PHASE 1 ENVIRONMENTAL SITE ASSESSMENT REPORT

47 CRESCENT ROAD

ROCHDALE

OL11 3LG

Prepared for:

Mohammad Imran

By:

ENVIROSOLUTION LTD

The Quay Suite 5

No. 12 Princess Docks

Liverpool Waters

Liverpool

L3 1DL

Date: 29th May 2019

EnviroSolution Ltd
Document Verification

Site Address	47 Crescent Road, Rochdale, OL11 3LG		
Report Title	Phase 1 Environmental Site Assessment Report		
Job Number	CL101	**Document Ref.**	CL101
Date Issued	29th May 2019	**Report Version**	1
Prepared by	Tom Craig	**Signature**	
Checked by	Gemma Lucas	**Signature**	

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Executive Summary
The preliminary environmental site assessment indicates that the site can be classified as moderate 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 moderate. This classification is due to the previous use of the site as garages and the potential for Made Ground deposits to be present associated with the demolition of the garage structures. There is therefore the potential for contaminants such as heavy metals, hydrocarbons and asbestos to be present in the ground beneath the site. Additionally, there is the potential for peat deposits to be present beneath the site which could generate ground gases (e.g. methane and carbon dioxide). It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

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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 land to the rear of 47 Crescent Road in Rochdale. This report was commissioned to support the planning application for the construction of a new residential property with detached garage.

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. Site walkover assessment survey
3. Assessment of potential hazards and constraints during construction and longer term.

This work has been devised to generally comply with the relevant principles and requirements of the following legalisation and guidance:

- Part IIA of the Environmental Protection Act, 1990 and Section 57 of the Environmental Act 1995;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, February 2019);
- BS10175: 2011 +A2:2017 “Investigation of Potentially Contaminated Sites- Code of Practice”; and
- DEFRA/Environment Agency (2004) Report CLR11 “Model Procedures for the Management of Land Contamination”.

1.4 Information Sources

Historical Ordnance Survey maps have been obtained from historical records, ranging from 1851 to 2019. 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 land to the rear of 47 Crescent Road, Rochdale, OL11 3LG. The British National Grid Reference for the approximate site centre is GR: 387735 411494.

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 on the 28th May 2019.

The site is irregular in shape and has an approximate area of 1,350 square meters. The plot forms an open area to the rear of several properties along Crescent Road, Bluebell Drive and Kingsland Road.

The majority of the site is grassed with a small tarmacadam track running along the southern end of the site which extends to the rear alleyway / access track. The site is generally flat with little change in topography.

A group of trees are located just north of the access track and in the north-eastern corner of the site. No signs of discolouration were noted on either the leaves or the visible soils.

The site is bounded by the rear gardens and adjacent allotment gardens. The site boundaries consist of wooden and metal fencing on all sides.

The immediate surrounding land use is predominantly residential.

There are no petro filling stations located within a 250m radius of the site.

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

Photographs of the site taken during the walkover survey are included in **Appendix B.**

2.3 Development Proposals

It is understood that the development plans comprise the construction of a new detached property with a detached garage and areas of soft landscaping

The current planning application reference number is: 18/00386/FUL.

The development plans are shown on **Figure 3** in **Appendix A**.

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
1851	1:10,560	Site lies within an open agricultural field.	Mathew Farm 170m west of the site.
1890	1:2,500	No significant change.	Well 140m west of the site. Pump 170m west of the site.
1910	1:2,500	No significant change.	Terraced residential houses built 60m west and 120m east of the site.
1929	1:2,500	No significant change.	Residential properties built along Lynton avenue adjacent to the south eastern site boundary. Small mill reservoir 245m south of the site.
1958	1:2,500	No significant change.	Allotment gardens adjacent to the southern site boundary, 100m east and 140m north of the site. Residential development 170m north of the site.
1970	1:2,500	Small garages built along the northern site boundary of the site.	Large residential development adjacent to the site boundary extending north. Electrical substation 40m east and 140m north of the site. High school 170m west of the site.
1993	1:10,000	No significant change.	Large residential development 10m south of the site.
2019	1:2,500	Garages demolished. Site now grassed.	Reservoir demolished 245m south of the site and replaced with care home.

3 Environmental Setting

3.1 Geology

Geological maps of the area indicate the site is directly underlain by glaciofluvial deposits which are of Quaternary age. Glaciofluvial deposits generally consists of variable sands and gravels, locally with lenses of silt and clay.

The underlying bedrock consists of the Pennine Lower Coal Measures Formation which is of Carboniferous age. The formation generally consists of interbedded grey mudstone, siltstone and pale grey sandstone, with numerous thicker coal seams in the upper part. The geological maps indicate that the site lies above a band of Old Lawrence Rock which is a sandstone unit within the coal measures.

A BGS borehole log (Ref: SD81SE58) has been obtained from BGS online records approximately 130m southwest of the site. The borehole logs show 0.60m of Made Ground at the surface, overlying a 0.50m layer of fibrous peat. Beneath the peat are deposits of variable silty sands and sandy silts with interbedded clays. Bedrock was not encountered in the borehole with a maximum depth of 12.50m below ground level.

No geological faults have been identified within a 500m radius of the site.

A copy of the geological maps is included in **Appendix D.** A copy of the BGS borehole records is included in **Appendix E**.

3.2 Radon

The site lies within an elevated band of radon potential where it is estimated that a maximum of between 1-3% of the properties are above the action level (low probability). Radon protective measures are not deemed necessary for the development.

3.3 Coal Mining Activity

The site falls within a coal mining area described as having minable coal deposits but does not lie within a 'Development High Risk Area' for coal mining, as defined by the Coal Authority.
A review of the Coal Authority Interactive Viewer map (**Appendix F**) has shown that there are no recognised coal mining related hazards which could affect the site.

3.4 Hydrogeology

The superficial glaciofluvial deposits are designated 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 Pennine Lower Coal Measures Formation is designated as a Secondary A Aquifer, defined as above.

The site is not located within Source Protection Zone and there are no known groundwater abstraction licences held within a 1km radius of the site.

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

3.5 Hydrology

The River Roch is located 720m north of the site and is the only significant surface water course (rivers, lakes, reservoirs) located within a 1km radius of the site.

There are no minor surface water features located within a 250m radius of the site.

3.6 Flood Risk

The site lies within a Flood Zone 1, land assessed as having less than a 1 in 1,000 annual probability of river flooding (0.01%) in any year (low risk).

The completion of a detailed Flood Risk Assessment is not deemed necessary for this site.

3.7 Waste Management Facilities

There are no records of historic or currently authorised landfill sites located within a 1km radius of the site.

There are no records of sites in the surrounding area operating under an environmental permit for waste operations.

3.8 Environmental Permits, Incidents and Registers

There is a single record of a site located within a 500m radius of the site operating under an environmental permit. The permit is held for discharges to water and groundwater approximately 300m west of the site.

There are no records of any pollution events having occurred within a 500m radius of the site.

3.9 Designated Environmentally Sensitive Sites

Records of designated environmentally sensitive sites locates within a 1km radius of the site are summarised in Table 2 and shown on plans included in **Appendix H**.

Table 2 – Environmental Designations Summary

Features	Distance	Comments
Sites of Special Scientific Interest	980m	The Rochdale Canal SSSI is located 980m southeast of the site.

4 Preliminary Conceptual Site Model

4.1 Introduction

In order 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 taking into account the development proposals. This preliminary conceptual model is based on the gathered desk based information (e.g. historical OS data and data sourced from the EA, Geoindex and Magic databases).

The conceptual site model is a representation of the hypothesised relationships between sources, pathways and receptors which allows the identification of potential pollutant linkages and whether these linkages have the potential to comprise significant harm and/or pollution of controlled waters in relation to the site. 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 all three elements are present, then a potential pollutant linkage exists and this may require further assessment.

4.2 Potential Contamination Sources

The site was undeveloped agricultural land until the 1970s when it was developed for residential garages b for the properties along Crescent Road. The garages have since been demolished. The specific use of the garages is unknown but are likely to have been used for vehicle storage. Therefore, there is the potential for contamination to be present in the ground associated with this land use. Potential contaminants could include heavy metals and hydrocarbons. Furthermore, Made Ground may be present on the site associated with the demolition of the garage structures. Therefore, there is the potential for contaminants such as heavy metals, hydrocarbons and asbestos to be present in the Made Ground deposits.

A nearby borehole record shows the presence of peat deposits and so there is the potential for peat to be present beneath the site too. Peat is organic rich and has the potential for the generation of ground gases (e.g. methane and carbon dioxide). Therefore, there is the potential for ground gases to be present beneath the site if peat deposits are present.

Historical records indicated the presence of two electrical substations in the vicinity of the site from the 1970s. therefore, there is the potential for polychlorinated biphenyls to be present in the ground beneath the site associated with these features.

4.3 Receptors

The potential receptors considered to be at risk from soil and groundwater contamination associated with the site are summarised in Table 3 below:

Table 3 - Receptor Description

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

4.4 Pathways

The potential exposure pathways linking contamination with the receptors identified above are summarised in Table 4 below:

Table 4 - 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 - Inhalation of migrating gases and vapours
Controlled waters	- Vertical and lateral migration of dissolved phase contaminants via preferential pathways to groundwater aquifers - Lateral migration and surface water run-off to water courses
Building/construction	- Buried materials/services - Contact with contaminated soil and/or groundwater

4.5 Potential Pollution Linkages

4.5.1 Human Health

The development comprises the construction of a new residential dwelling. Development plans include a detached garage and an area of soft landscaping. This is considered to be 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) and vapours 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.

4.5.2 Controlled Waters

The development involves the increase in impermeable hardstanding at the site. This will reduce the infiltration at the site and limit any vertical migration of any potential contaminants to the underlying aquifers.

No significant surface water features have been identified nearby and there are no groundwater abstraction licenses held in the surrounding area. The risk to controlled waters is considered to be low.

