.

4.6.2 Controlled Waters

There is limited potential for any potential contaminants to infiltrate into the underlying Secondary A Aquifer. No contaminants are thought to be present on site and concrete hardstanding at ground level will act as an impermeable barrier preventing migration.

The risk of contaminant migration to controlled surface waters is considered to be negligible due to no sensitive surface waters being identified nearby.

4.6.3 Building/ Construction Materials/ Buried Services

The presence of any soil and groundwater contaminants beneath the site could potentially impact on construction materials for the new development, such as below ground structures and services. Concrete foundations are particularly sensitive to aggressive ground conditions, i.e. sulphate attack.

If ground gases and vapour are present in the soil beneath the site, then there would be the potential risk of ingress into the new properties which could present a risk of explosion.

4.7 Preliminary Hazard Assessment

A preliminary hazard assessment is presented in Table 6. The preliminary hazard assessment is a qualitative assessment of the risks posed by each potential pollutant linkage described above and is used to identify the requirement for additional work (e.g. intrusive ground investigation).

Table 6 – Preliminary Hazard Assessment

Source 1	Pathway	Receptor	Likelihood	Effect	Risk	Assessment
Contaminated soil	Ingestion (via soil dust), inhalation (via soil dust and vapours), ingestion through dirty hands, dermal contact with soil/water.	Future site users Adjacent site users Construction workers	1	3	Low	Limited source potential identified from on-site sources. Limited potential off-site source identified.
Contaminated soil groundwater	Direct contact	Buildings/ services	1	3	Low	Limited source potential identified from on-site sources.
Contaminated groundwater	Downward or lateral migration	Secondary A Aquifer	1	3	Low	Limited source potential identified. Concrete hardstanding will sever vertical migration pathways.
Ground gas / vapours	Inhalation, ingress into buildings	Buildings / services Future site users Adjacent site users Construction workers	1	3	Low	No significant ground gas source identified. Landfill sites sufficient enough distance and accepted inert waste only.

Using Risk Matrix (Table 7) Degree of Risk (R) = Likelihood (L) x Effect (E)

Table 7 - Risk Matrix, Degree of Risk (R) = Likelihood (L) x Effect (E)

Likelihood	Description	Probability	Effect (E)	Description
5	Almost certain	>70%		
4	Probable	50-70%	4	Severe
3	Likely	30-50%	3	Medium
2	Unlikely	10-30%	2	Mild
1	Negligible	<10%	1	Minor
Risk (R)	Risk Level	Action		
1-5	Low	None required		
6-10	Moderate	Further assessment via Phase 2 intrusive ground investigation.		
>10	High	Further assessment via Phase 2 intrusive ground investigation.		

5 Conclusions and Recommendations

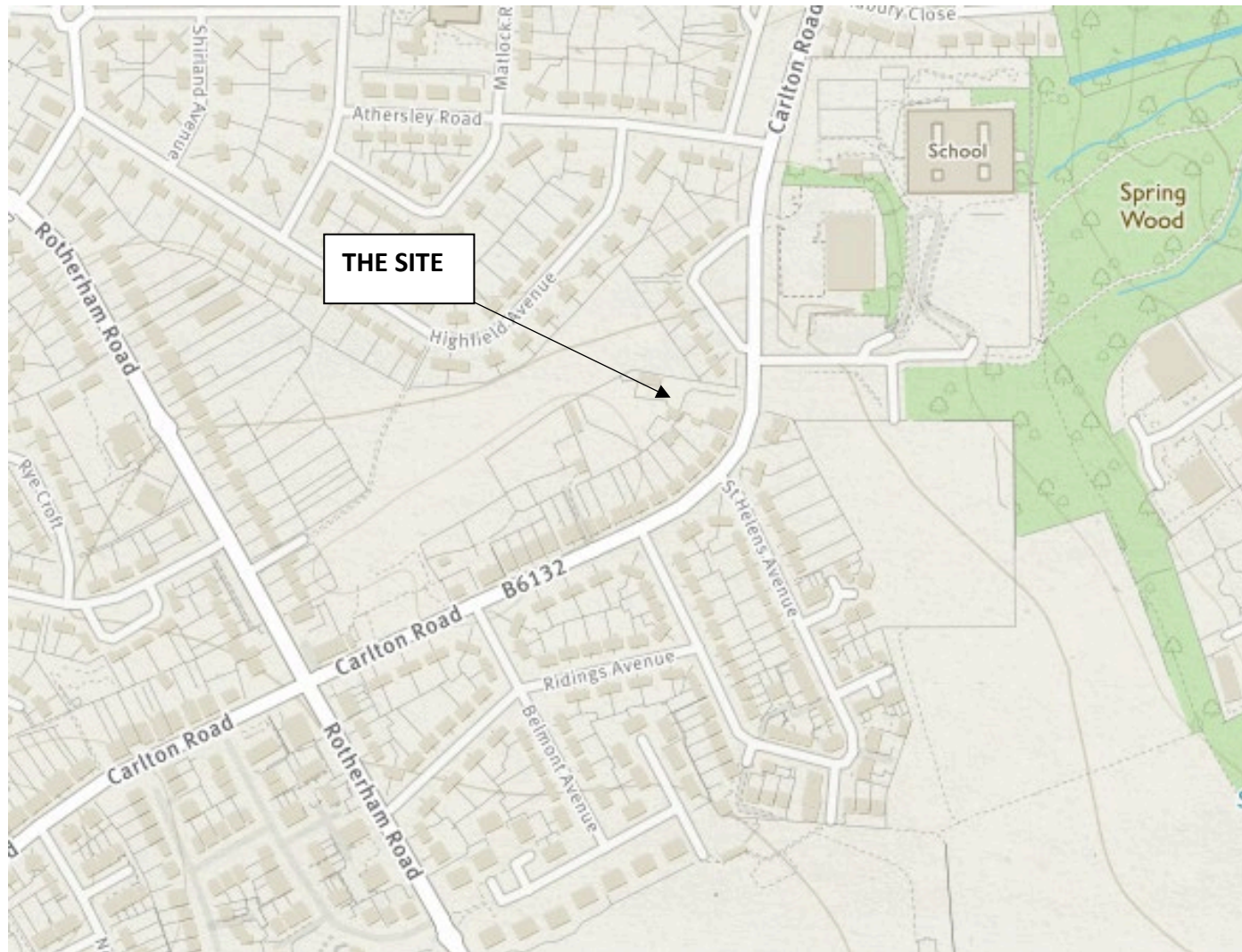
The preliminary environmental site assessment indicates that the site can be classified as low risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be low.

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In addition, to ensure that they do not come into contact with contaminated soils and groundwater, it is recommended that workers wear appropriate personal protective equipment (PPE) and that suitable Health and Safety procedures be adopted to ensure that ingestion of contaminated soils and groundwater is avoided (e.g. by washing hands prior to eating, drinking and smoking).

