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**PHASE 1 ENVIRONMENTAL
SITE ASSESSMENT REPORT**

**JOHNSON MATTHEY,
CLITHEROE WORKS,
PIMLICO INDUSTRIAL AREA,
WEST BRADFORD ROAD,
CLITHEROE, BB7 4QB**

Prepared for:

JOHNSON MATTHEY

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	

Disclaimer

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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 fact that the site is located in an area which has an industrial legacy and therefore, there is the potential for contamination to be present in the ground beneath the site associated with the industrial land uses. Furthermore, potential sources of ground gases (i.e. methane and carbon dioxide) have been identified in the vicinity of the site which could present a ground gas risk to the proposed development.

It is therefore 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.

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1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake Phase 1 environmental site assessment at land located at Johnson Matthey in Clitheroe. This work is required to inform development plans for construction of a large industrial unit.

1.2 Objectives

The objectives of the preliminary environmental site assessment were:

1. To provide a summary of the environmental setting and historical land use of the site and immediate surrounding area.
2. To develop a preliminary conceptual site model and complete a preliminary risk assessment in order to identify any environmental risks and liabilities associated with ground conditions at the site.
3. To identify the requirements for any additional works prior to site development (e.g. Phase 2 intrusive ground investigation).

1.3 Scope of Work

In order 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.

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 1840 to 2017. These maps provide high quality information on historical site uses.

The British Geological Survey Geoindex database has been used to gain information on geo-environmental aspects of the site and the immediate surrounding area, including 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 gain information on the environmental context of the site and surroundings.

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

Client supplied information such as site plans and previous ground investigation data has been utilised within this report.

2 Site Description and Site History

2.1 Site Location

The site is located within land occupied by Johnson Matthey in the Pimlico Industrial area on West Bradford Road in Clitheroe. The National Grid Reference for the site is 374523 443076.

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

2.2 Site Description

The site description has been prepared following a walkover survey conducted by EnviroSolution on the 8th May 2018. Photographs taken during the site visit are included in **Appendix B**.

The site is irregular in shape and covers an area of approximately 1 hectare. The site slopes from north to south.

The site mostly disused with the eastern part used as a contractor's yard serving the industrial site. A number of containers used as offices and welfare facilities are present on the eastern side of the site and this area is also used for by contractors for parking. The ground covering is predominantly hardstanding comprises a mixture of concrete, tarmac and compacted gravel.

A large vegetated earth mound is present along the western site boundary acting as a screening bund.

Land use in the immediate surrounding area is predominantly industrial. Areas to the north and northeast have been quarried for limestone, land to the west is occupied by a boarding school and open fields.

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

2.3 Development Proposals

The proposed development comprises a large warehouse structure. The actual proposed use is currently unknown. The development proposals are shown on **Figure 3 in Appendix A**.

2.4 Site History

The development of the 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
1840	1:7,500	Undeveloped land used for agricultural use.	River Ribble located 220m west of the site. Limestone quarry 250m north and 350m west of the site.
1880	1:5,000	No significant change.	Crosshill Quarry located 110m northeast of the site. Railway line 200m east of the site running N-S. Coplow Hill lime works 260m east of the site.
1910	1:5,000	No significant change.	No significant change.
1930	1:5,000	No significant change.	Knuck Knowles school 100m southwest of the site. Residential development 250m southeast of the site. Horrocksford Asphalt Works 320m northeast of the site.
1950	1:5,000	No significant change.	Industrial site development 120m northeast of the site (chemical works). Spring noted 250m west of the site.
1960	1:7,500	No significant change.	Crosshill quarry infilled and developed into green space (Landfill). Coplow quarry noted as disused and filled with water.
1970	1:7,500	No significant change.	Expansion of the chemical works adjacent to the northeast site boundary. Above ground storage tanks 90m and 50m northeast. Electrical substation 70m east.
2017	1:3,000	Site used as a contractor's yard/ car park.	Area to the south of the site developed

3 Environmental Setting

3.1 Geology

Published geological maps of the area indicate that the site overlies superficial glacial till diamicton deposits of Quaternary age. The diamicton generally consists of unsorted sandy gravelly clays with localised bands of sand and gravels.

The bedrock geology consists of the undifferentiated Clitheroe Limestone Formation and the Hodder Mudstone Formation. The limestone is likely to consist of pale grey and commonly coarsely crinoidal, packstones, wackstones and subordinate grainstones and mudstones. The mudstone consists of grey to dark grey thin-bedded calcareous mudstones with thin limestone interbeds. Soft sediment deformation features are common within the mudstone (slumps, debris flows, gravity slides).

A geological boundary lies at the northern extent of the site where the Chatburn Limestone Formation underlies the Clitheroe Limestone. The Chatburn Limestone consists of well-bedded grey packstones with chert lenses and subordinate mudstones.

A geological fault has been inferred approximately 180m west of the site and strikes roughly north-south. The direction of magnitude of downthrow is unknown.

Two BGS borehole logs have been obtained (Ref: SD74SW15 and SD74SW14) 100m and 40m southeast of the site respectively. The borehole logs show topsoil overlying a soft to firm silty clay with peat to depths of between 1.70m and 2.00m bgl. Underlying this is a firm to stiff boulder clay. Limestone bedrock was encountered in borehole SD74SW14 at 5.40m bgl.

A copy of the geological maps and BGS borehole logs is included in **Appendix D**.

3.2 Radon

The site lies within an elevated area of radon potential where the maximum radon potential is 10-30%. Basic radon protection measures should be considered for the development. Further advice on radon protection measures can be found in BRE Report BR211. For a specific site location contact the respective Regional Building Regulations/Standards Department for England.

3.3 Coal Mining Activity

The site does not fall within a coal mining consultation area described as having minable coal deposits and there is no indication that mining activity has taken place in the surrounding area. The site therefore has no risk of being affected by coal mining liabilities.

3.4 Hydrogeology

The diamicton is classified as a Secondary (undifferentiated) Aquifer, defined as; having previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the soil type. The diamicton is not likely to form a significant aquifer in the area.

The underlying limestone Formations are classified as Secondary A Aquifers, 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.

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

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

3.5 Hydrology

There are no surface water features located within a 250m radius of the site. The River Ribble is located approximately 260m west of the site.

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

3.6 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	19.50
Cadmium	1.00
Chromium	68.48
Nickel	24.55
Lead	88.29

3.7 Waste Management Facilities

Two landfill sites have been identified within a 1km radius of the site. The sites are summarised in Table 3 below and a copy of the landfill map is included in **Appendix D**.

Table 3 - Waste Management Facilities Summary

Site Name	Operation Dates	Waste Type	Distance From Site
Crosshill Quarry	1967-1979	Industrial, Inert, Household	100m NE
Atkinson's of Clitheroe	No Information	Inert	550m SE

There are several sites nearby operating under environmental permits for waste operations. These are held by; Tarmac Trading Limited 100m east of the site (physical treatment facility), Castle Cement Ltd 650m north of the site (co-disposal site and industrial waste landfill) at Coplow Quarry.

3.8 Environmental Permits, Incidents and Registers

Records of sites operating under an environmental permit include:

- Johnson Matthey Plc (the site) for the manufacture of inorganic chemicals (non-metals and salts).
- Castle Cement Ltd located 650m north of the site for the activity of grinding cement clinker. The materials include cement and lime. The permit also includes waste landfilling.

Castle Cement Ltd currently hold a permit for discharges to water and groundwater 600m north of the site.

3.9 Designated Environmentally Sensitive Sites

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

Table 4 - Environmentally Sensitive Sites

Features	Distance	Comments
Local Nature Reserve	110m	Crosshill Quarry is located 110m north of the site.
	910m	Salthill Quarry is located 910m southeast of the site.
Site of Special Scientific Interest	400m	Coplow Quarry is designated a SSSI 400m east of the site and is classed as 'unfavourable recovering'.
	910m	Salt Hill and Bellman Park Quarry is designated a SSSI 910m southeast of the site and is classified as 'favourable'.

4 Previous Investigations

An intrusive ground investigation was undertaken by Strata Surveys Limited in 2007 on land located adjacent to the southern site boundary. This investigation was undertaken to inform development plans for the construction of a new industrial building which is now present on site. The findings of this investigation was presented within the following report:

- Strata Surveys Limited, Ground Investigation Report, Johnson Matthey Catalyst, Clitheroe, Report No. 13849, 23rd March 2007.

The investigative works comprised the drilling of 10 no. cable percussive boreholes (BH1 – BH10) to depths of between 3.25m and 10.85m, geotechnical and chemical sampling and the installation of 5 no. gas monitoring wells. The key findings are summarised below:

- The boreholes recorded a soft brown peaty clay underlying a thin layer of topsoil (0.20m), extending to depths of up to 2.20m bgl. Variable glacial till was found to underlie this, consisting of soft to firm sandy gravelly clays or dense sandy gravel, extending to depths of up to 10.25m bgl (BH4).
- Bedrock was encountered in 3 of the boreholes (BH1, BH3 and BH7) at depths of between 7.0m and 9.70m bgl.
- A pond was identified in the centre of the site.
- Groundwater monitoring found a high groundwater level consistently between the ground level and 1.0m bgl.
- The ground was identified to not be suitable for conventional shallow pad or strip foundations due to the presence of compressible clay and peats.
- The underlying glacial till (below 2.0m) is shown to have a undrained shear strength in the range of 50-270kN/m² and an approximate bearing capacity of 125-200kN/m².
- The chemical testing found low sulphate content in the groundwater and therefore a Design Sulphate Class of DC-1 and AC-1 was recommended for the site.
- The soil and groundwater chemical results identified no contaminants of concern as all detected concentrations of chemical substances were below the assessment criteria.
- The gas monitoring recorded methane values of 0.4% in BH4 only and elevated carbon dioxide in BH3, BH5A, BH7 and BH10. The report concluded that due to the presence of the peat material, methane poses a potential risk to the new development. It was recommended a DPM (damp proof membrane) and a gas proof membrane should be incorporated into the floor slab design.

5 Preliminary Conceptual Site Model

5.1 Introduction

In order to assess the environmental risks present, a preliminary conceptual model has been developed for the site. This uses best practice guidelines in conjunction with the current assessment framework, taking into account the development proposals. This preliminary conceptual model is based on information collected during this Phase 1 study (i.e. historical Ordnance Survey data and data sourced from the Environment Agency, BGS Geoindex and Magic databases).