4.5.3 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. Gas migration towards the site is considered feasible with migration through the permeable underlying strata.

4.6 Preliminary Hazard Assessment

A preliminary hazard assessment is presented in Table 5. 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 5 – 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	2	3	Moderate	Source potential identified.
Contaminated soil groundwater	Direct contact	Buildings/ services	2	3	Moderate	Source potential identified.
Contaminated groundwater	Downward or lateral migration	Secondary A Aquifer River Roch	1	3	Low	Increase in impermeable hardstanding will reduce infiltration. No groundwater abstractions located nearby.
Ground gas / vapours	Inhalation, ingress into buildings	Buildings / services Future site users Adjacent site users Construction workers	2	4	Moderate	Potential ground gas source identified from potential peat deposits.

Using Risk Matrix (Table 6) Degree of Risk (R) = Likelihood (L) x Effect (E)

Table 6 - 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

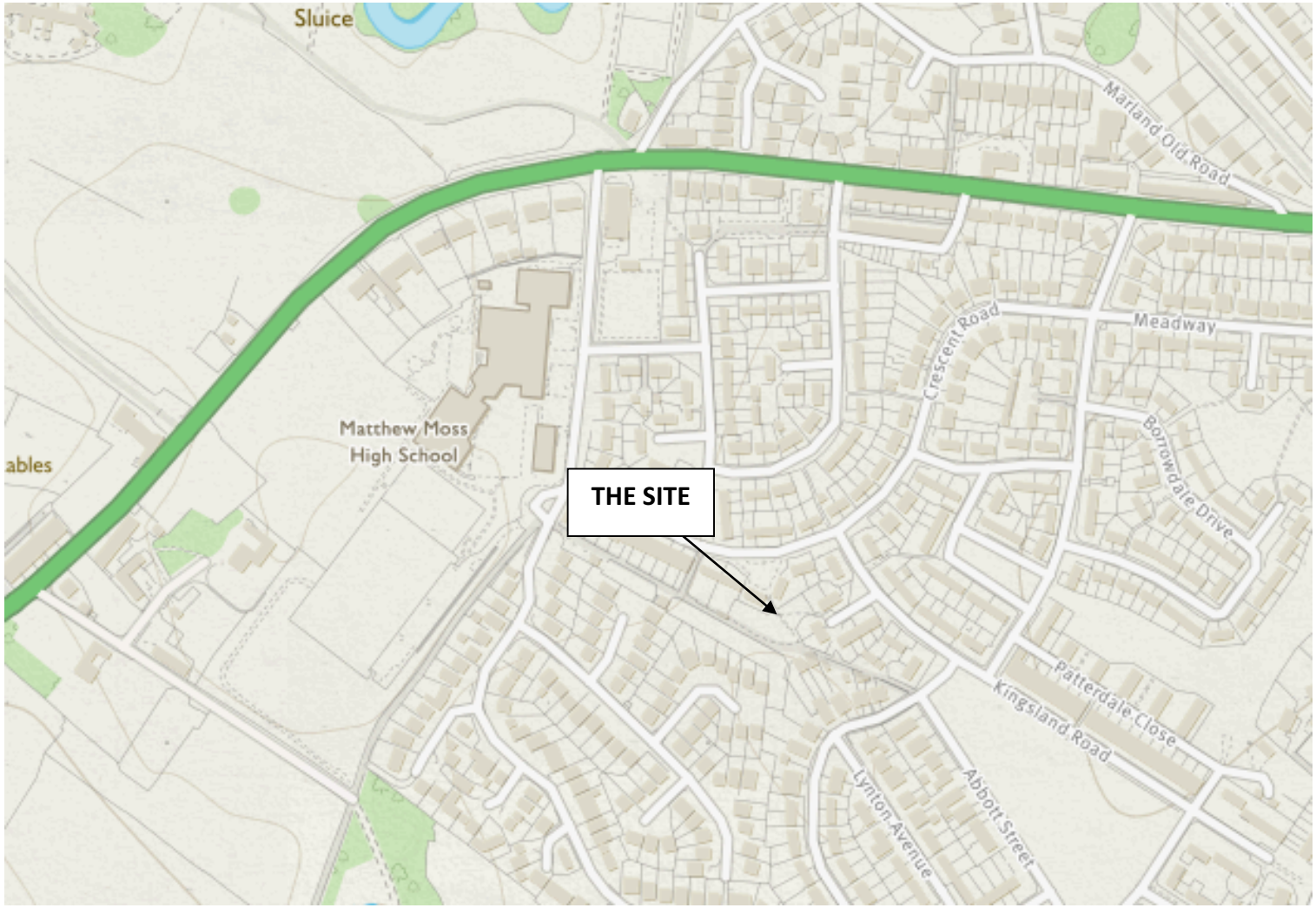
The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be moderate.

This classification is due to the previous use of the site as garages and the potential for Made Ground deposits to be present associated with the demolition of the garage structures. There is therefore the potential for contaminants such as heavy metals, hydrocarbons and asbestos to be present in the ground beneath the site. Additionally, there is the potential for peat deposits to be present beneath the site which could generate ground gases (e.g. methane and carbon dioxide).

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

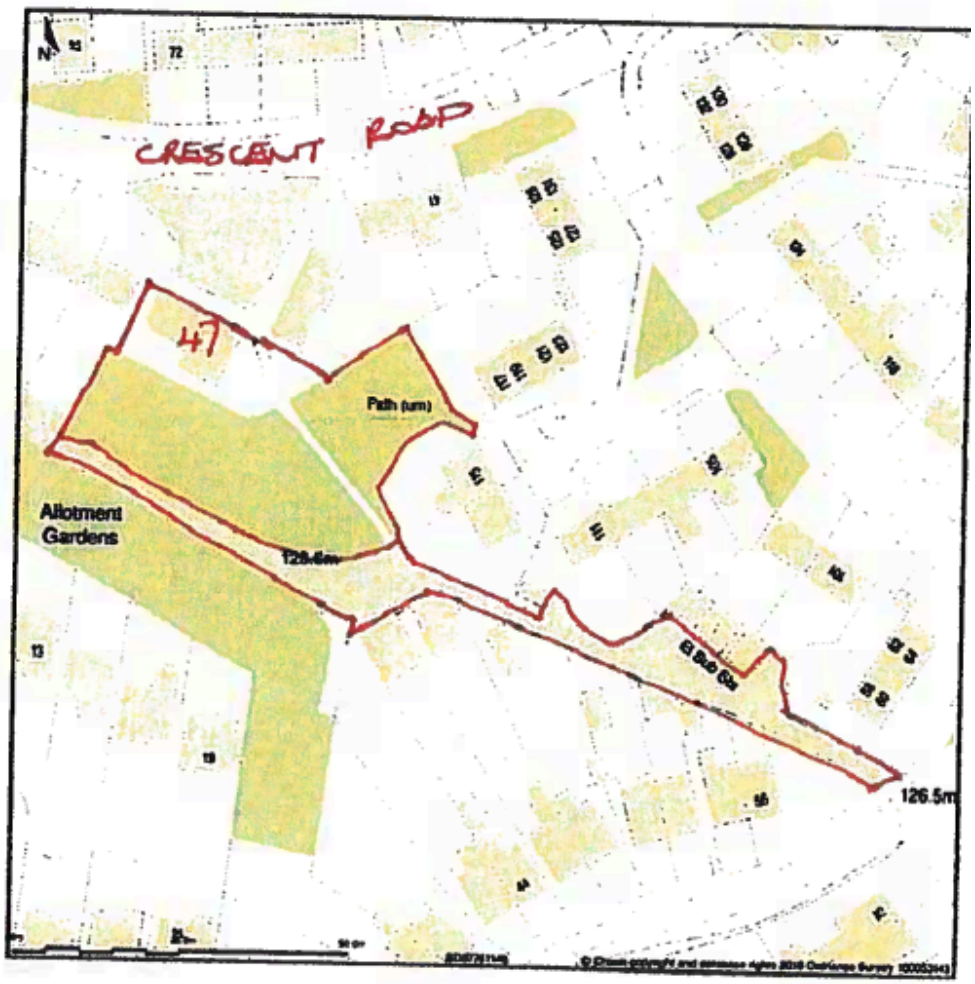
APPENDICES

Appendix A – Site Location and Site Plan



enviro | solution	**Site Location Map**

Figure 1



enviro | solution	**Existing Site Plan**

Figure 2



enviro | solution

Proposed Development Plan

Figure 3

Appendix B – Site Photographs



enviro | solution	**View looking east along access track**



enviro | solution	**Two garages located in the south-eastern corner of the site**