APPENDICES

Appendix A - Site Location and Site Plan





Appendix B – Site Photographs



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1.5m tall access gate



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View of the site looking west showing concrete hardstanding



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Storage of trailers and machinery on site



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Outbuilding used as small garage



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Open green space on the western side of the site



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Small concrete outbuilding with gas canisters



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Small greenhouse type building on the eastern boundary

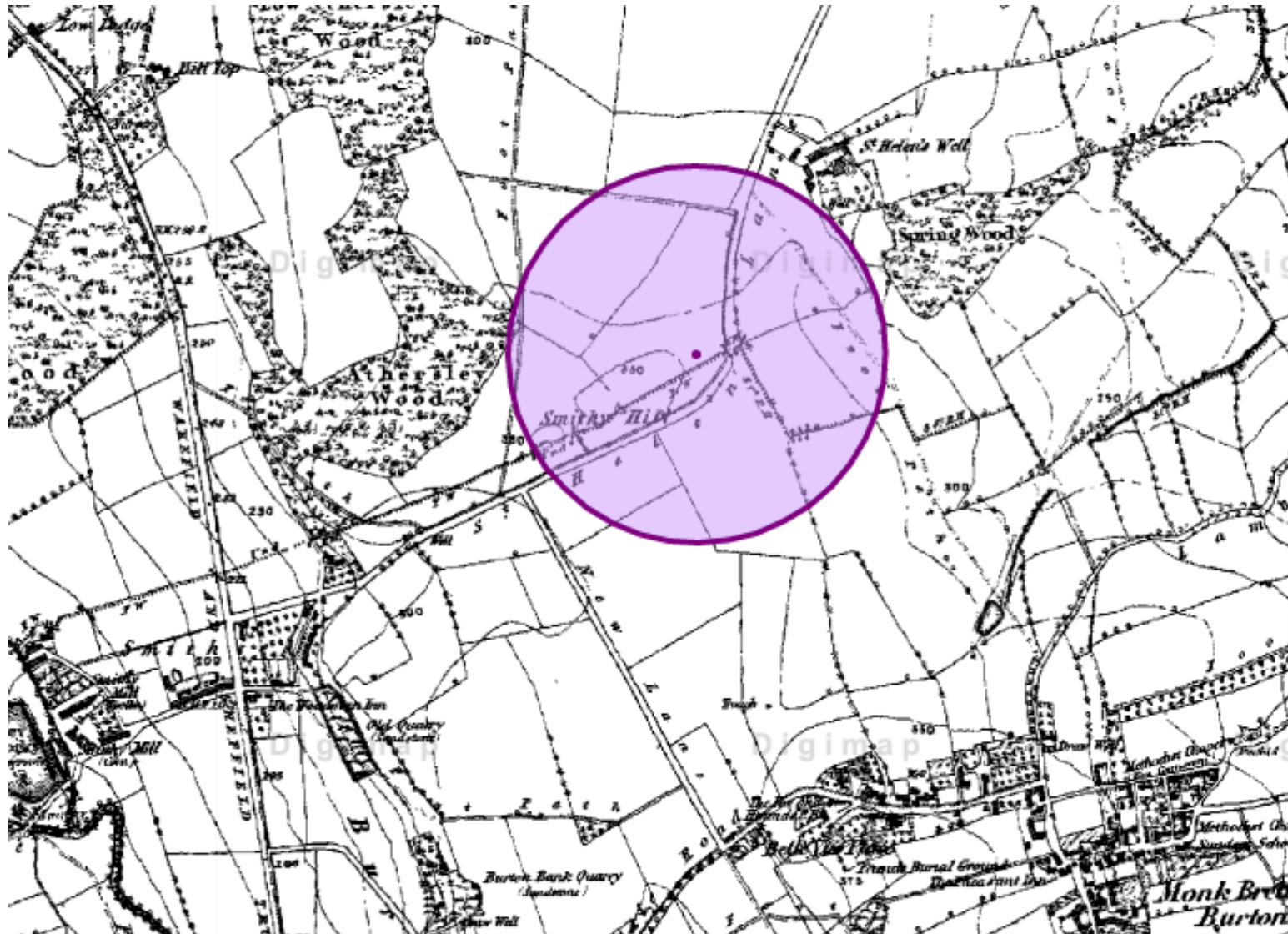


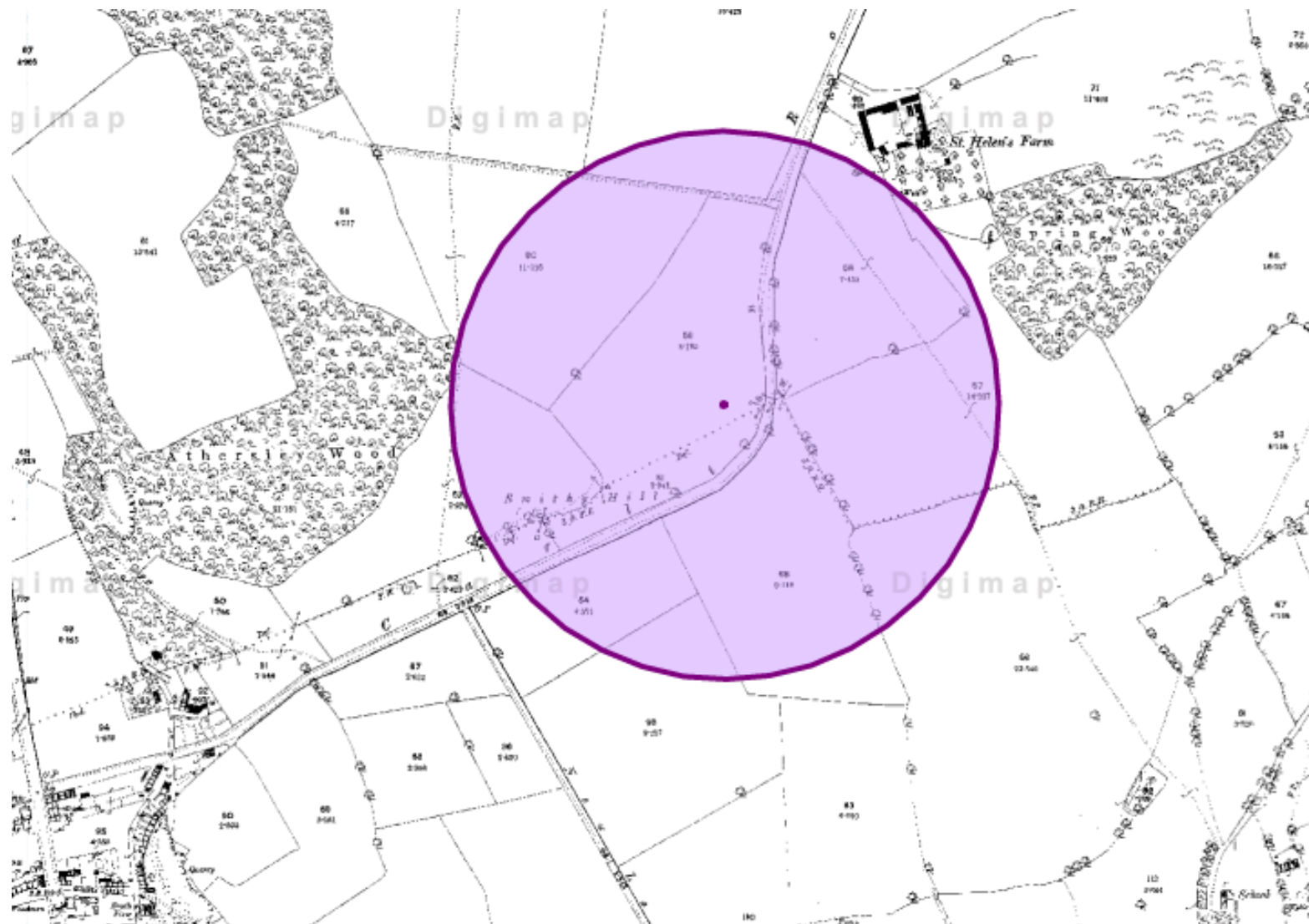
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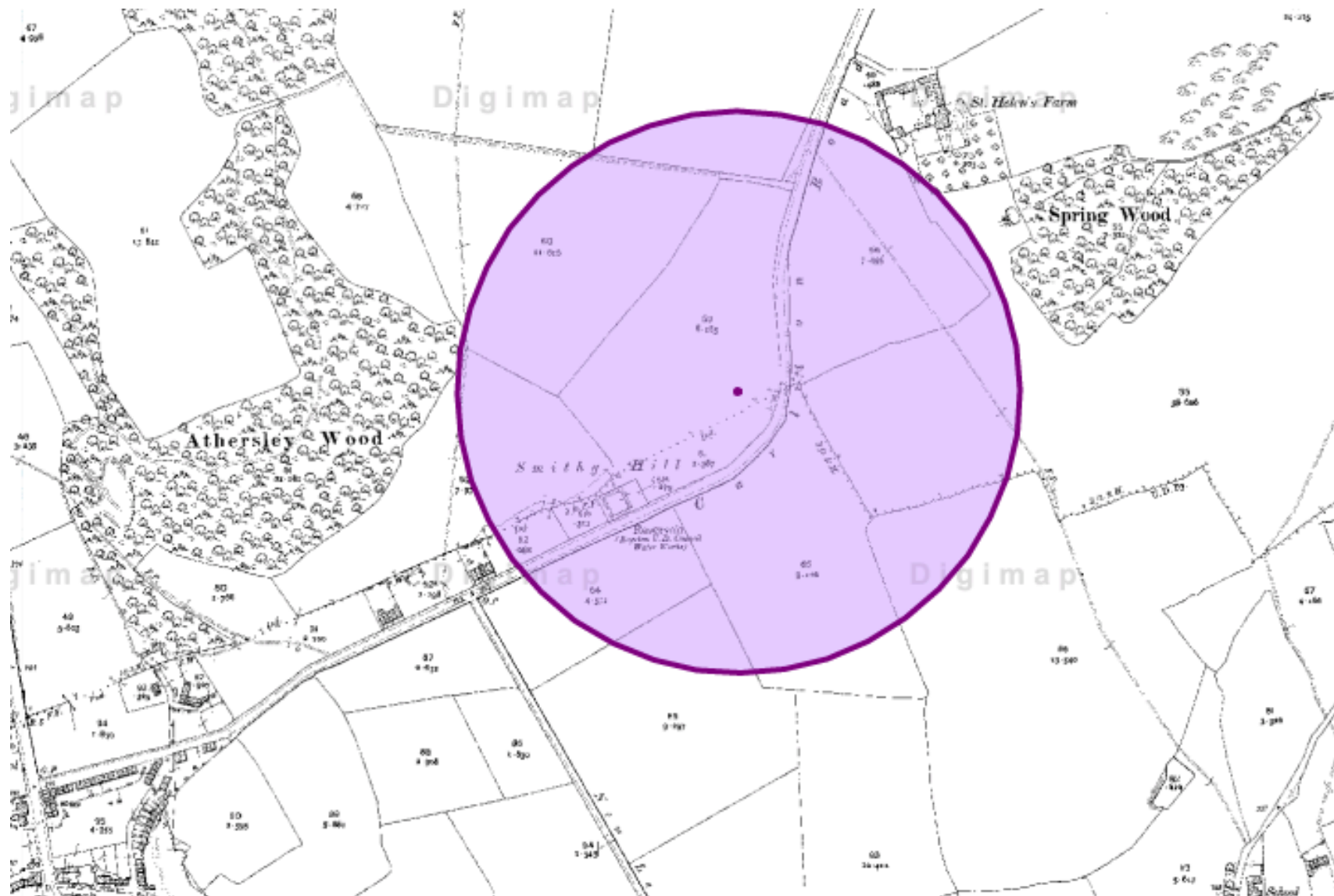
enviro | solution