5.2 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. In order 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.

5.3 Potential Contamination Sources

The site is land located within a chemical works site. Although the land itself has not been developed, it has more recently been used as a contractor's yard. There is the potential for contamination to be present in the ground beneath the site associated with any spillages and / leakages that may have arisen from the chemical processes undertaken on the adjacent land. Potential contaminants could include heavy metals, hydrocarbons and ammonia compounds.

Peat has been proven on the land to the south of the site and associated slightly elevated concentrations of methane and carbon dioxide have been encountered. Therefore, there is the potential for similar conditions to be present beneath the site.

A number of historical and current sources of contamination have been identified in the area surrounding the chemical plant. These include a number of quarries, an asphalt works, lime works and electricity substation. Therefore, there is also the potential for contamination to be present associated with these land uses. Contaminants could include heavy metals, hydrocarbons and polychlorinated biphenyls.

5.4 Receptors

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

Table 6 - Receptor Description

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

5.5 Pathways

The potential exposure pathways linking contamination with the receptors identified above are summarised 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 (fugitive dust) - Inhalation of migrating gases and vapours
Controlled waters	- Vertical and lateral migration to Secondary Aquifer. - Horizontal migration via preferential pathways to the River Ribble.
Building/construction	- Materials/services - Contact with contaminated soil and/or groundwater - Ingress of potentially explosive gases (i.e. methane)

5.6 Potential Pollution Linkages

5.6.1 Human Health

The proposed development comprises the construction of an industrial warehouse building. Soft landscaping is not proposed.

The presence of buildings and hardstanding would eliminate the risk of exposure, via the dermal contact and ingestion pathways, to future sites users to any contamination that may be present in the soil or groundwater.

However, inhalation of gases (such as methane and carbon dioxide) and vapours associated with presence of volatile organic contaminants beneath the site could be feasible.

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.

5.6.2 Controlled Waters

There is the potential for migration of contamination from the shallow soils into the Secondary Aquifer via localised pockets of sands and gravels in the shallow diamicton.

Whilst migration through the diamicton is feasible, it is likely to comprise dominantly of impermeable clay rich material that will act as an aquitard, reducing the lateral and vertical

migration of dissolved phase contaminants to the secondary Aquifer of the underlying limestones.

Due to the distance of the River Ribble from the site (i.e. 260m) it is considered unlikely that any contamination associated with the site would impact on this surface water course. In addition, horizontal migration would be restricted by the presence of relatively impermeable clay deposits.

5.6.3 Building/ Construction Materials/ Buried Services

The presence of any soil and groundwater contaminants beneath the site could have a detrimental impact on construction materials for the new development, such as below ground structures and services.

If ground gases and vapour are present in the soil beneath the site, then there could be the potential risk of ingress into the new properties, which could present a risk of explosion. Hydrocarbon contamination can also have a detrimental impact of plastic piped services.

Aggressive ground chemistry could have a detrimental impact to concrete building foundations. Concrete is particularly susceptible to sulphate attack, arising from sulphate bearing Made Ground deposits.

5.7 Preliminary Hazard Assessment

A preliminary hazard assessment is presented in Table 7. This is a qualitative assessment of the risks posed by each potential pollutant linkage described above and is used to identify the requirement for the next stage of work (Phase 2 intrusive ground investigation).

Table 5 – Preliminary Hazard Assessment

Source 1	Pathway	Receptor	Likelihood	Effect	Risk	Assessment
Contaminated soil / groundwater /	Ingestion (via soil dust) and 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 off-site with a feasible pathway.
	Downward and lateral migration	Secondary Aquifer	2	3	Moderate	Source potential identified. Discrete pathways exist via permeable superficial sands. Pathways reduced due to impermeable clay.
		River Ribble	1	3	Low	Source potential identified, but unlikely to impact on the surface water body due to distance (>250m) and the presence of impermeable clay which would restrict migration.
	Direct contact	Buildings	2	3	Moderate	Source potential identified off-site with a feasible pathway.
Ground gas	Inhalation, Ingress into buildings	Future site users Buildings	3	4	Moderate	Ground gas source identified on site in the 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.		

6 Conclusions and Recommendations

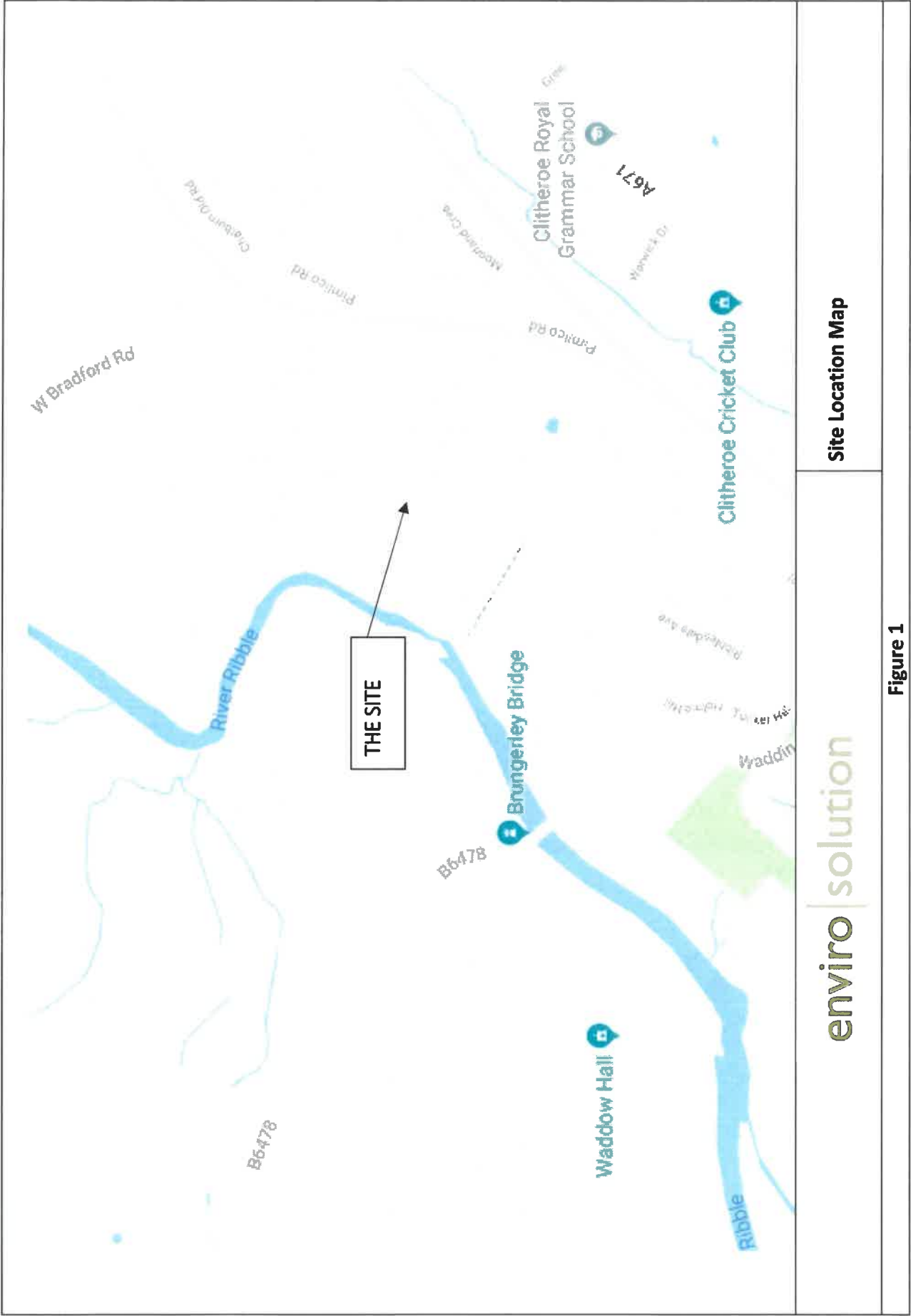
The preliminary environmental site assessment indicates that the site can be classified as Moderate risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be Moderate.

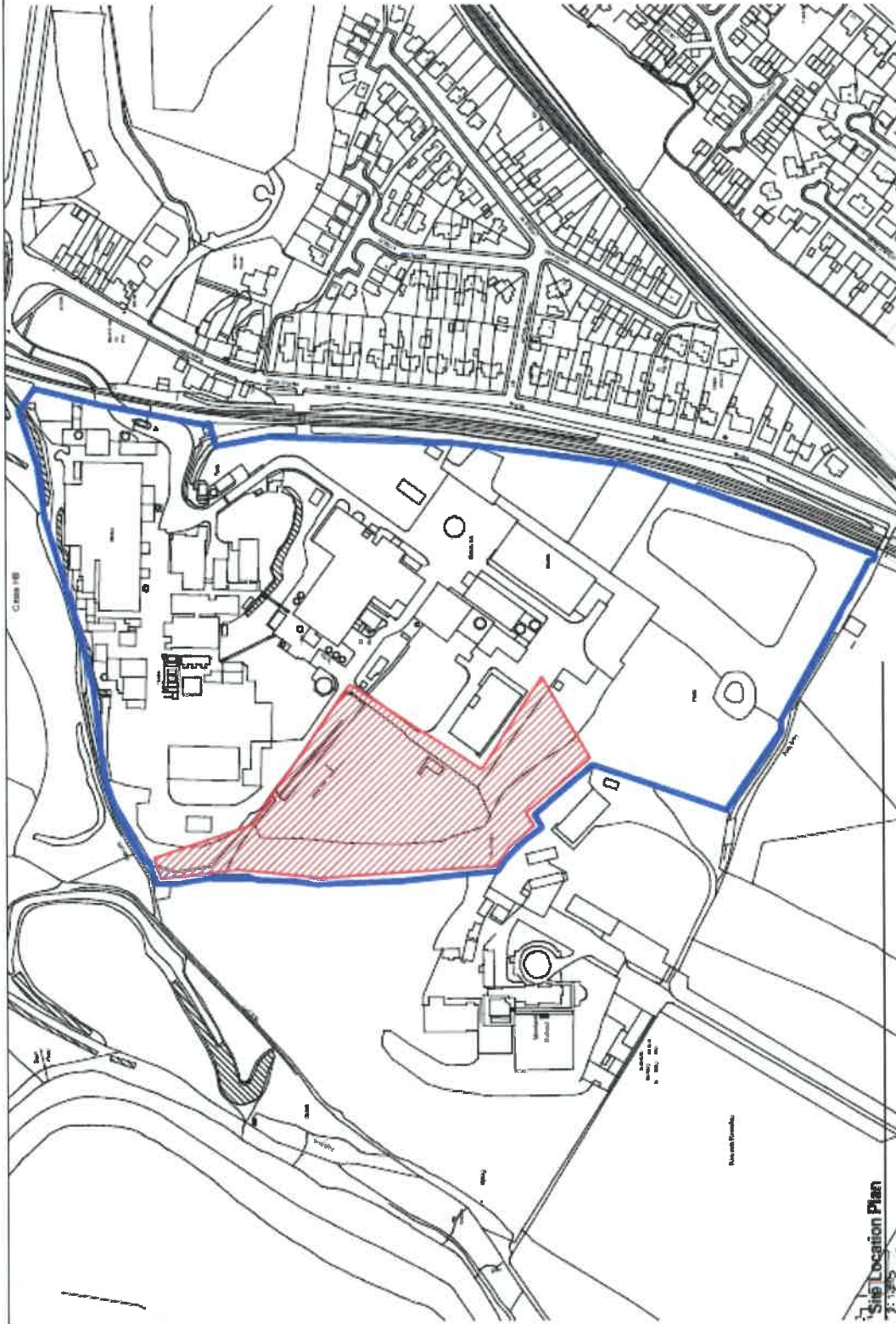
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It is therefore recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons.