enviro | solution	**Adjacent properties, looking south**



enviro | solution	**View of southern site boundary, looking west**



enviro | solution	**View of site looking northwest**



enviro | solution	**View of site looking west**



enviro | solution	**Area of trees and shrubs in the north-eastern corner**



enviro | solution	**View of the eastern site boundary**



enviro | solution	**View of site, looking southeast**



enviro | solution	**View of the site, looking southwest**



enviro | solution	**Evidence of burning on site**

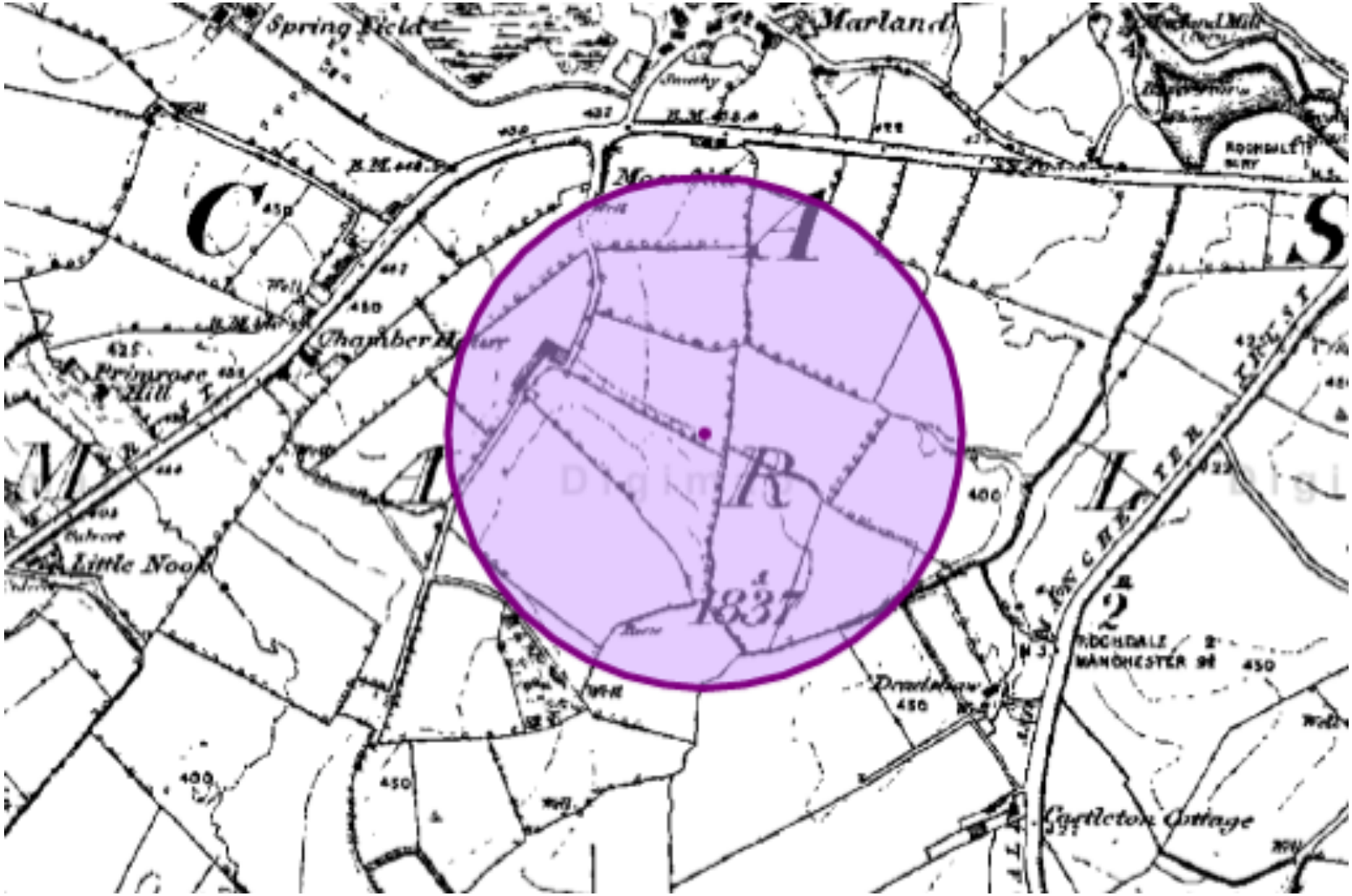


enviro | solution	**Site access from Crescent Road**



enviro | solution	**View looking east**

Appendix C - Historical Maps



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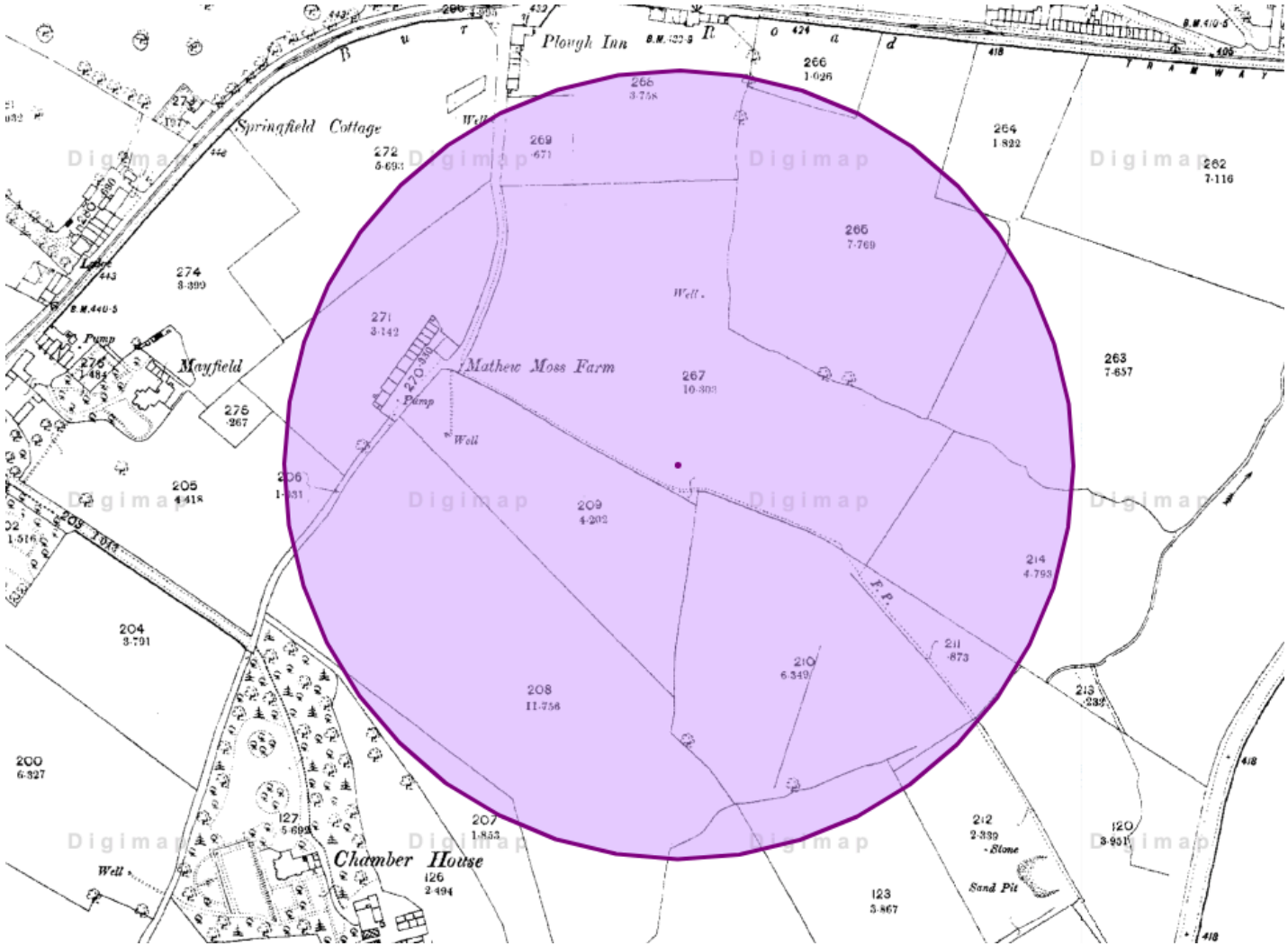
Historic Map (250m search buffer)
Date: 1851
Scale 1:2,500



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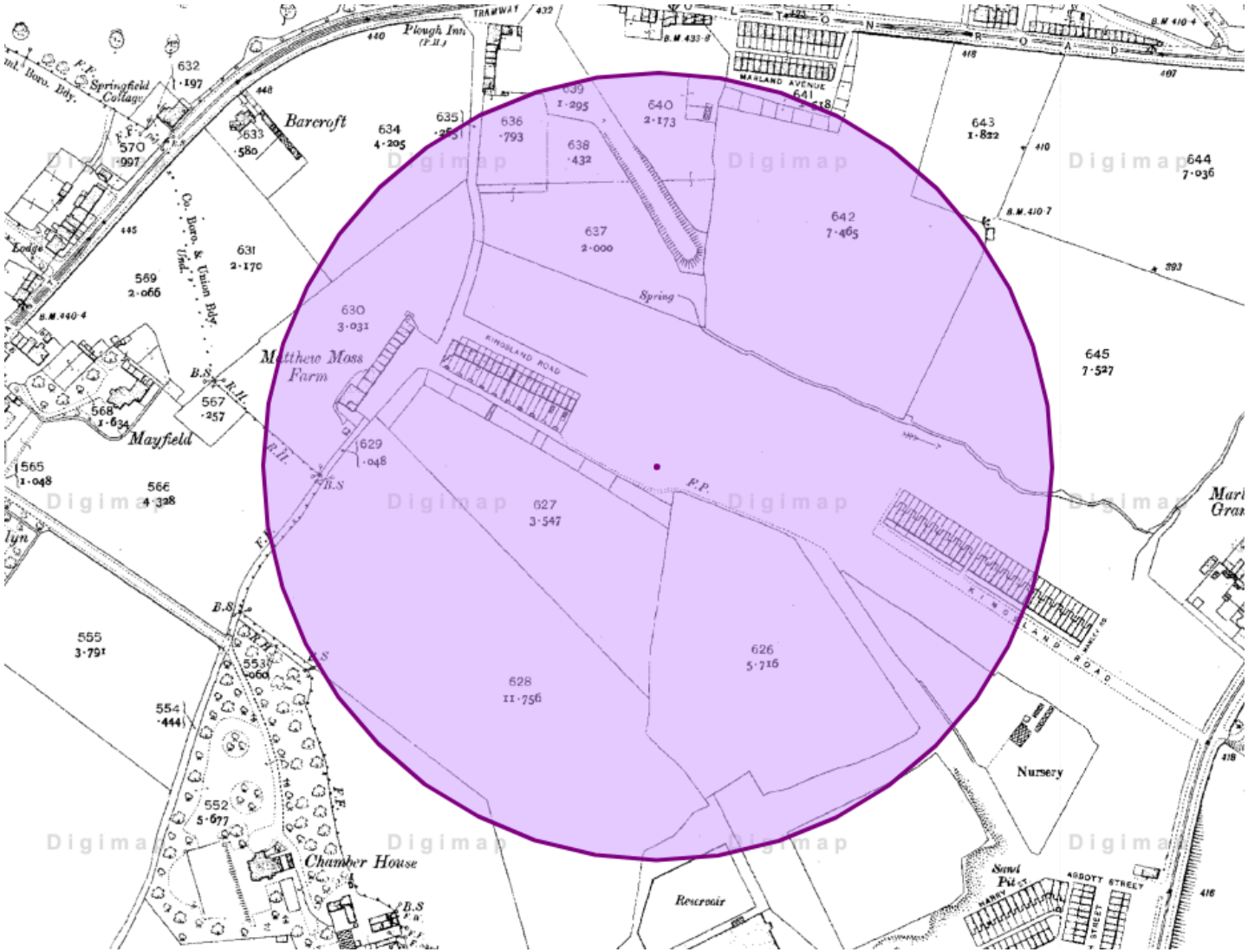
Historic Map (250m search buffer)
Date: 1890
Scale 1:2,500