Concrete outbuilding on the western boundary

Appendix C - Historical Maps

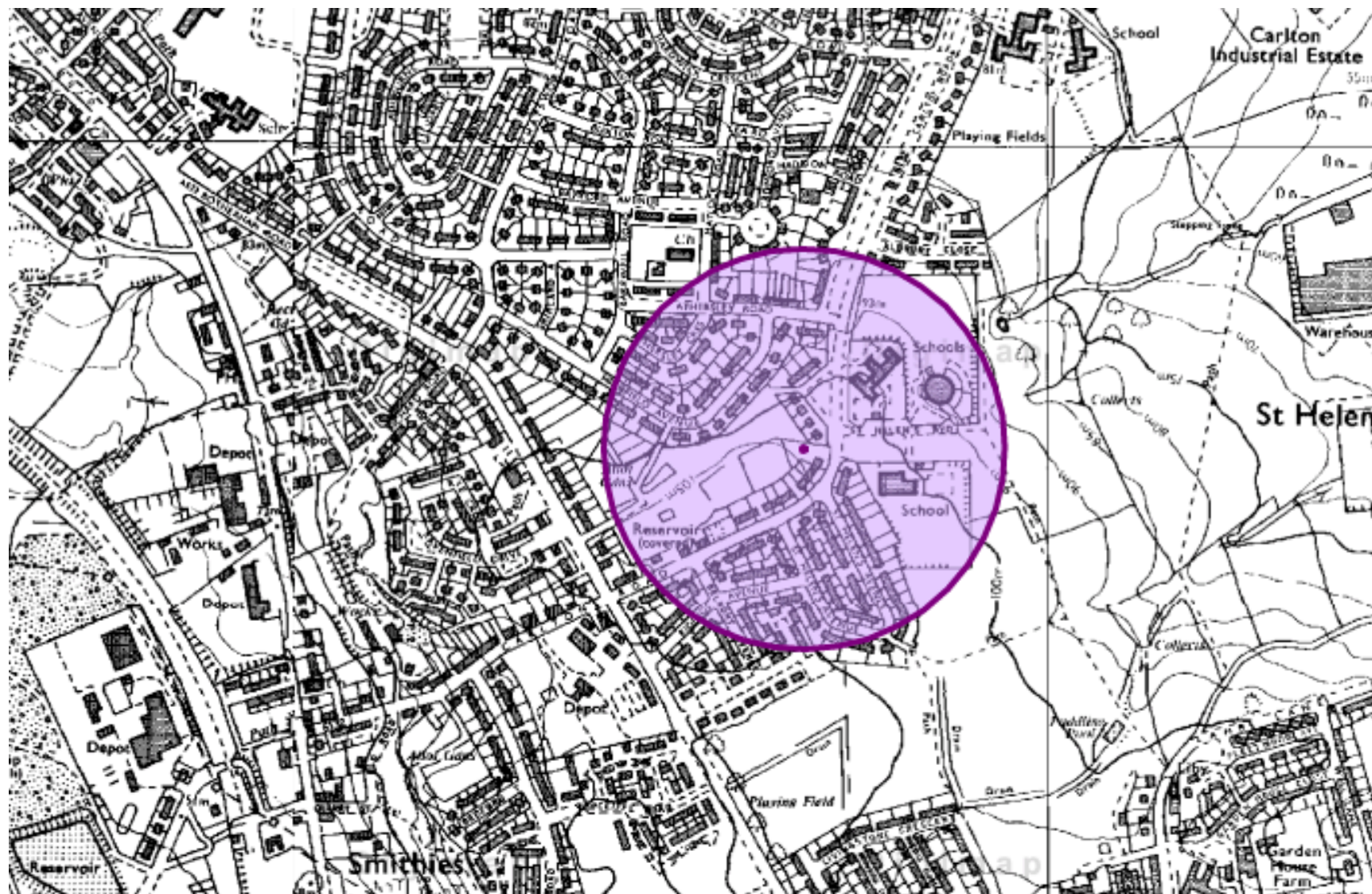










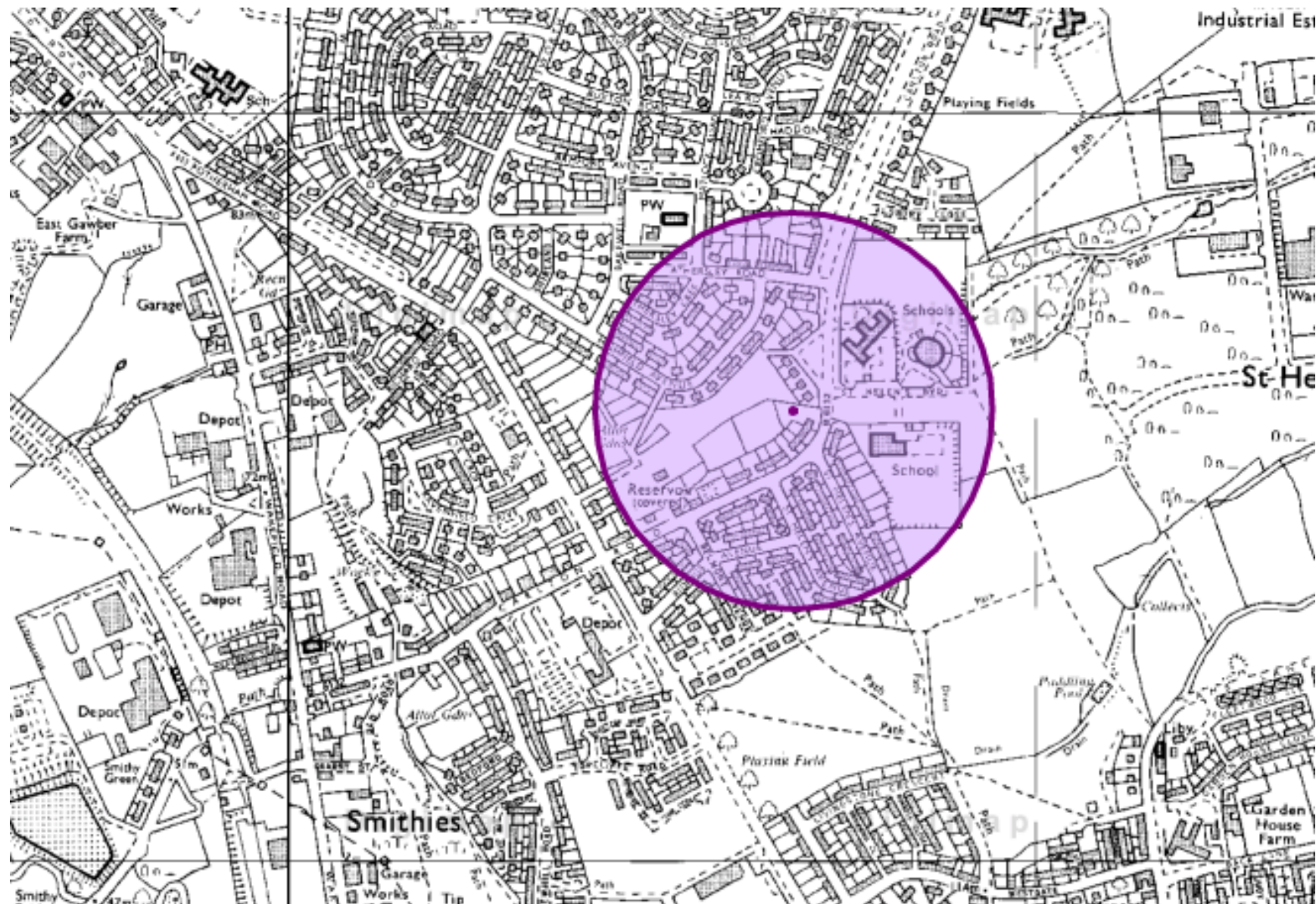


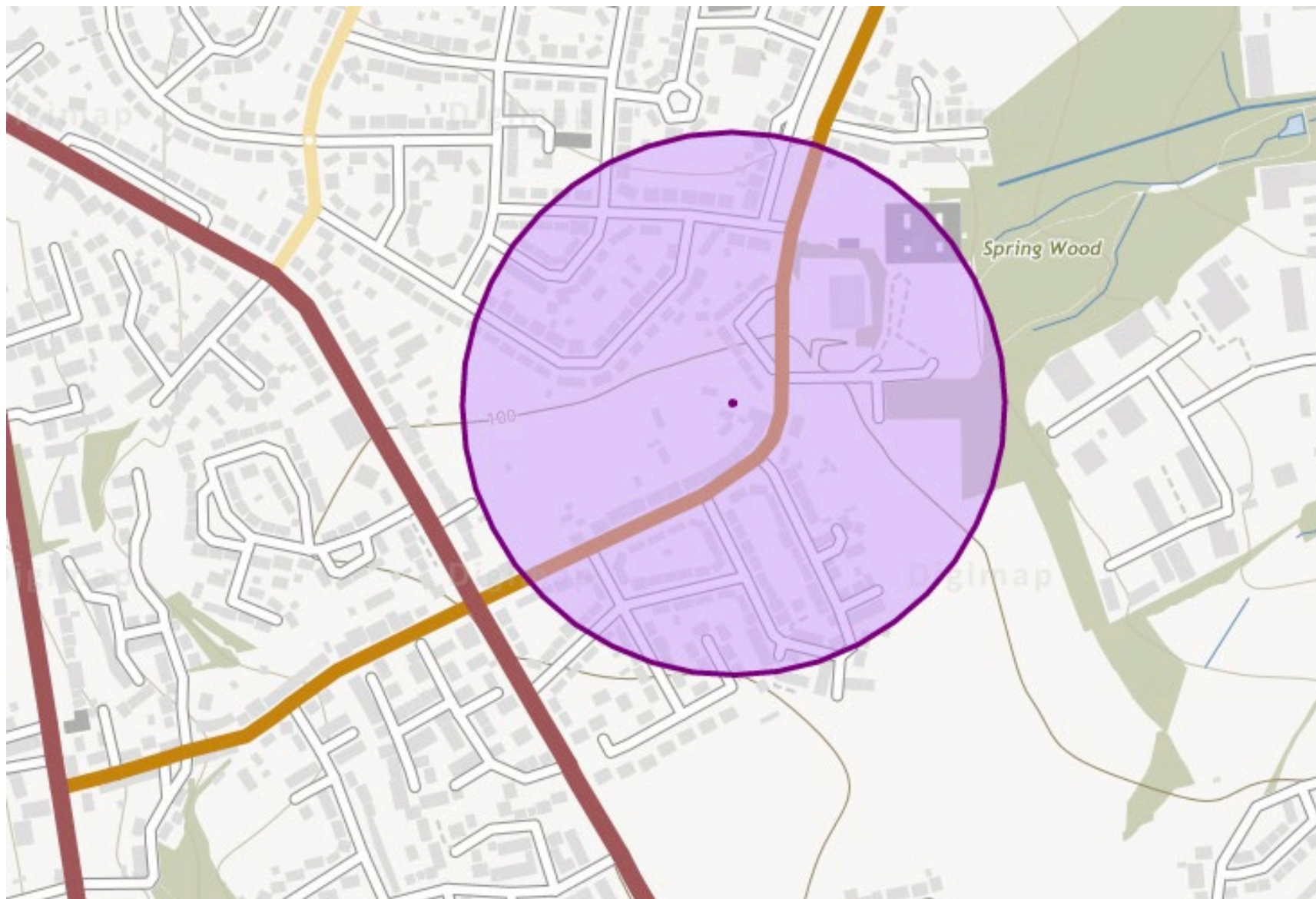
enviro|solution

Modern Map (250m search buffer)