APPENDICES

Appendix A – Site Location and Site Plan

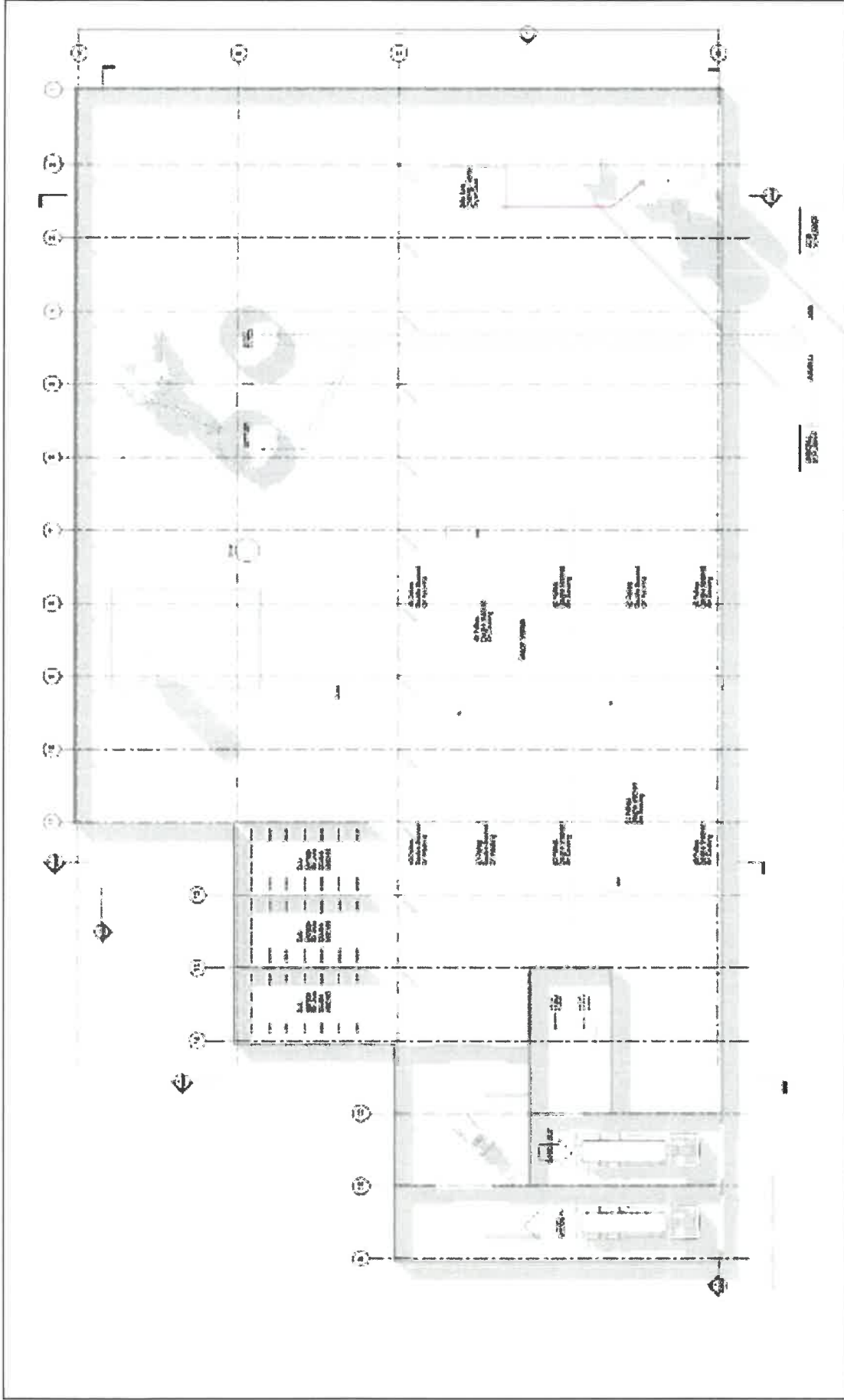




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Existing Site Layout Plan

Figure 2



Proposed Site Plan

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Figure 3

Appendix B – Site Photographs



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View of infilled former pond land to the east of the main development plot



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Concrete and pea gravel hardstanding



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Looking north west across the site



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Steel shipping containers on site



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Site access via wide road from the north east



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Raised earth bund on the western boundary



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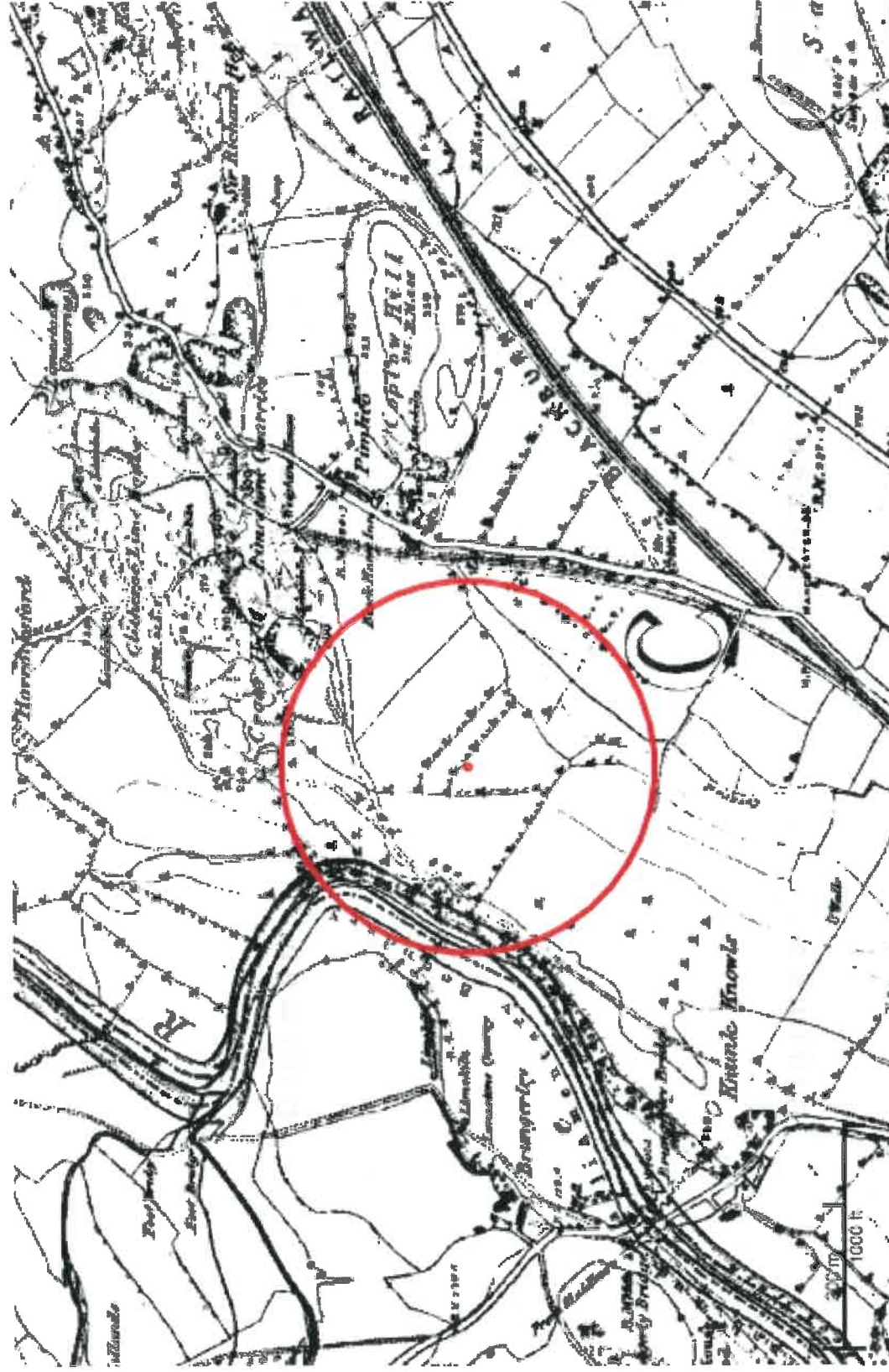
Looking north across the site



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Grassed area along the western flank of the site