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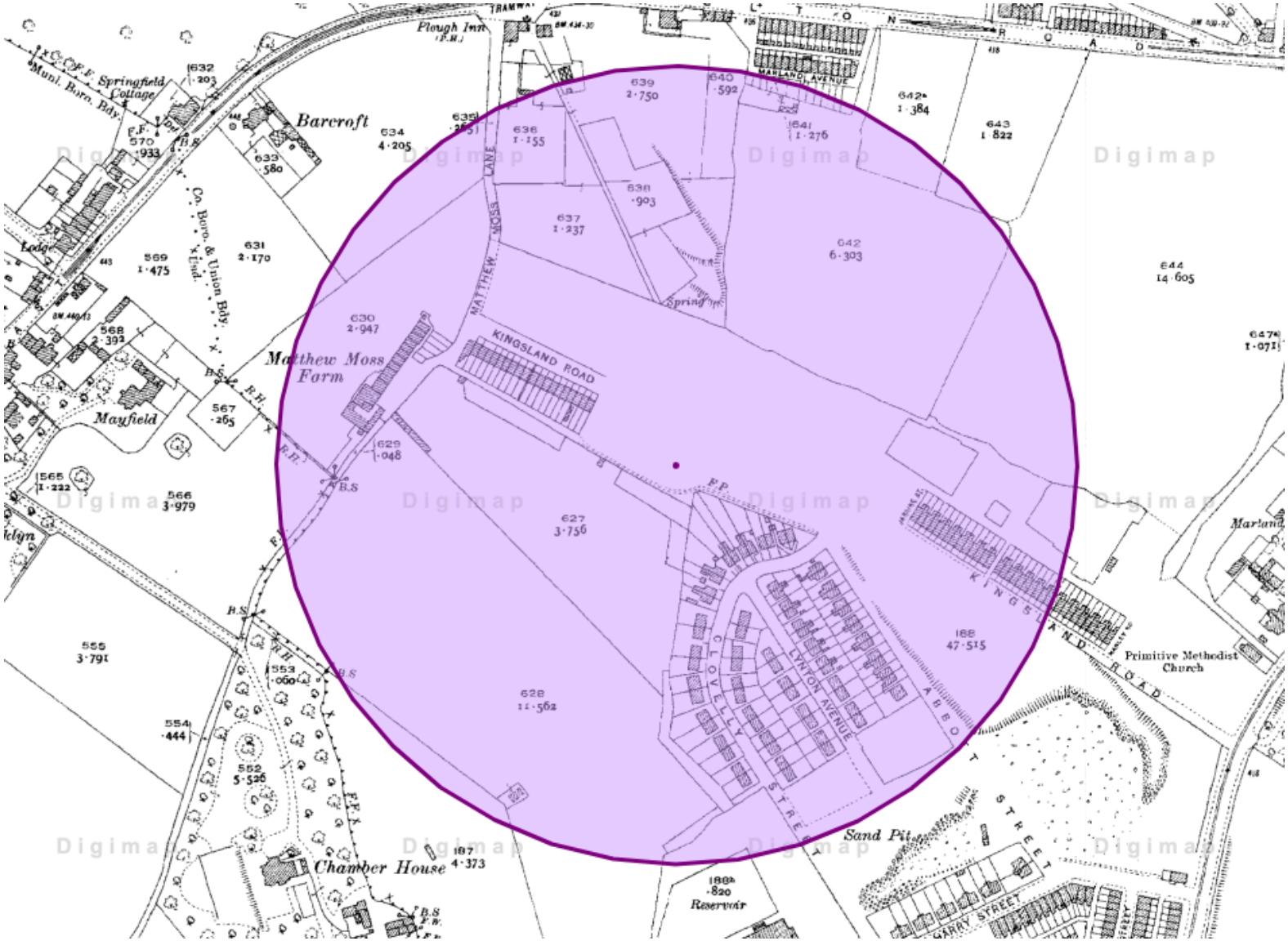
Historic Map (250m search buffer)
Date: 1910
Scale 1:2,500



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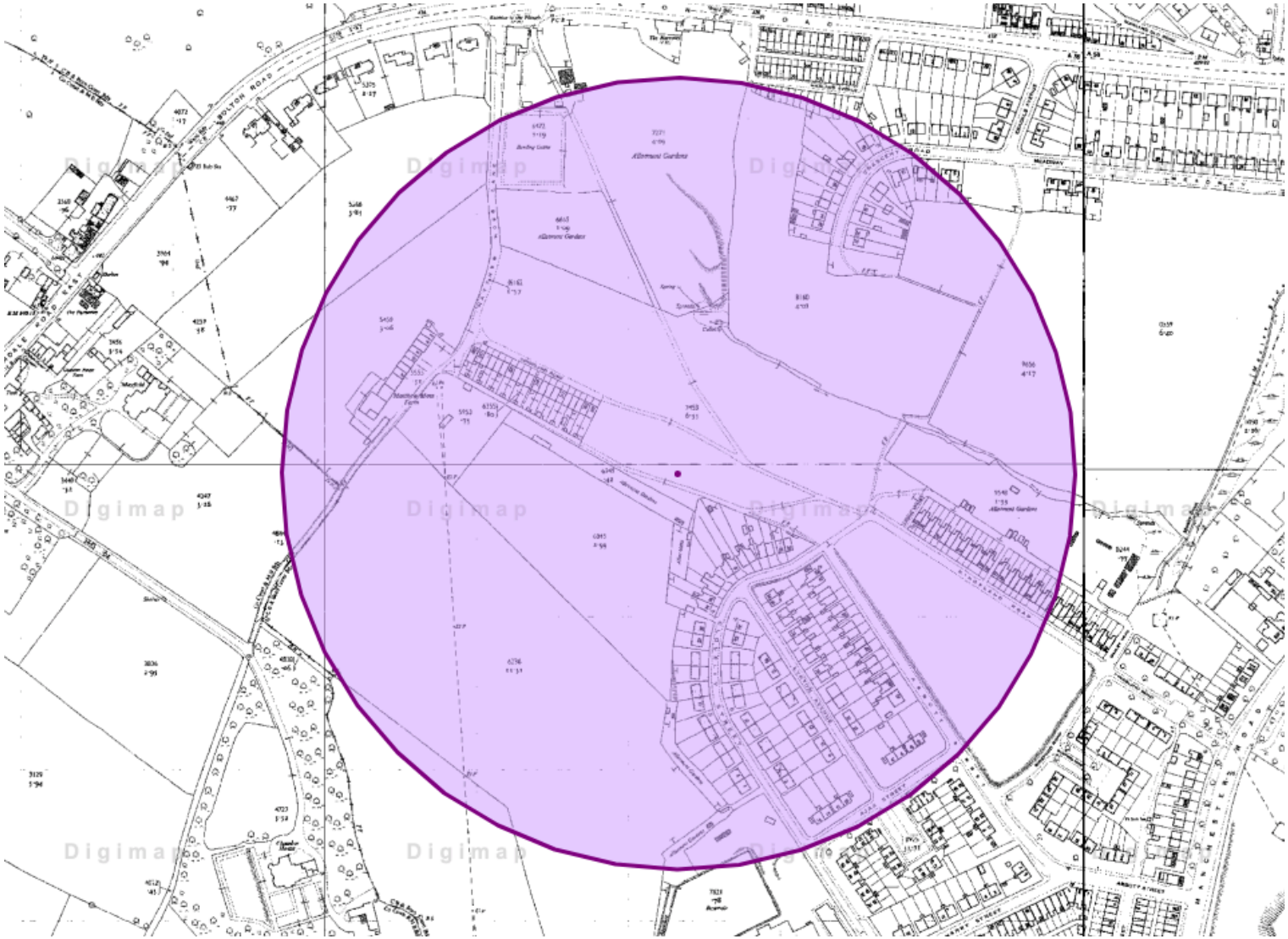
Historic Map (250m search buffer)
Date: 1929
Scale 1:2,500