Date: 1984

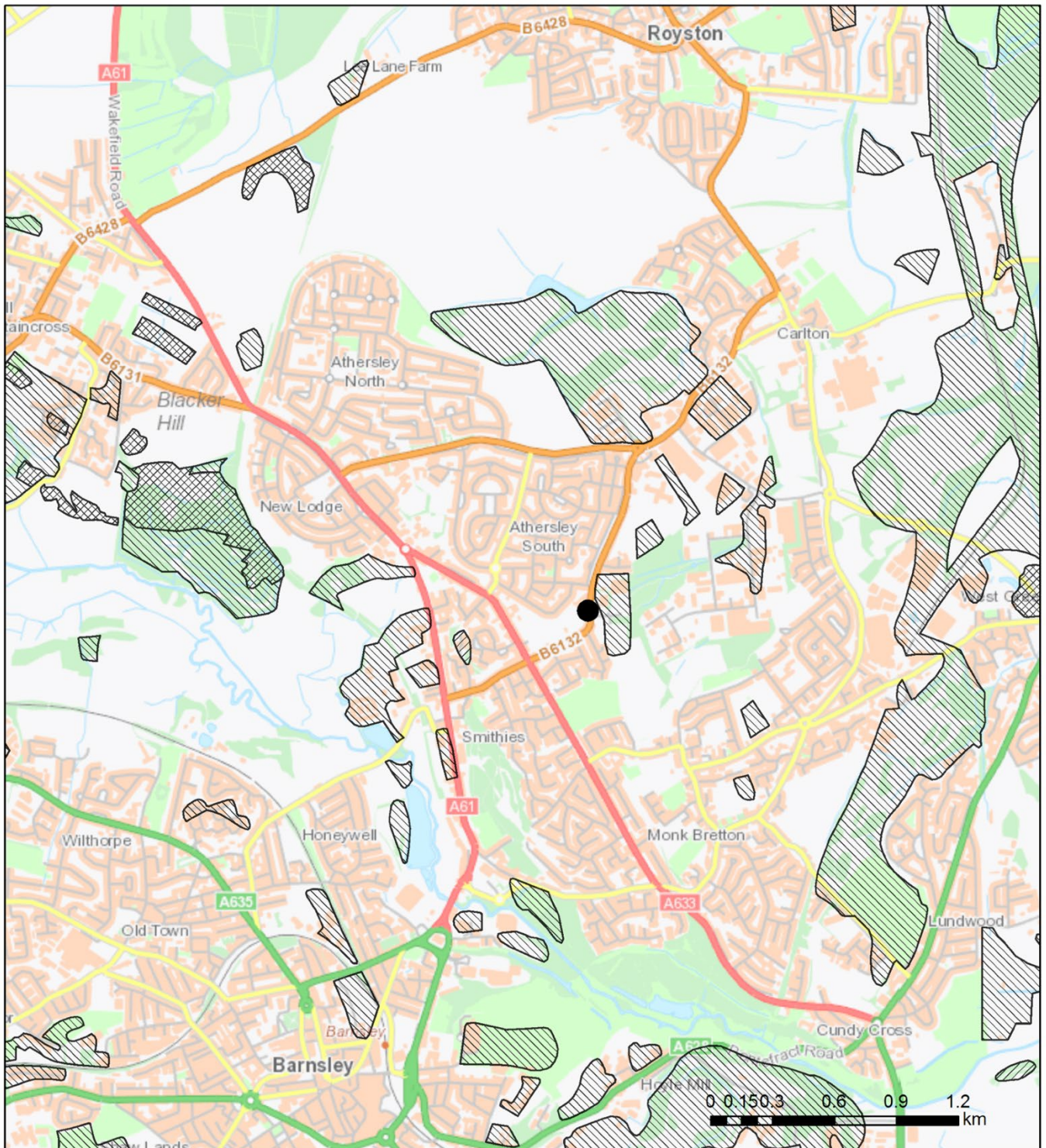
Scale 1:10,000





Appendix D – Geological Maps

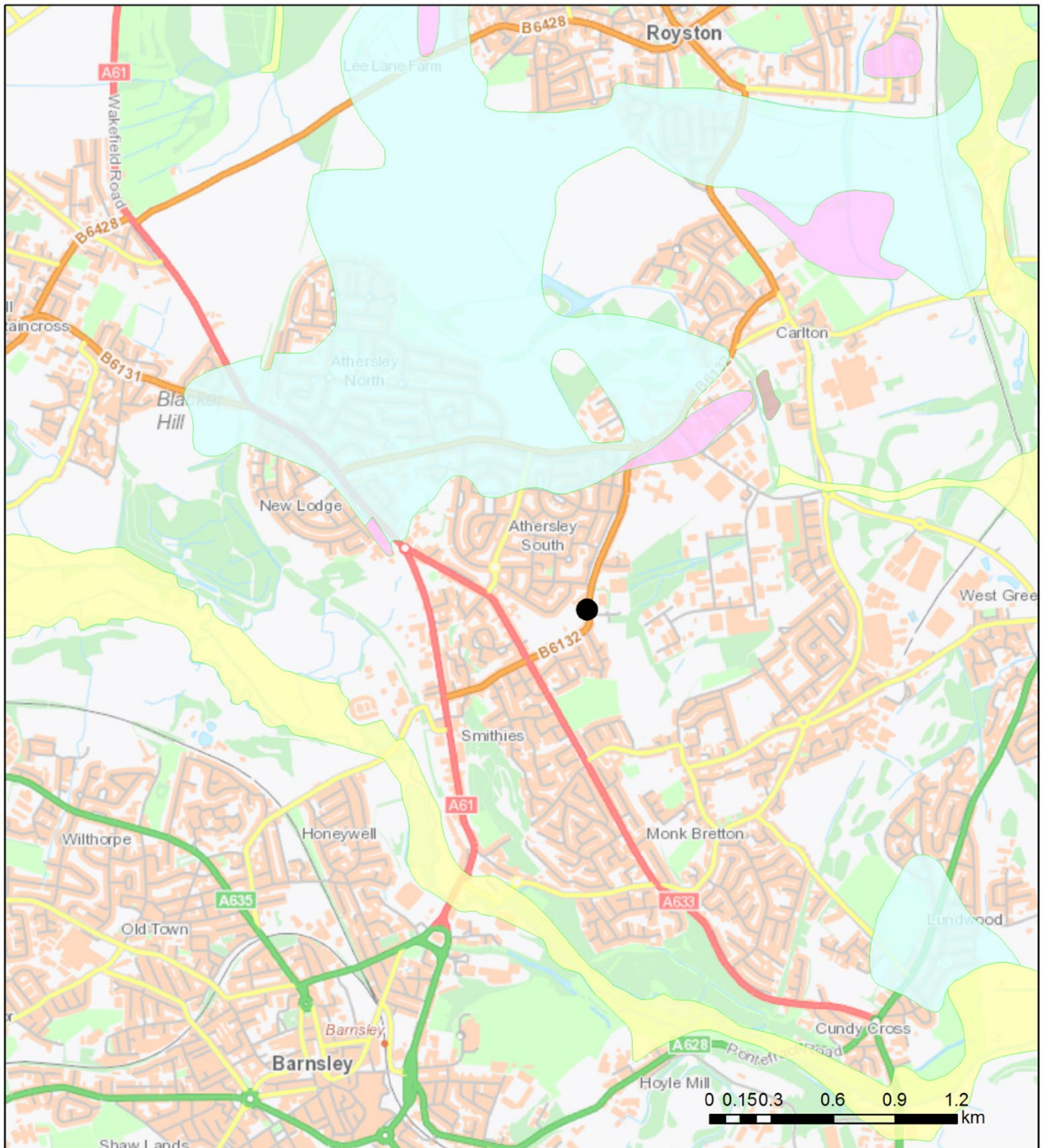
Artificial Geology



Artificial ground 1:50,000 scale

-  **MADE GROUND (UNDIVIDED) - ARTIFICIAL DEPOSIT**
-  **WORKED GROUND (UNDIVIDED) - VOID**
-  **INFILLED GROUND - ARTIFICIAL DEPOSIT**