Appendix C - Historical Maps

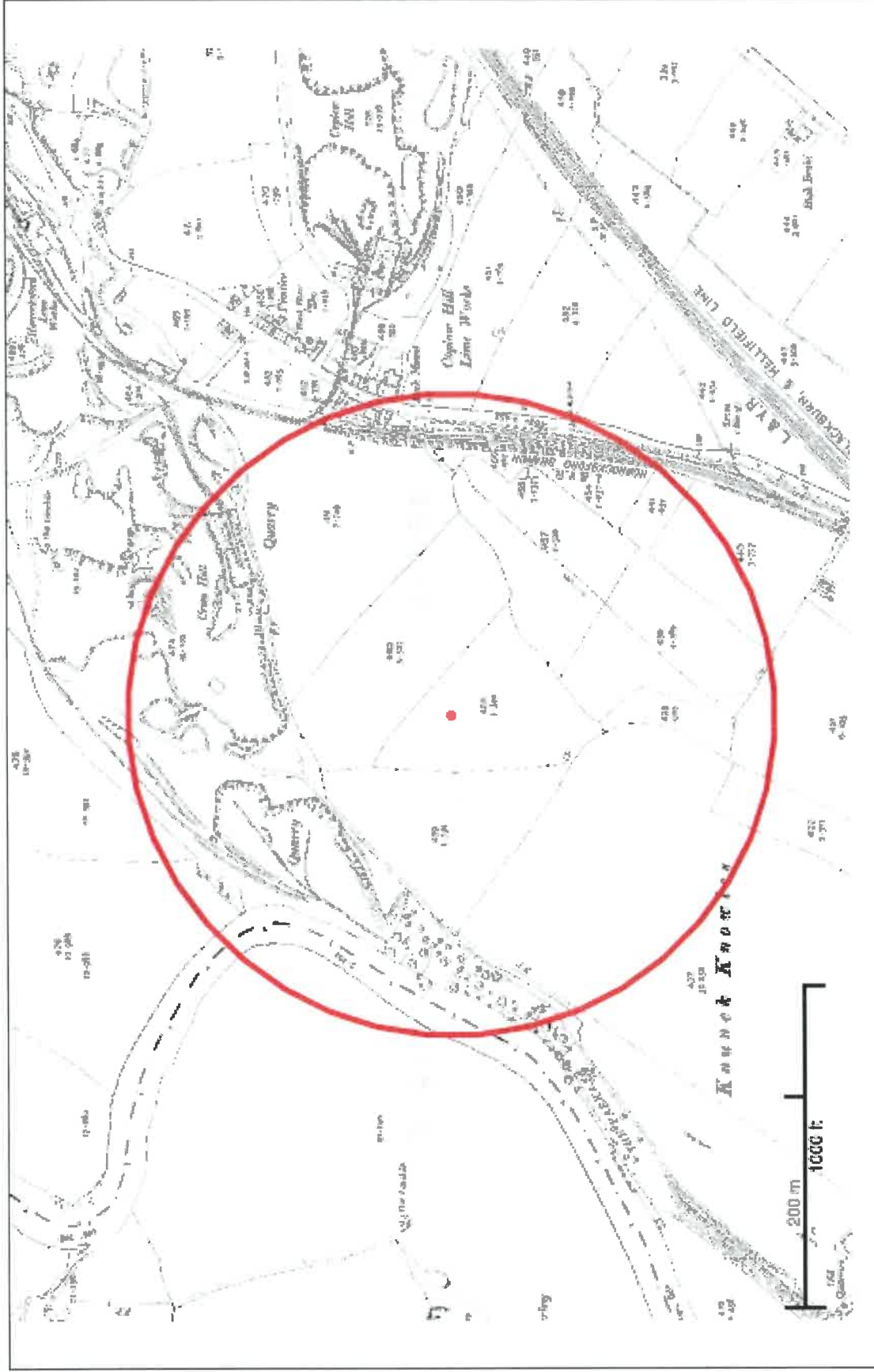


Historic Map (250m search buffer)

Date: 1840

Scale 1:7,500

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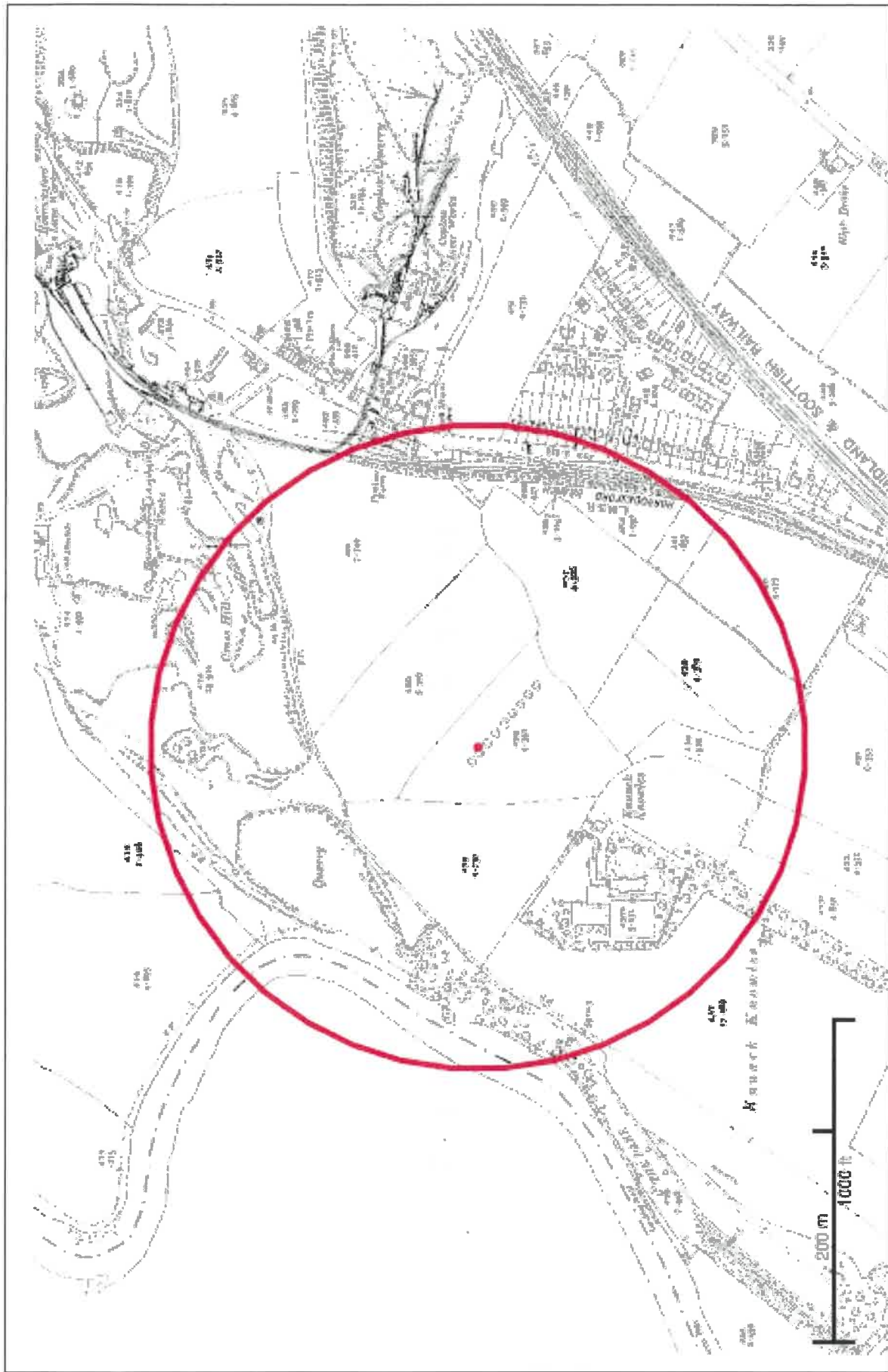


Historic Map (250m search buffer)

Date: 1910

Scale 1:5,000

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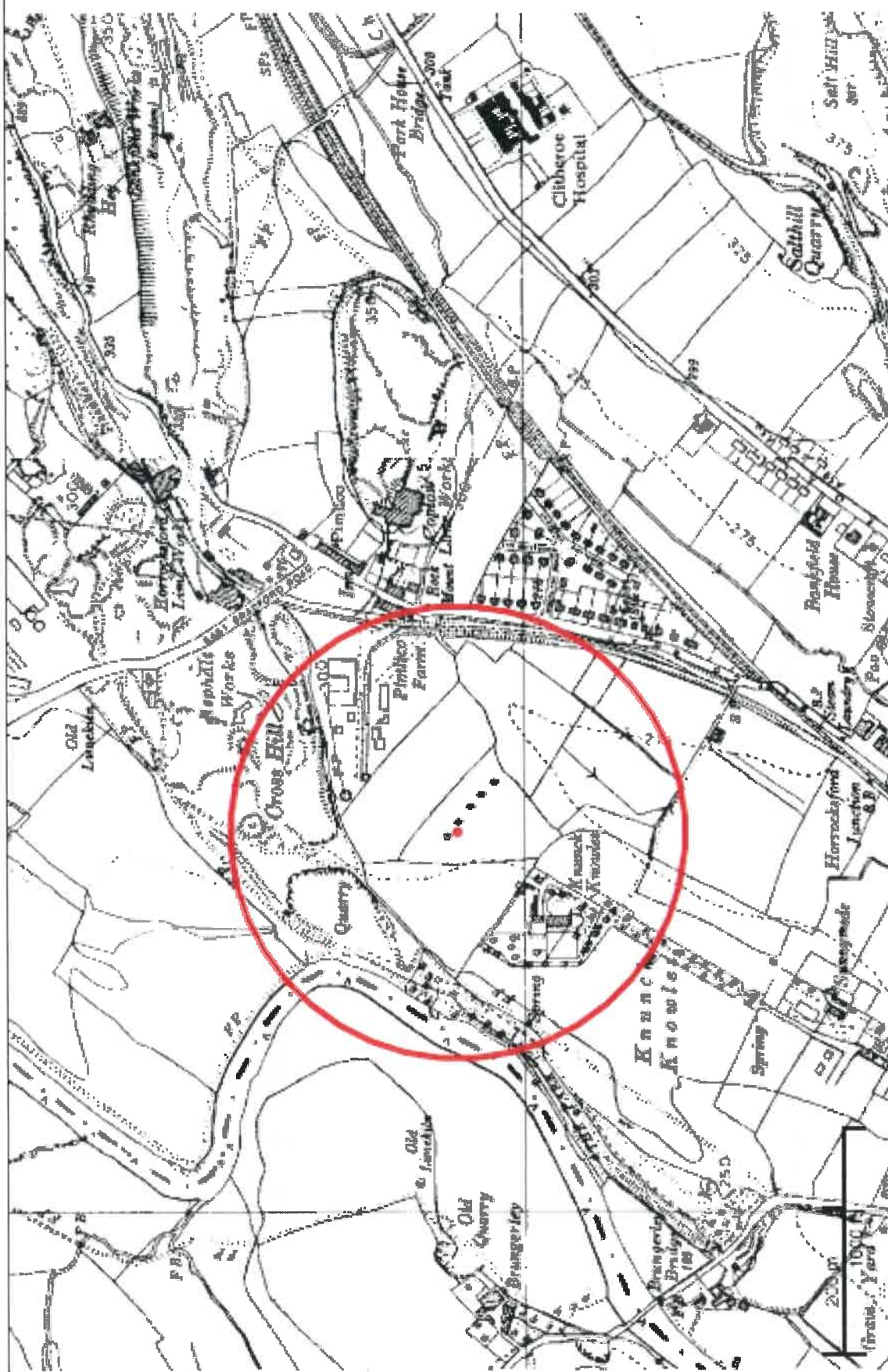