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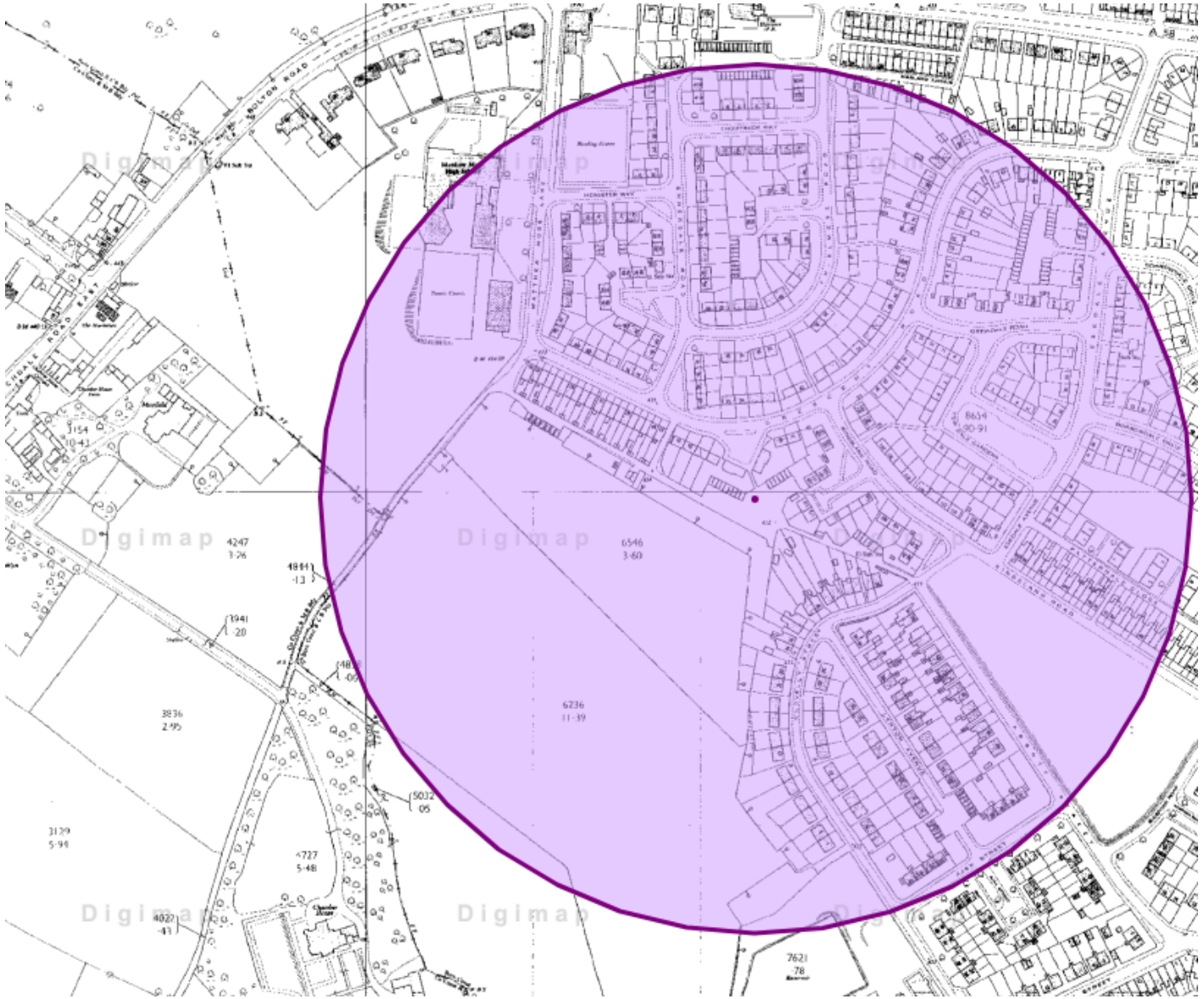
Historic Map (250m search buffer)
Date: 1958
Scale 1:2,500



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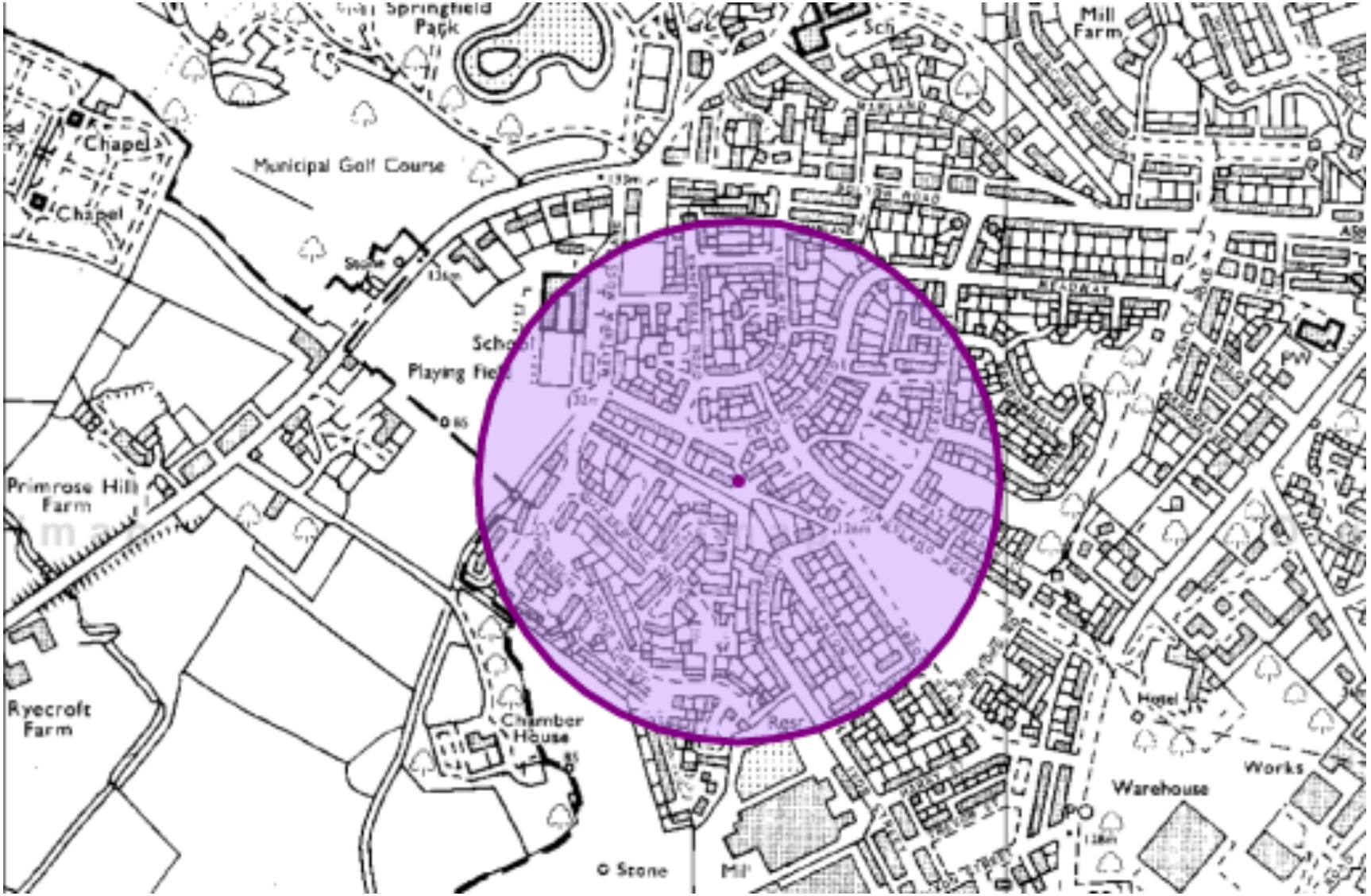
Historic Map (250m search buffer)
Date: 1970
Scale 1:2,500



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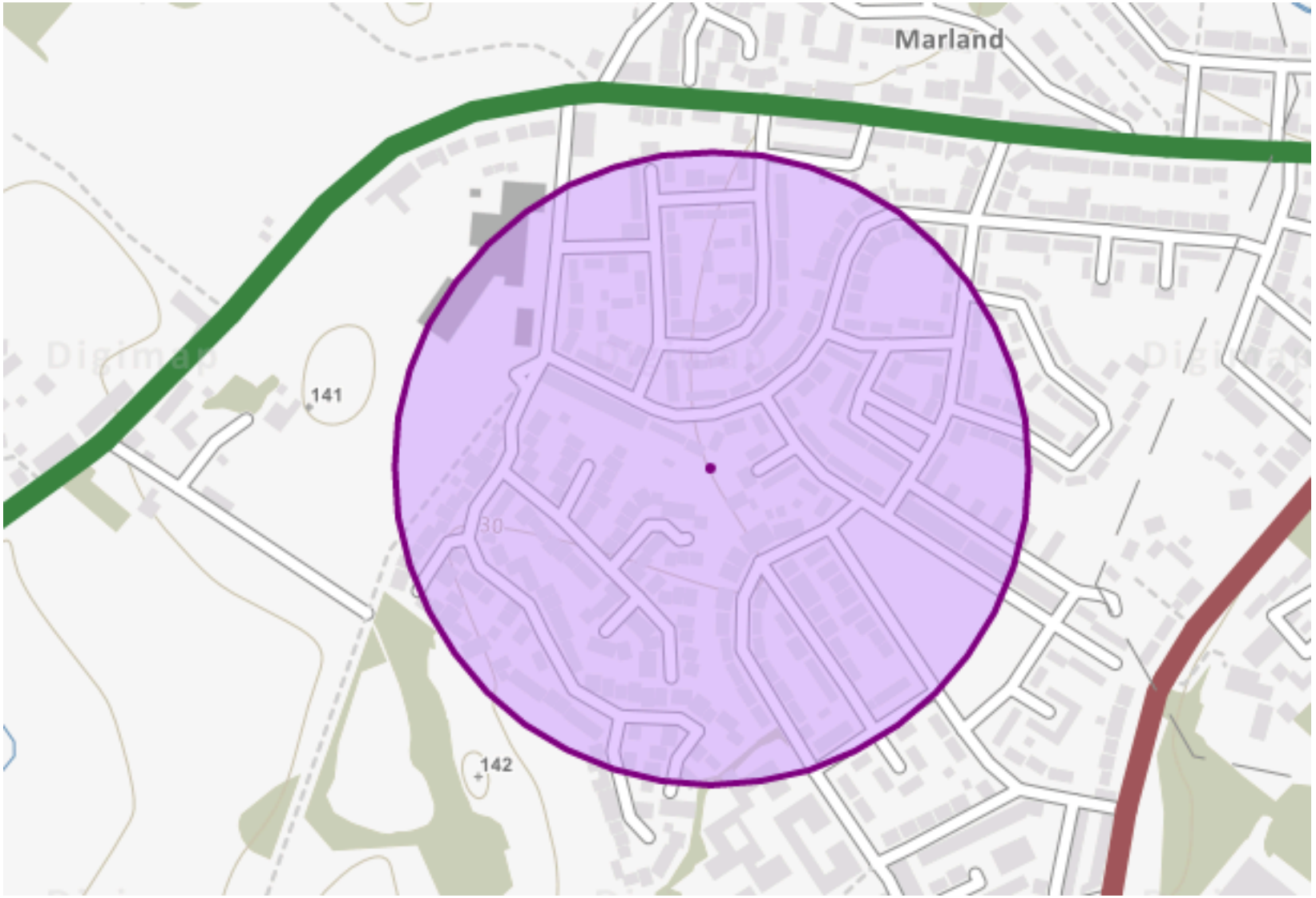
Historic Map (250m search buffer)
Date: 1993
Scale 1:2,500