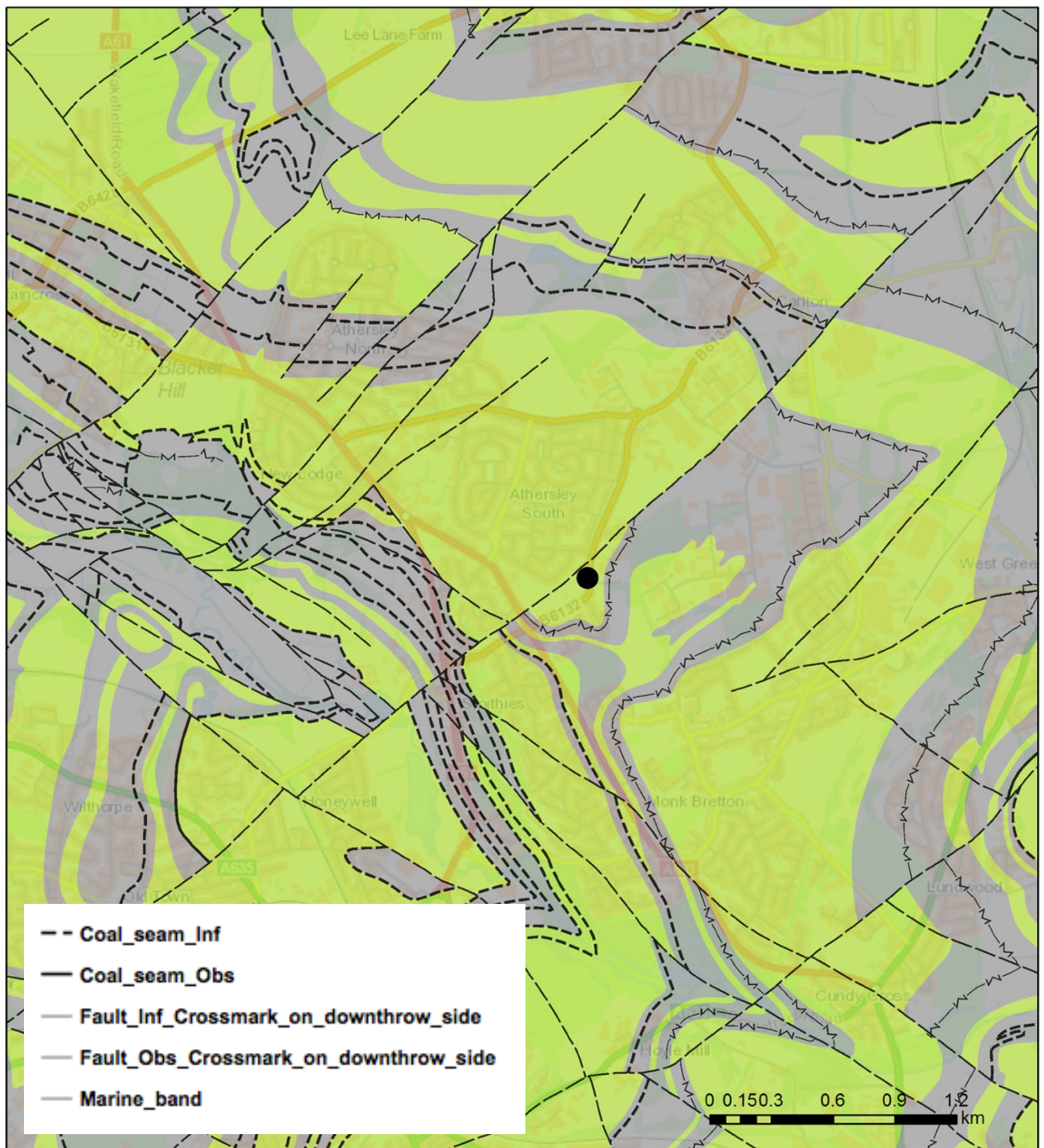
Superficial Geology



Superficial deposits 1:50,000 scale

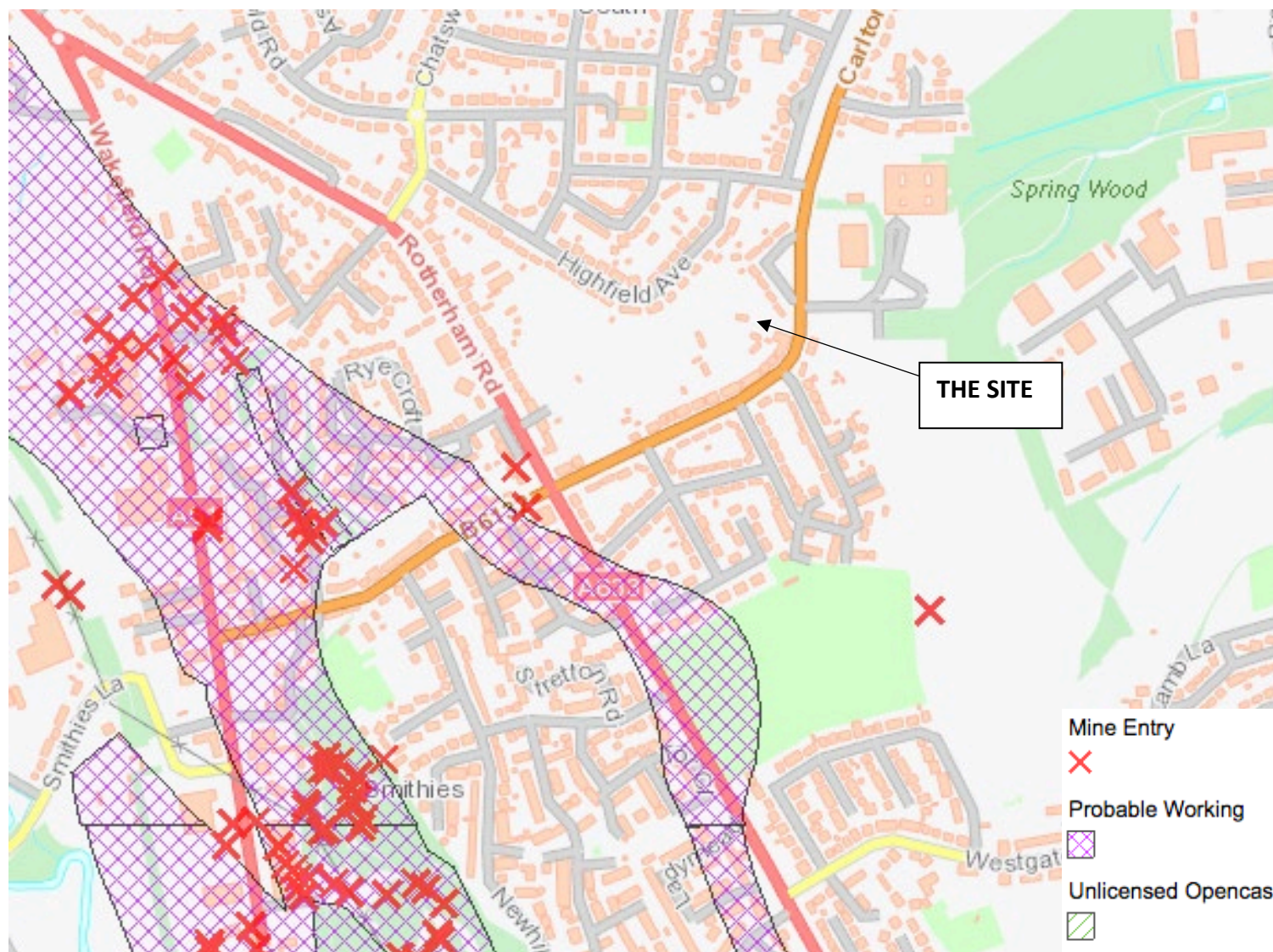
- GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE - SAND AND GRAVEL
- TILL, MID PLEISTOCENE - DIAMICTON
- ALLUVIUM - CLAY AND SILT
- HEAD - DIAMICTON