Historic Map (250m search buffer)

Date: 1930

Scale 1:5,000

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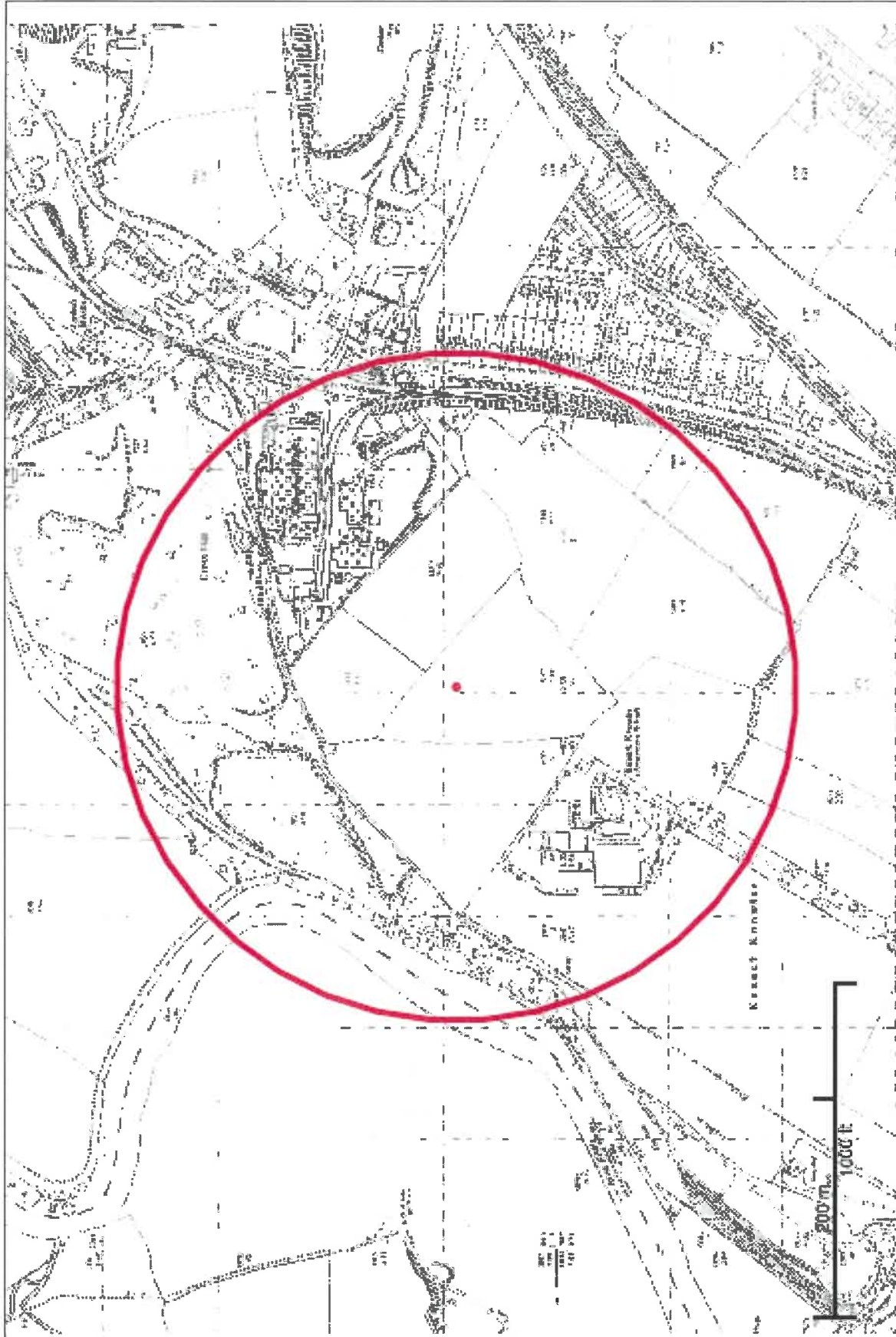


Historic Map (250m search buffer)

Date: 1950

Scale 1:7,500

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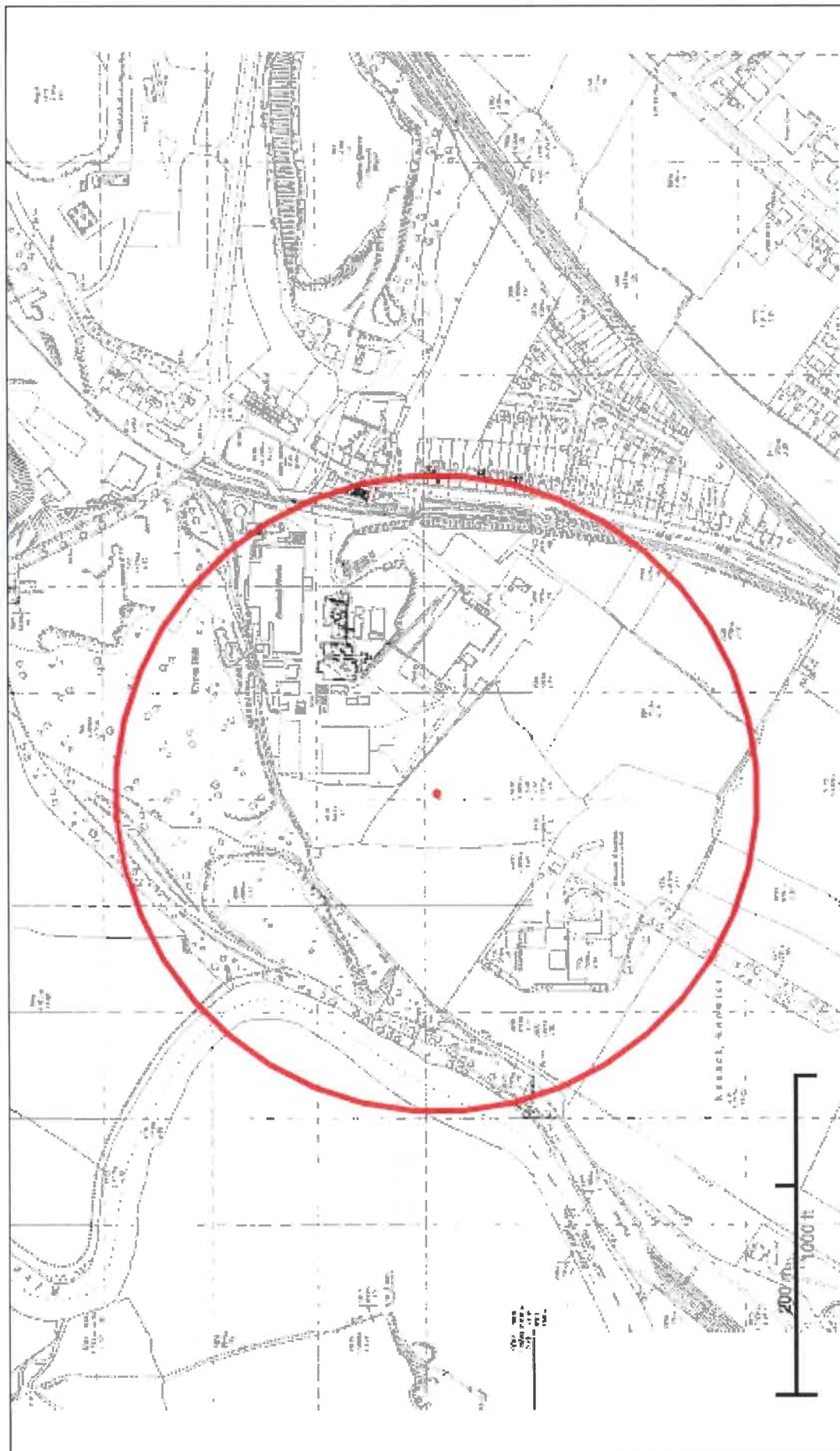