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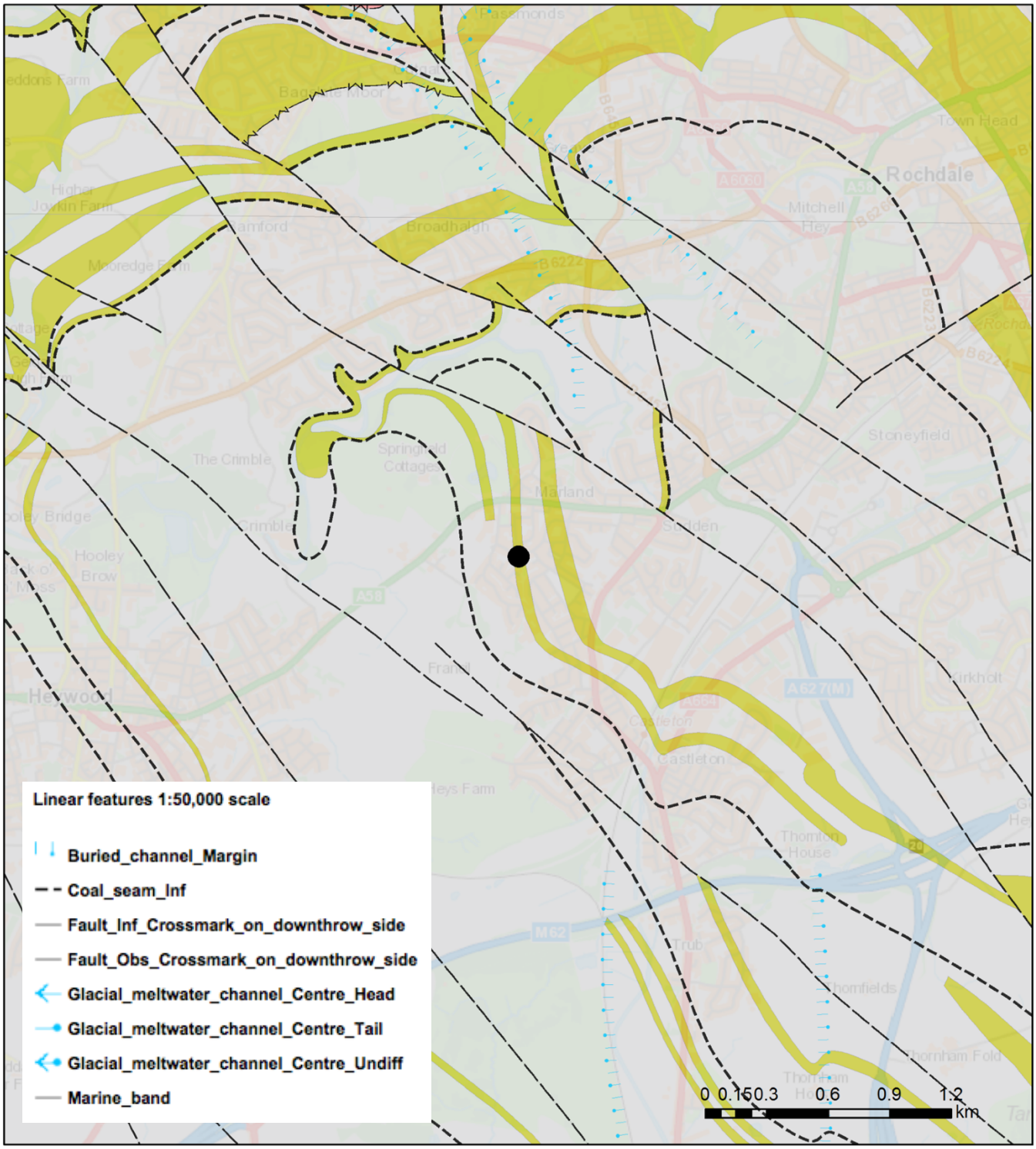
Historic Map (250m search buffer)
Date: 2019
Scale 1:2,500

Appendix D – Geological Maps

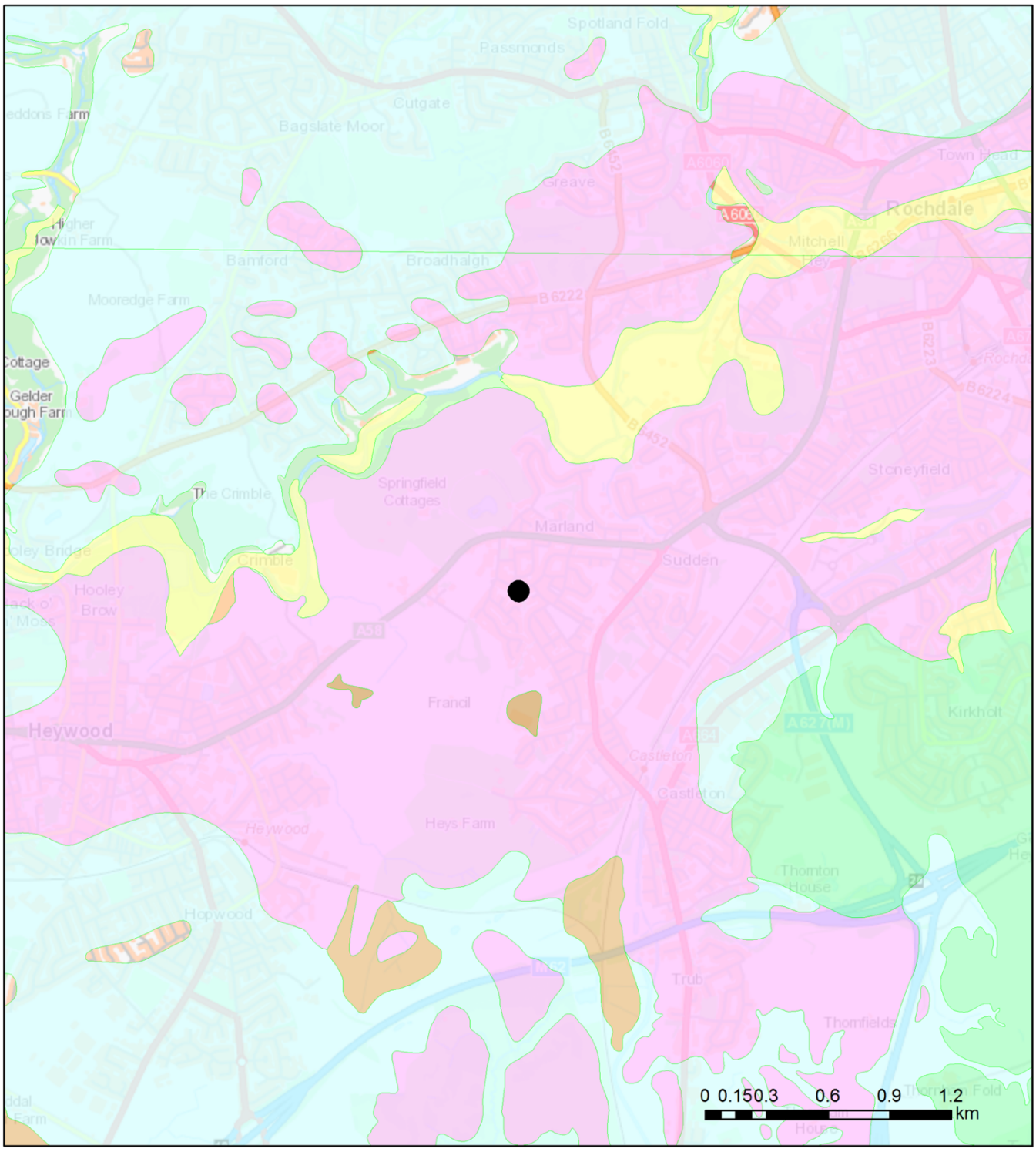
Bedrock Geology



Bedrock geology 1:50,000 scale

- PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- ROUGH ROCK - SANDSTONE
- GREAT ARC SANDSTONE - SANDSTONE

Superficial Geology



Superficial deposits 1:50,000 scale

- GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- TILL, DEVENSIAN - DIAMICTON
- HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - DIAMICTON
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- HEAD - CLAY, SILT, SAND AND GRAVEL
- RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL
- LACUSTRINE DEPOSITS - CLAY
- PEAT - PEAT

Appendix E – BGS Borehole Logs

SD81SE58

BOREHOLE RECORD SD81SE 58 876-114

Project PROPOSED HOUSING DEVELOPMENT | Client WALTER LAWRENCE HOMES LIMITED | Borehole 2 | Sheet 1 of 2