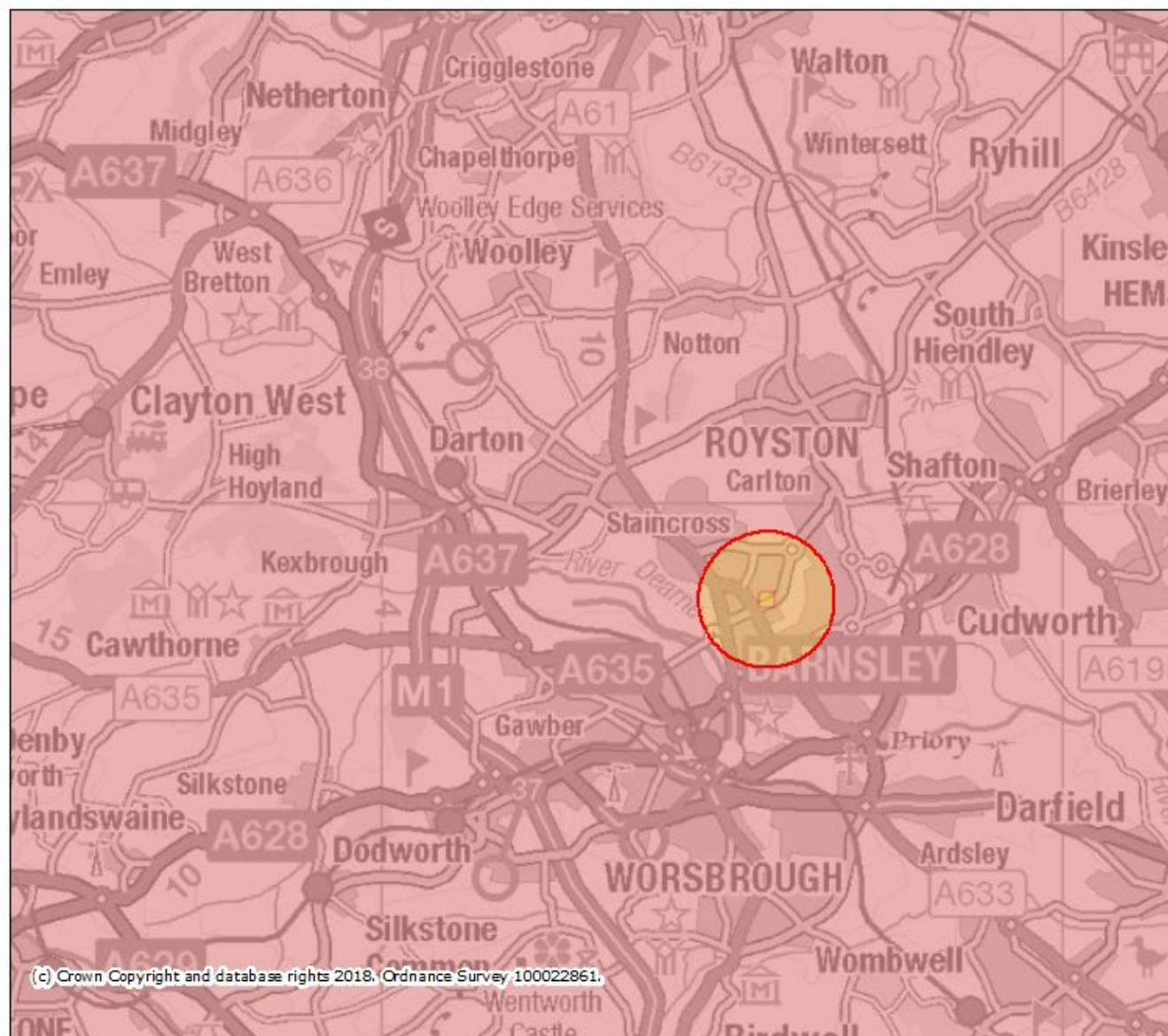
Bedrock Geology



- | | |
|---|---|
|  | <u>PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u> |
|  | <u>PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u> |
|  | <u>PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u> |
|  | <u>ACKTON ROCK - SANDSTONE</u> |
|  | <u>ACKWORTH ROCK - SANDSTONE</u> |
|  | <u>PENNINE UPPER COAL MEASURES FORMATION - SANDSTONE</u> |

Appendix E – Coal Mining Summary Map





Legend

Aquifer Designation Map (Bedrock) (England)

- Principal
- Secondary A
- Secondary B
- Secondary
(undifferentiated)
- Unproductive

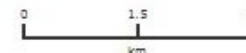
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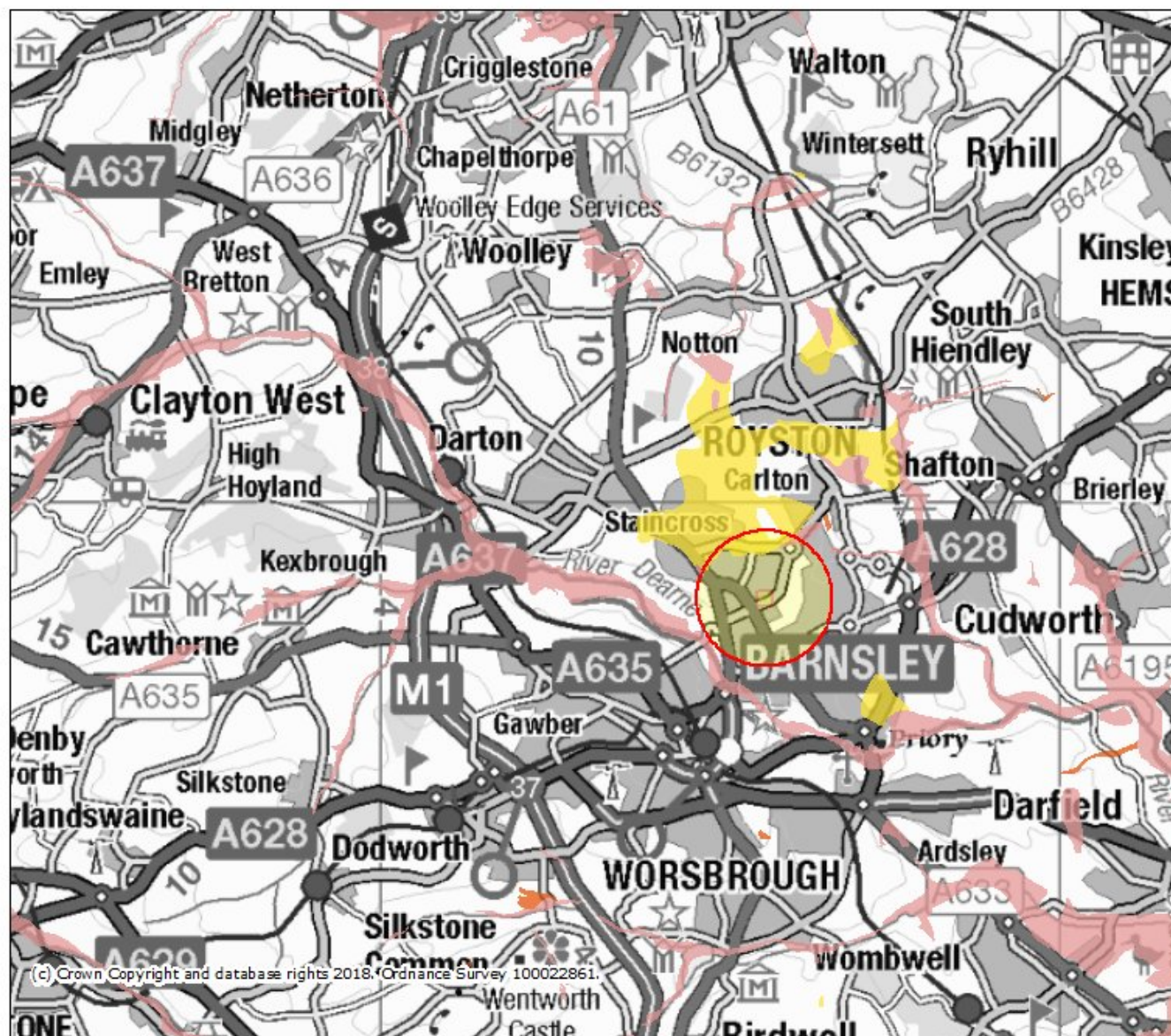
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Legend

Aquifer Designation Map (Superficial Drift) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