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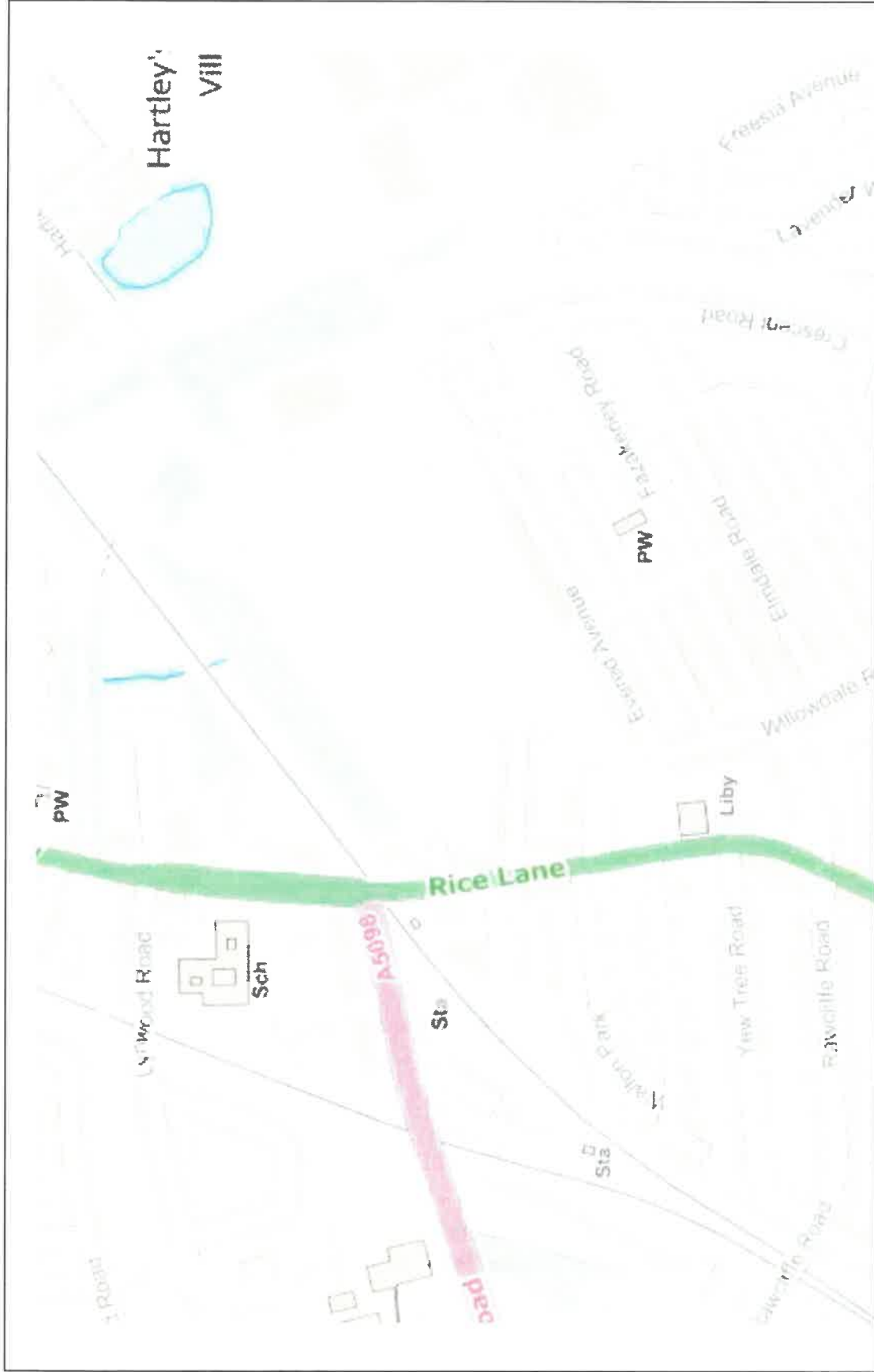
Date: 1960

Scale 1:5,000

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Historic Map (250m search buffer)
Date: 1970
Scale 1:5,000

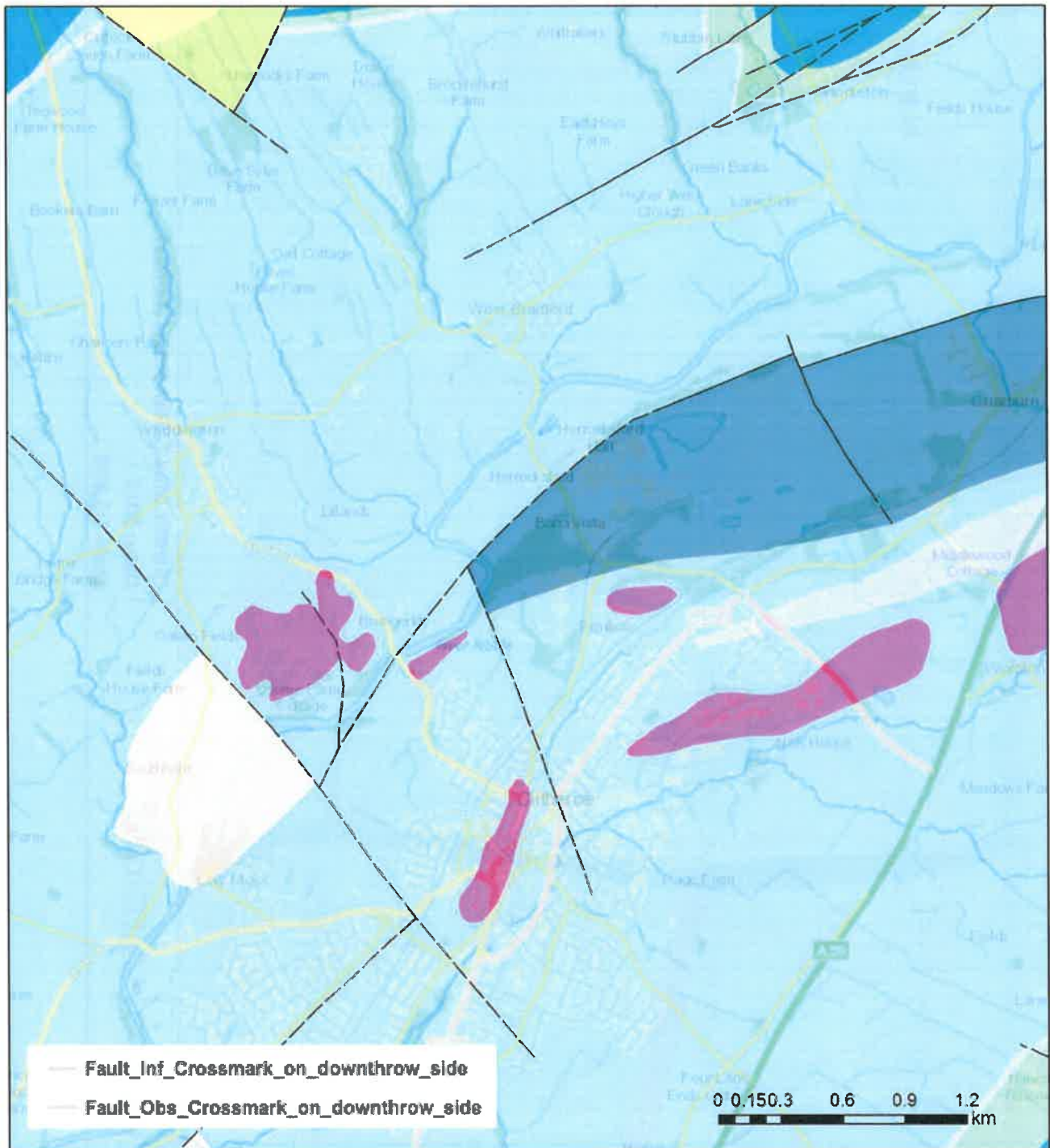


Historic Map (250m search buffer)
Date: 2017
Scale 1:5,000

enviro solution

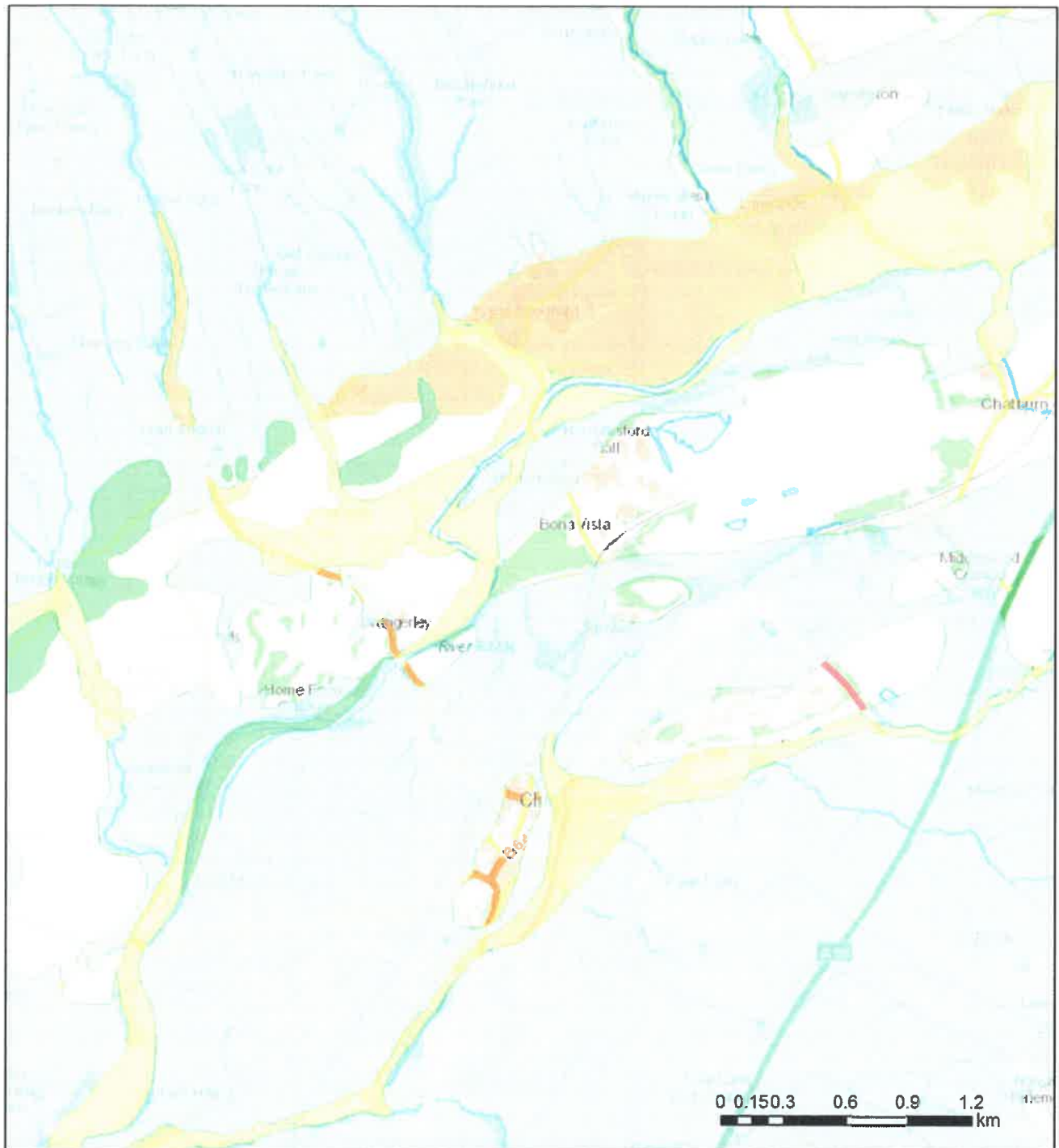
Appendix D – Environmental Records

Bedrock Geology



- HODDERENSE LIMESTONE FORMATION - LIMESTONE**
- CLITHEROE LIMESTONE FORMATION AND HODDER MUDSTONE FORMATION (UNDIFFERENTIATED) - MUDSTONE**
- CLITHEROE LIMESTONE FORMATION (KNOLL-REEF) - LIMESTONE**
- PENDLESIDE LIMESTONE FORMATION - LIMESTONE**
- PERMIAN ROCKS AND TRIASSIC ROCKS (UNDIFFERENTIATED) - SANDSTONE AND MUDSTONE**
- RAD BROOK MUDSTONE MEMBER - MUDSTONE**
- CHATBURN LIMESTONE FORMATION - LIMESTONE**

Superficial Geology



- TILL, DEVENSIAN - DIAMICTON**
- GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY AND SILT**
- HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - DIAMICTON**
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL**
- RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL**

BGS Borehole Logs

Holst Son Engineering Limited

Parkside Lane, Dewsbury Road, Leeds LS11 5SX
Telephone Leeds (0532) 73346 Telex 557357

SOFT GROUND DRILLING RECORD

DATE+TIME OF START.....