Location MATTHEW MOSS LANE, ROCHDALE | Engineer — | Project No. 88-5886

Sampling				Properties			Strata		
Depth	Sample Type	Depth of Casing	Depth to Water	Strength KN/m²	W %	SPT N	Description	Depth	Legend	Level OD
							Brick and rubble Fill	GL		
								0.60		
							Black silty fibrous PEAT	1.10		
1.60-2.05	JS	1.60				6	Loose pinky brown/grey silty fine /medium SAND with some black coal (?) sand sized grains Becoming more silty and browner in colour with depth.			
1.60-2.80	B									
2.95-3.40	JS	2.95				5				
2.95-4.00	B									
4.00-4.45	JS	4.00				4				
4.00-5.25	B									
5.25-5.70	JS	5.25				7				
5.25-6.35	B									
6.55-7.15	D(23)							6.55		
6.55-7.30	B									
7.30-7.75	JS					15	Soft to firm grey/brown laminated silty CLAY becoming stiffer with depth. Occasional orange/brown fine/medium sand pockets.			
7.30-7.90	B									
7.90-8.50	D(39)									
7.90-8.50	B									
8.50-8.95	JS					18				
9.00-9.65	B						loose to medium dense dark brown /grey sandy SILT with occasional clay bands and Fine/medium, gravel.	9.00		

Ground Water

Depth Struck	Depth of Casing	Depth after 20 mins	Depth Sealed	Date am pm	Depth of Hole	Depth to Water
GL-1.10	-	-	-	9.10.85mm	12.50	1.65

Remarks

Position of BH was on side of hardcore road. Top layer of peat (approx. 1m) had been stripped off.

Boring

Plant Dilcon
Crew A.N (G.S)

Type and Diameter	Depth
cable tool 150mm	18.95

Start Date 6.10.88
Finish Date 6.10.88

Symbols and abbreviations are explained on the accompanying key.

All linear dimensions are in metres.

geotechnics

SD81SE 58

BOREHOLE RECORD

Project PROPOSED HOUSING DEVELOPMENT | Client WALTER LAWRENCE HOMES LIMITED | Borehole 2 | Sheet 2 of 2

Location MATTHEW MOSS LANE, ROCHDALE | Engineer — | Project No. 88-5886

Sampling / Properties / Strata

Depth	Sample Type	Depth of Casing	Depth to Water	Strength KN/m²	W %	SPT N	Description	Depth	Legend	Level OD
9.65-10.25	D(49)						Loose to medium dense dark brown/ grey sandy SILT with occasional clay bands and fine gravel. Becoming denser and more silty and clayey with depth.			
9.65-10.50	B									
10.50-11.10	D(56)									
10.50-11.60	B									
11.60-12.05	JS					37				
12.05-12.50	Driving a Boulder							12.50		
							End of Borehole.			

Ground Water

Depth Struck	Depth of Casing	Depth after 20 mins	Depth Sealed	Date	am pm	Depth of Hole	Depth to Water

Remarks

Could not get casing past 10.05m an edge of boulder.

Boring

Plant PILCON

Crew A.N (G.S)

Type and Diameter	Depth
Cable Tool 150mm	12.50,

Start Date 6.10.88

Finish Date 6.10.88

Symbols and abbreviations are explained on the accompanying key.

All linear dimensions are in metres.

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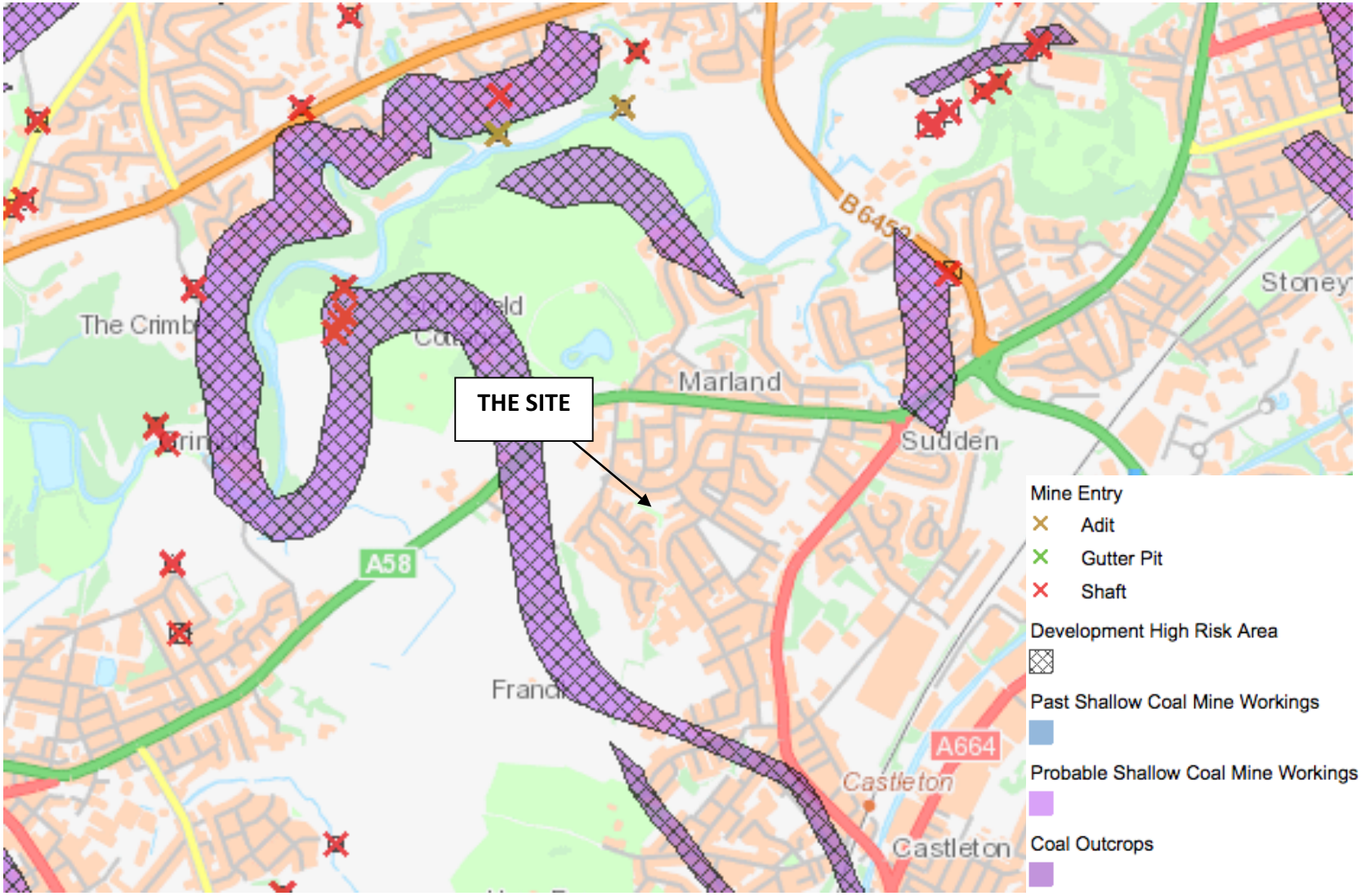
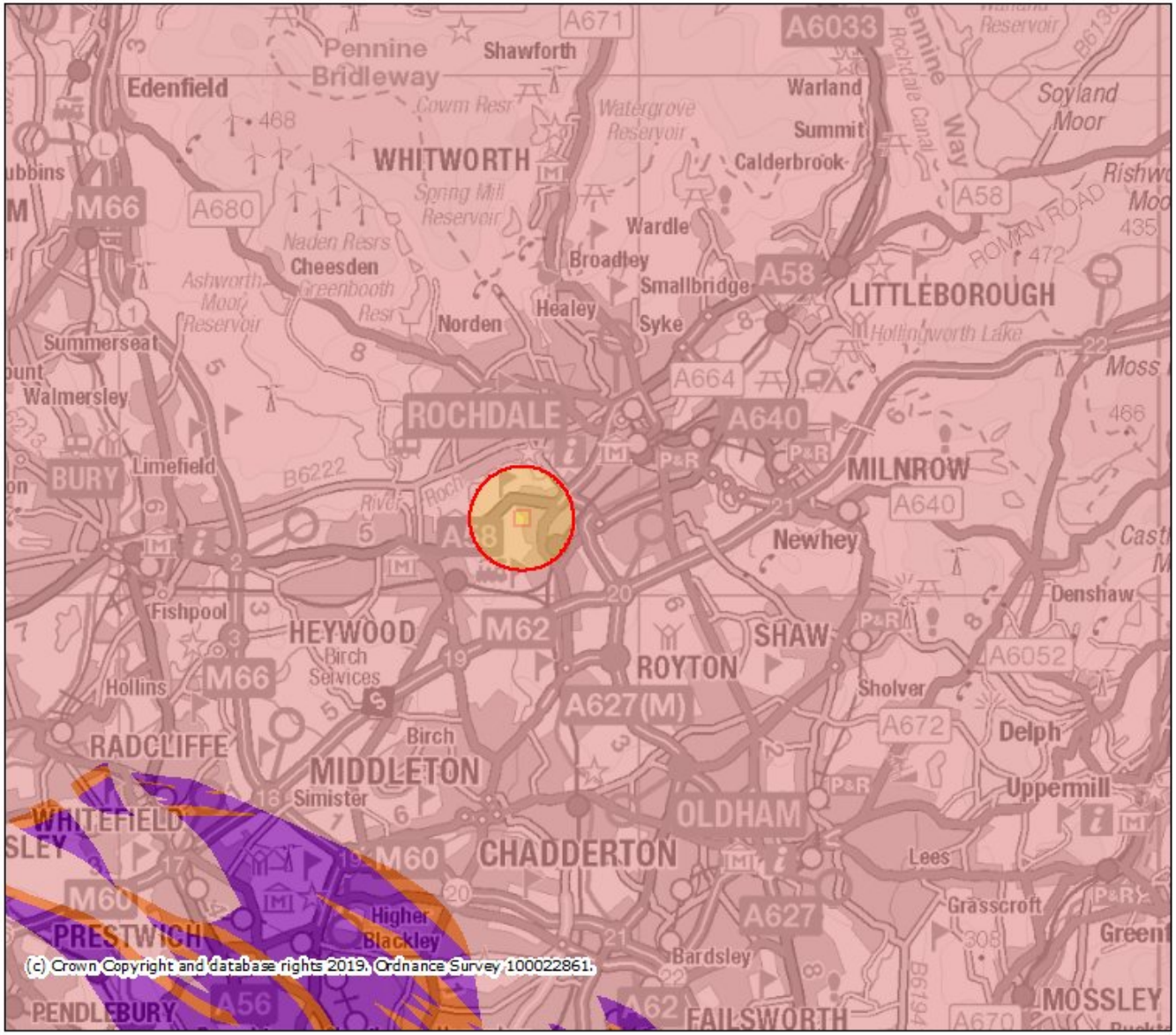
Appendix F – Coal Mining Summary Map



enviro | solution	**Coal Authority Interactive Viewer Map**

MAGIC

Bedrock Aquifer



Legend

Aquifer Designation Map (Bedrock) (England)