Projection = OSGB36

xmin = 417000

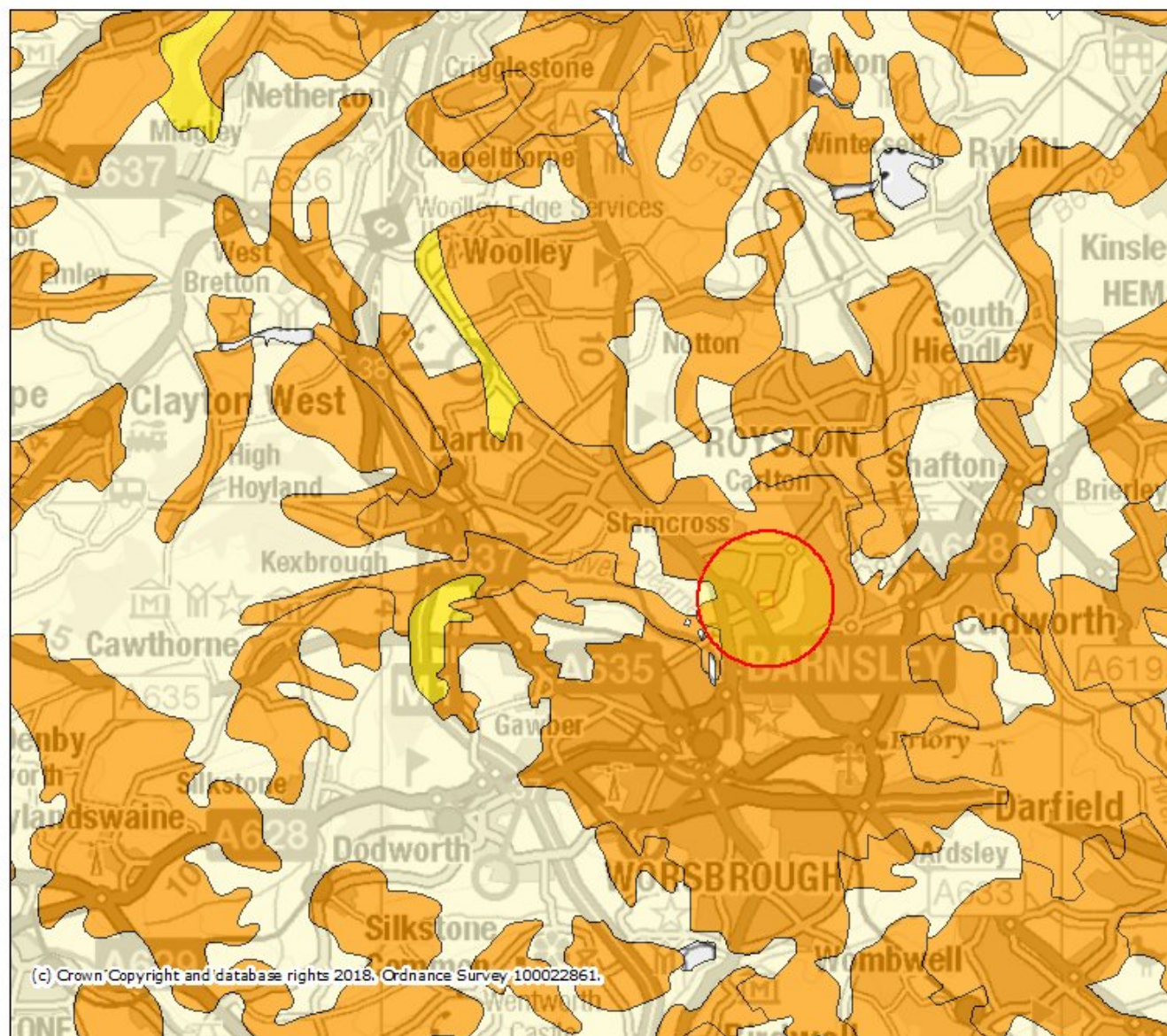
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Legend

Groundwater Vulnerability Map (England)

- Major Aquifer High
- Major Aquifer Intermediate
- Major Aquifer Low
- Minor Aquifer High
- Minor Aquifer Intermediate
- Minor Aquifer Low

Projection = OSGB36

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ymin = 400500

xmax = 449300

ymax = 418900

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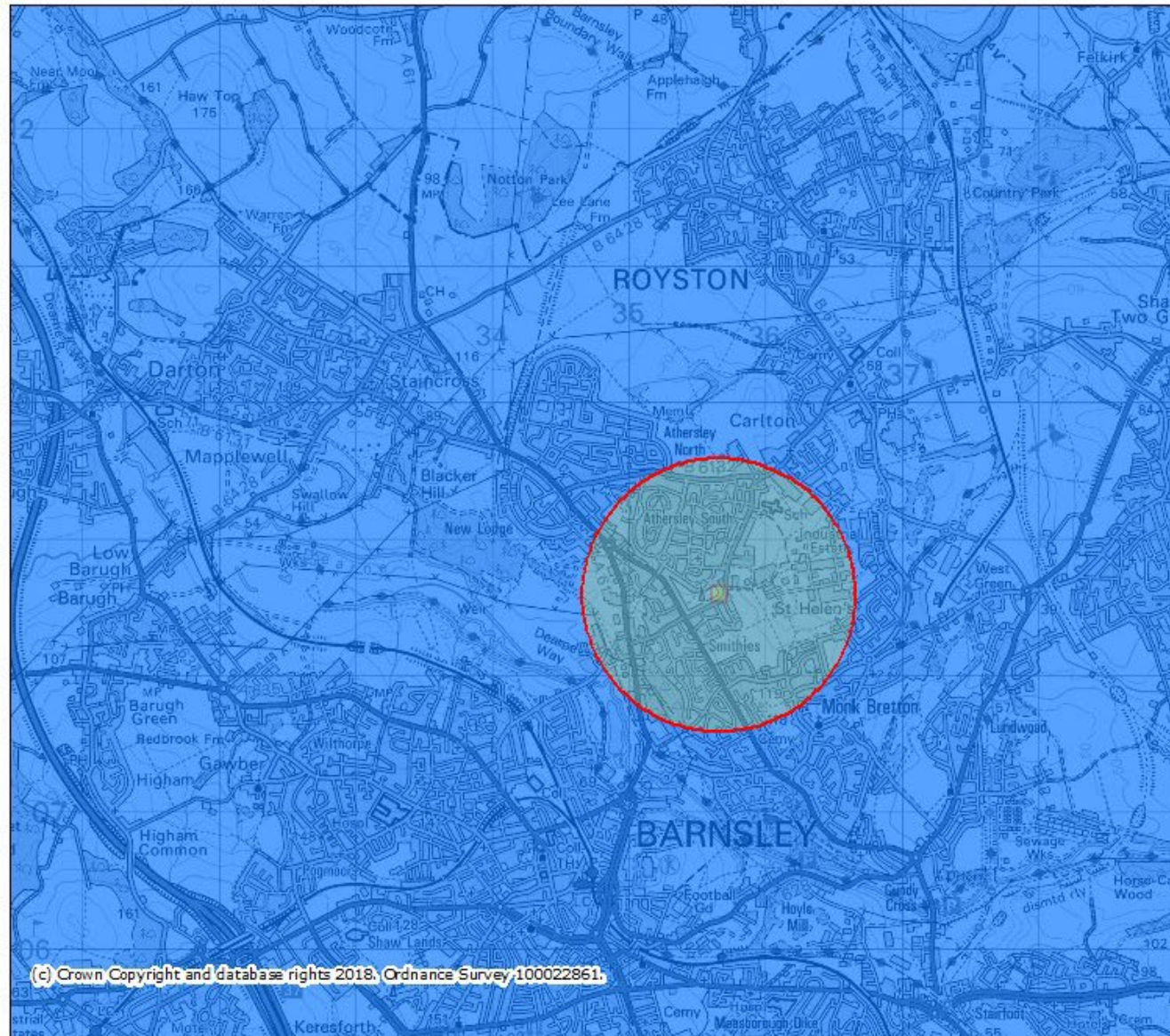
Appendix G – Historic Landfill Map



Appendix H – Environmental Designation Map

MAGiC

Nitrate Vulnerability



Legend

Nitrate Vulnerable Zones 2017 Designations (England)

- Eutrophic Water
- Groundwater
- Surface Water

Projection = OSGB36

xmin = 426700

ymin = 404500

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