DATE+TIME OF FINISH.....

TOWN... *CUTHBERT*

SITE... *101*

BOREHOLE No. *11*

BOREHOLE DIAM. *0.15*

CASING INSERTED *1.5*

EQUIPMENT IN USE.....

VEHICLE No.

SD 74SW 15
7459 4302

DESCRIPTION OF STRATA	Depth to Base of Stratum	Depth of Casing When Sampling	Type No. of Sample	Penetration of Sampler		SAMPLING										REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
				From	To	0"	3"	6"	9"	12"	15"	18"	21"	24"																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
						10"	12"	15"	18"	21"	24"	27"	30"	33"	36"																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Topsoil Soft - Firm Grey - Yellow Silty Clay from 0.8 - 1.1 Firm turning stiff Heavier Clay Gravelly	0.1			U	0.6	1.1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						</

SHOW SAMPLES THUS:

4 in. dia. undisturbed Sample *U* Disturbed Sample *D*
Standard Penetration Test *S* Bulk Sample *B*
Cone Penetration Test *C* Water Sample *W*

FULL DETAILS OF DELAYS, OBSTRUCTIONS ETC.
(INCLUDING TIMES):

WATER

OBSERVATION DEPTH DATE TIME CASING DEPTH

Exit 1.0

Sealed 1.5

FSL 0.4

OBSERVATIONS e.g. 'Water Struck', 'Final Standing Level', 'Sealed' etc. Note Rate of Flow

DRILLERS SIGNATURE... *[Signature]* CLIENTS SIGNATURE.....

WEATHER: Fine/Sunny/Warm/Dry/Wet/Overcast/Drizzling/Raining
Windy/Gales/Still/Thundery/Stormy/Snow/Freezing

Holst Soil Engineering Limited

Parkside Lane, Dewsbury Road, Leeds LS11 5SX
Telephone Leeds (0532) 73346 Telex 557357

SD 74 SW 14
7464 4299

SOFT GROUND DRILLING RECORD

DATE + TIME OF START.....
DATE + TIME OF FINISH.....

TOWN... CATHERGEE.....
SITE... 1.2.1.....
BOREHOLE No. 10.....
BOREHOLE DIAM. 0.15.....
CASING INSERTED 3.0.....
EQUIPMENT IN USE.....
VEHICLE No.

DESCRIPTION OF STRATA	Depth to Base of Stratum	Depth of Casing When Sampling	Type No. of Sample	Penetration of Sampler		SAMPLING										REMARKS	
				From	To	0"	3"	6"	9"	12"	15"	18"	21"	24"			
						10 3"	10 6"	10 9"	10 12"	10 15"	10 18"	10 21"	10 24"				
Topsoil	0.3		D	0.5													
Firm Clay - Yellow Sticky Clay	1.0		D	1.5													
Soft Peat	2.0		D	2.5													
Firm Clay Clay	3.0		D	4.0													
Stiff Boulders Clay	5.4		D	4.9	5.3												
Limestone			S	5.5													
Gravel	6.0		W														

SHOW SAMPLES THUS:

4 in. dia. undisturbed Sample... U Disturbed Sample... D
Standard Penetration Test... S Bulk Sample... B
Cone Penetration Test... C Water Sample... W

FULL DETAILS OF DELAYS, OBSTRUCTIONS ETC.
(INCLUDING TIMES):

WATER

OBSERVATION DEPTH DATE TIME CASING DEPTH

EXCL. 1.8

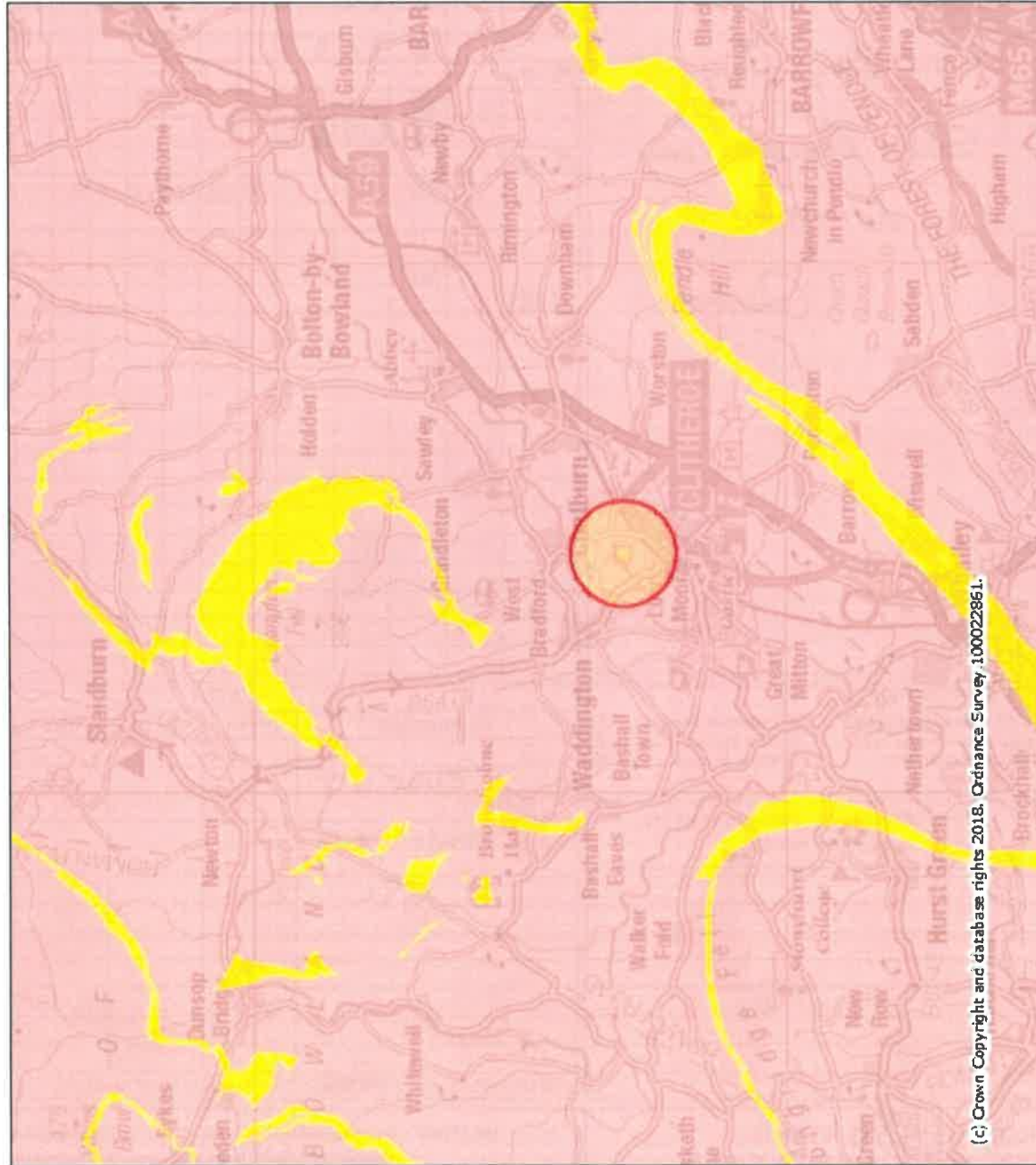
SEALED 2.0

FSL 0.4

OBSERVATIONS e.g. 'Water Struck', 'Final Standing Level', 'Sealed' etc. Note Rate of Flow

DRILLERS SIGNATURE WGA CLIENTS SIGNATURE.....

WEATHER: Fine/Sunny/Warm/Dry/Wet/Overcast/Drizzling/Raining
Windy/Gales/Still/Thundery/Stormy/Snow/Freezing