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

Projection = OSGB36
xmin = 367000
ymin = 399500
xmax = 411000
ymax = 423500

0 2 4
km

Map produced by MAGIC on 28 May, 2019.

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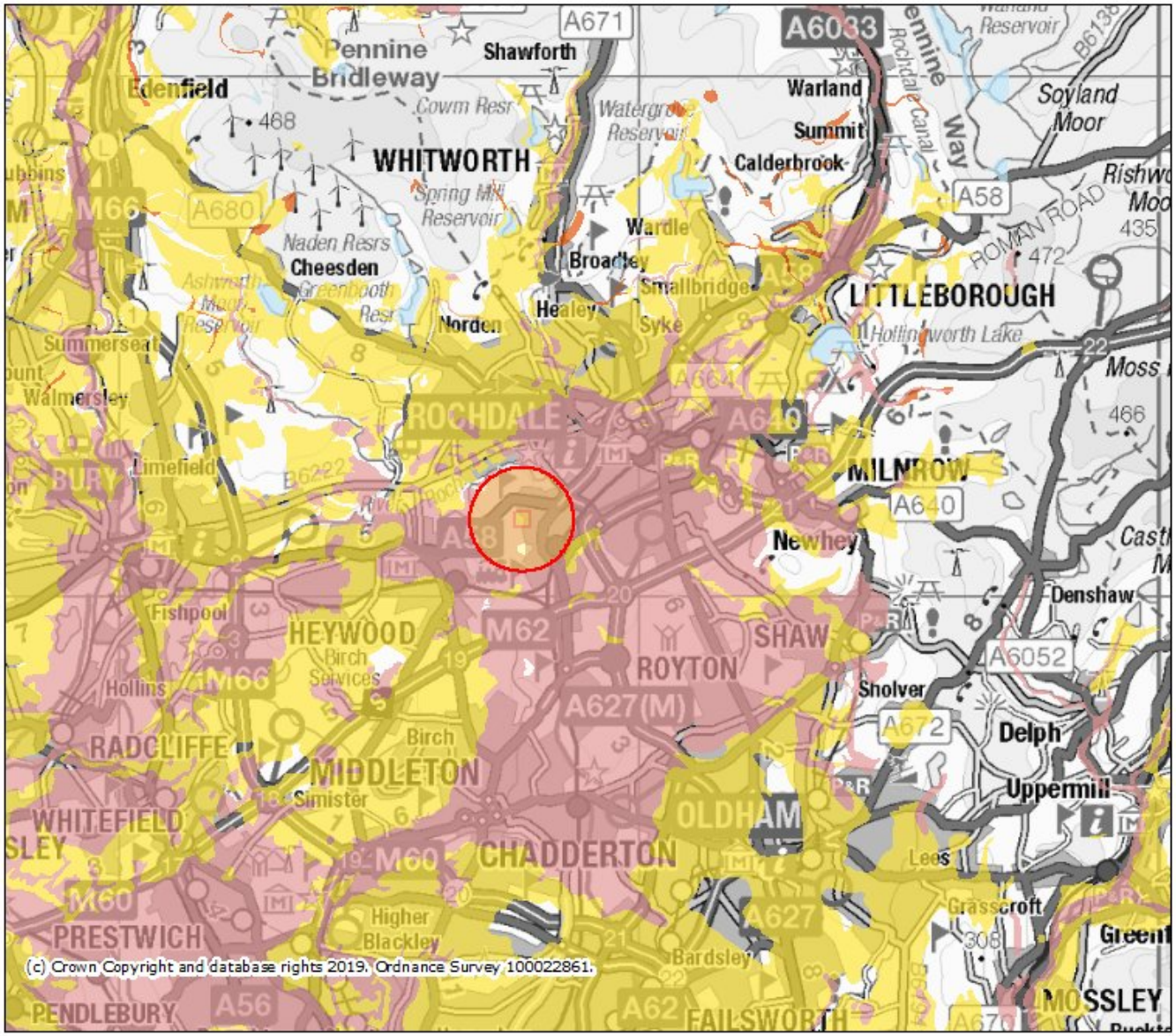
MAGiC

Superficial Aquifer



Legend

Aquifer Designation Map (Superficial Drift) (England)

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

Projection = OSGB36
xmin = 367000
ymin = 399500
xmax = 411000
ymax = 423500

0 2 4
km

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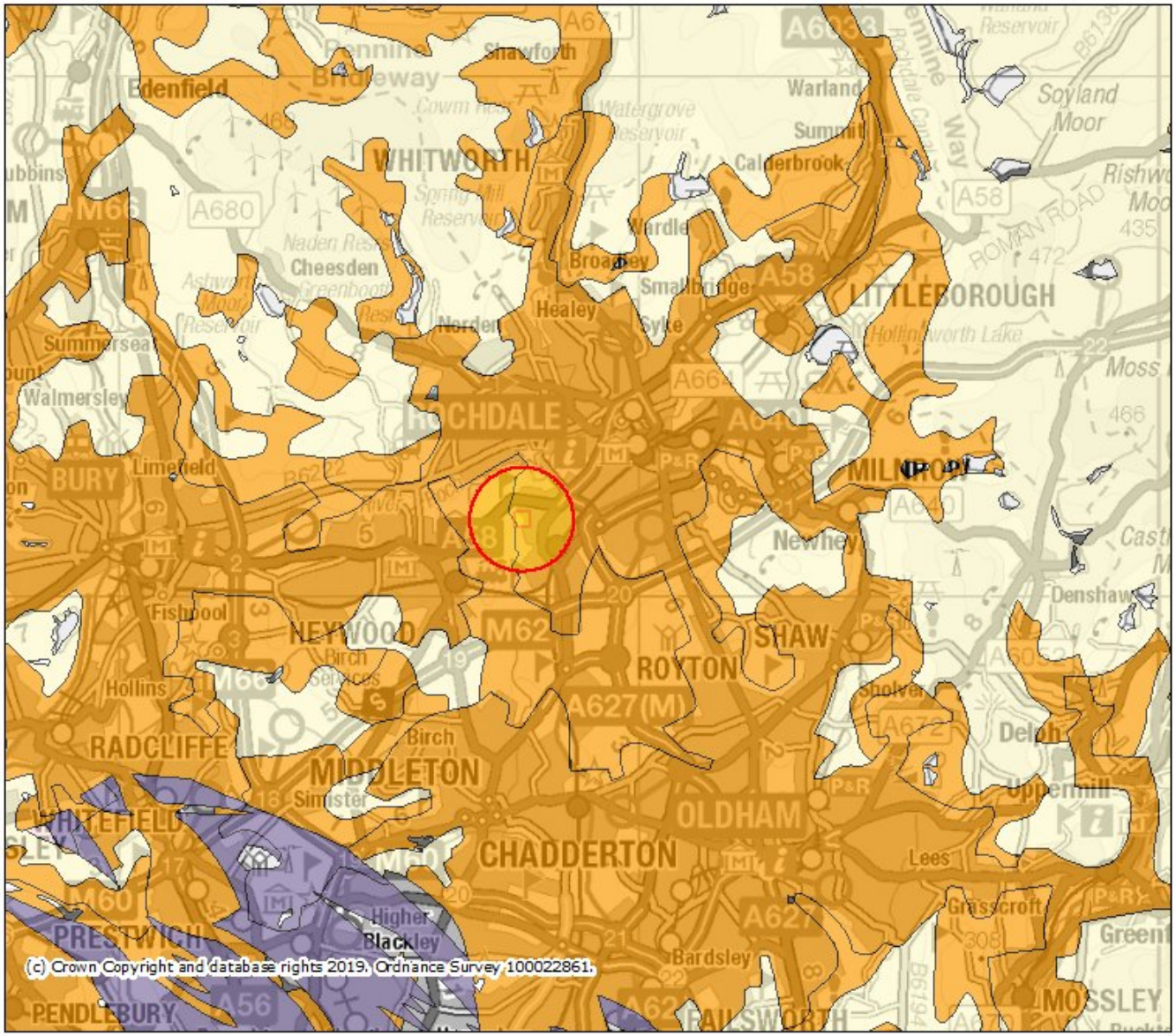
MAGiC

Groundwater Vulnerability



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
xmin = 367000
ymin = 399500
xmax = 411000
ymax = 423500

0 2 4
km

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MAGIC

Sites of Special Scientific Interest



Legend

Sites of Special Scientific Interest (England)

Projection = OSGB36
xmin = 384900
ymin = 410200
xmax = 390400
ymax = 413200

0 0.25 0.5
km

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