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Legend

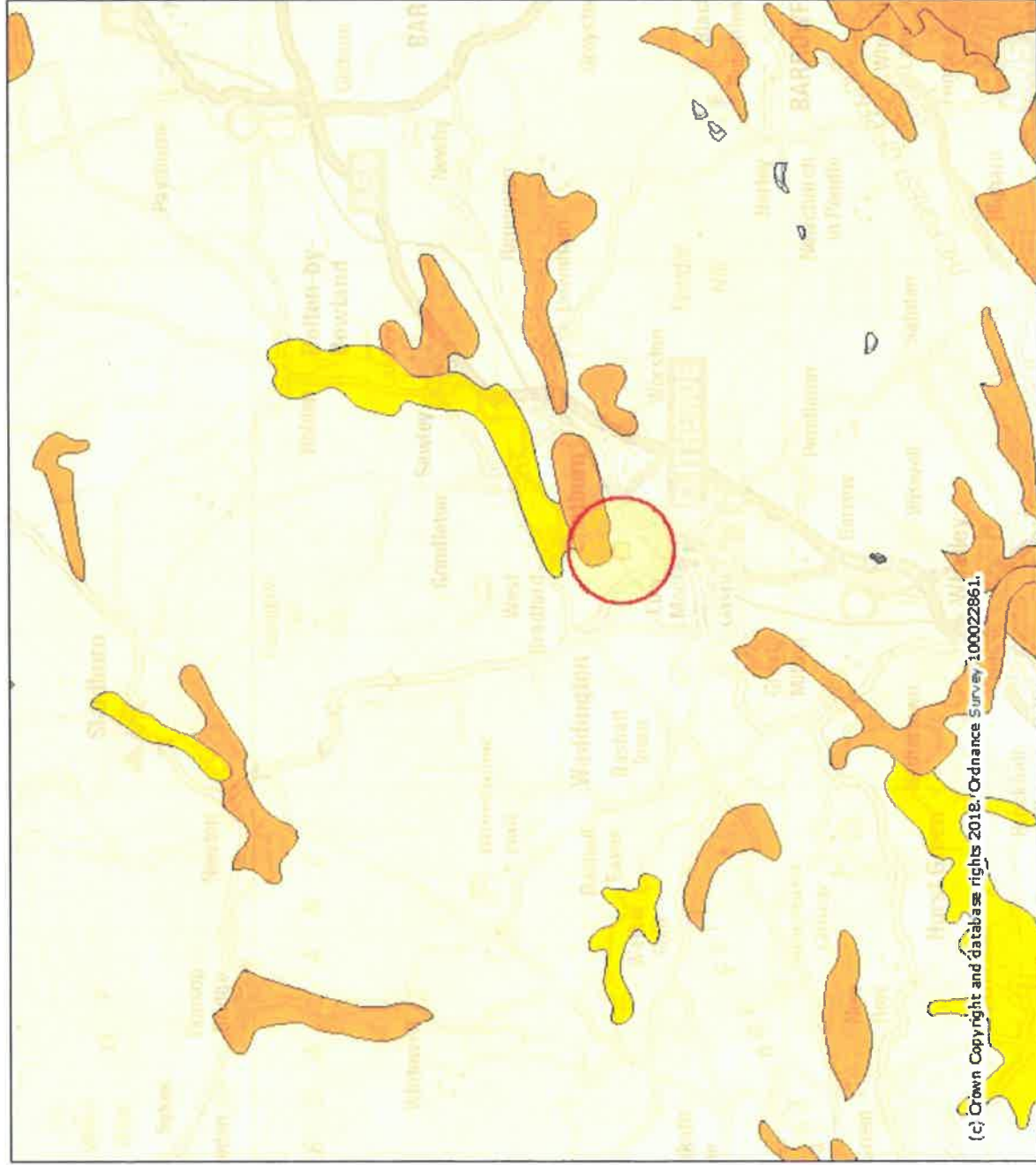
Aquifer Designation Map (Bedrock) (England)

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

Projection = OSGB36
xmin = 355600
ymin = 435300
xmax = 392200
ymax = 454500



Map produced by MAGiC on 4 May, 2018.
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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

xmin = 355600

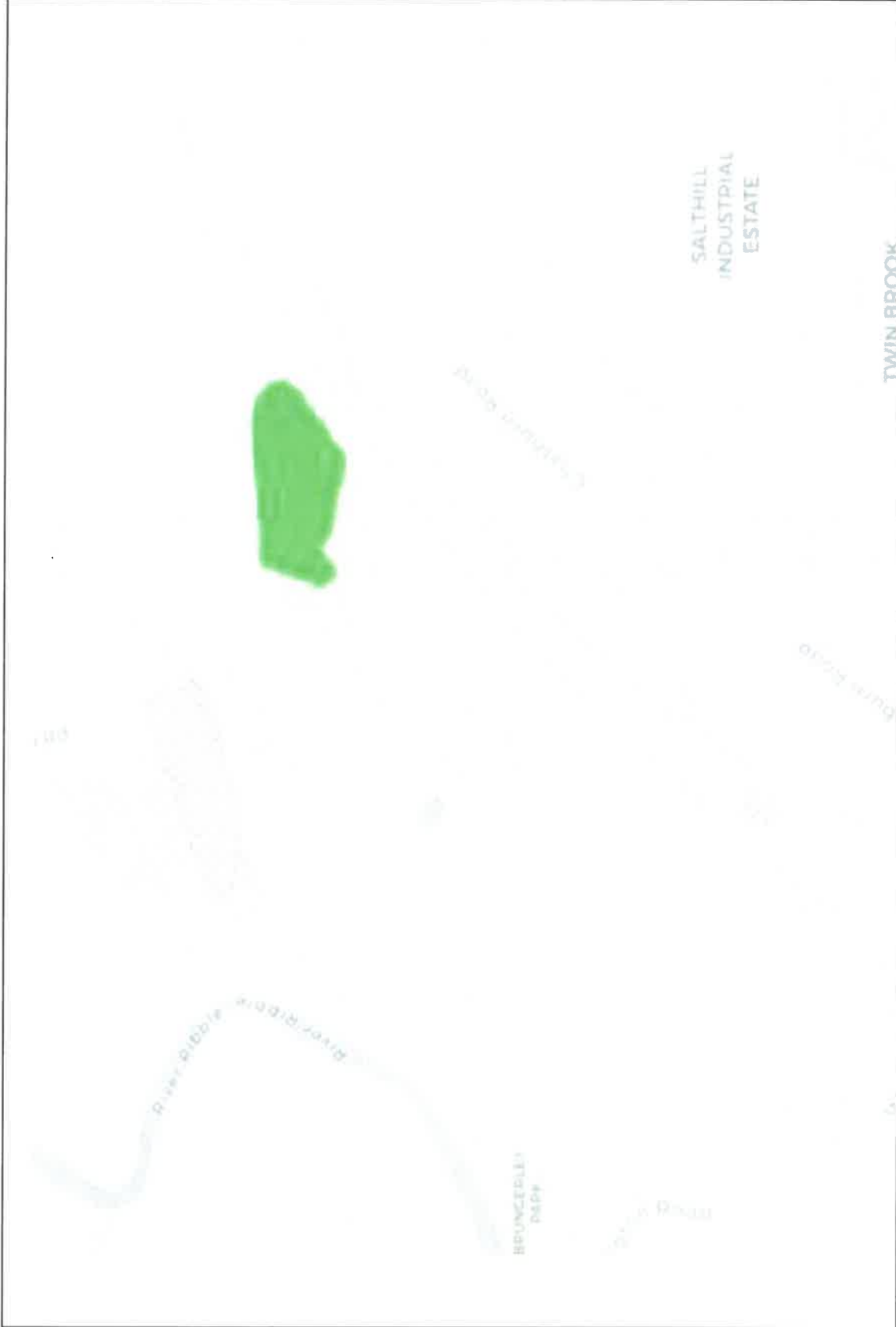
ymin = 435300

xmax = 392200

ymax = 454500

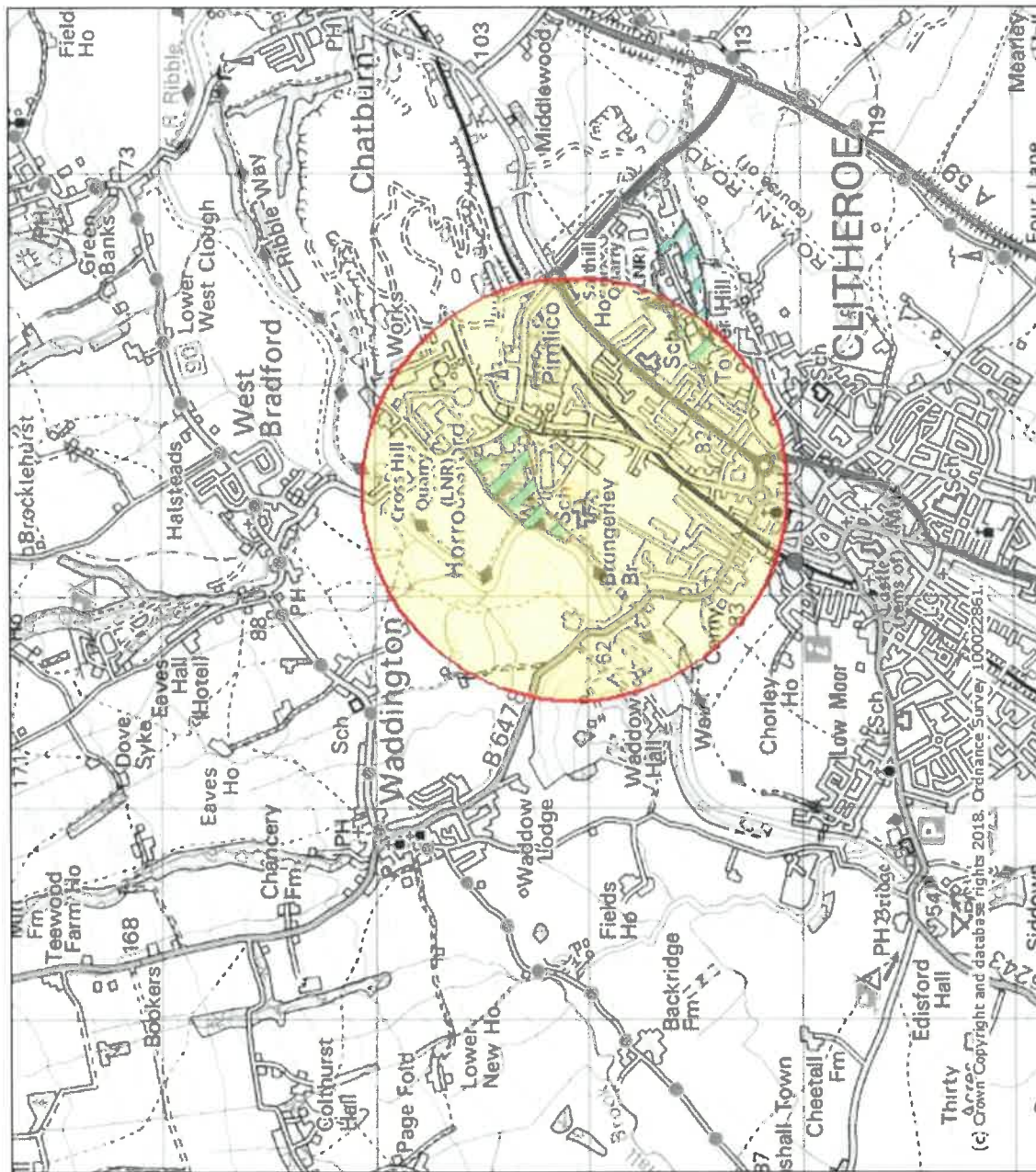
Map produced by MAGiC on 4 May, 2018.
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Waste Management Facilities Map



Waste Management Facilities Map

enviro | solution



Legend

 Local Nature Reserves (England)

Projection = OSGB36

xmin = 369400

ymin = 440900

xmax = 378600

ymax = 445700

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