

Phase 1 Preliminary Risk Assessment

25 September 2023

Madi Hussain

Land adjacent to 26 Wheatfield Close, Bury, BL9 6XD

Report by Mr Louis Turner BSc (Hons)

Supervised by Mr Joseph Turner

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1. Introduction

The following document is a Phase 1 Preliminary Risk Assessment carried out by Oakshire Environmental, and includes details of the site, environmental setting, contaminant linkages and an evaluation of risk.

1.1 Project Overview

The client's proposed project involves the erection of 1 no. dwelling with associated landscaping and parking on Land adjacent to 26 Wheatfield Close, Bury, BL9 6XD. Oakshire Environmental have carried out a Phase 1 Preliminary Risk Assessment, as described below.

1.2 Purpose of Investigation

The objectives of the Phase 1 Preliminary Risk Assessment were to:

- Develop a detailed assessment of the site.
- Identify potential contamination sources, receptors and pathways at the site.
- Assess the level of potential contamination risk.
- Determine the requirement or scope of further investigations.

1.3 Scope of Work

- Brief introductory information has been noted to provide context to the report and include an Introduction, Project Overview, Scope of Work and Limitations.
- To develop a detailed assessment of the site, desk studies have been carried out to collate information obtained from sources including the British Geological Society, Environment Agency and Ordnance Survey on planning and site history, ground conditions and environmental setting.
- This information has been used to identify potential contamination sources, receptors and pathways at the site, as part of an initial Conceptual Site Model.
- To assess the level of potential contamination risk, a Conceptual Site Model has been produced to categorise the potential severity of the impact of the contaminant linkage on the receptor and the probability of the contaminant linkage being present.
- Following the assessment of contaminant linkages, an evaluation of contamination risk has been conducted to determine the requirement and scope of further investigations.
- Supporting appendix include photographs, maps, and plans of the site.

1.4 Limitations

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This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

2. Site

The following section provides a description of the site, location and proposed development, in addition to, planning and site history, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located on Wheatfield Close and is approximately 0.02ha. The site is comprised of a vacant area of grassed open space. There is no visible evidence of contamination at the site.

The site is bordered by dwellings to the north, Wheatfield Close to the east with dwellings beyond, a footpath to the south with dwellings beyond and garages and an access road to the west with additional dwellings beyond. The surrounding area is predominantly residential with some commercial premises.

National Grid Reference: SD 80839 13278

2.2 Proposed Development

The proposed development involves the construction of a detached dwelling with a driveway at the east, paving curtailment the dwelling and a private garden at the west.

2.3 Relevant Planning History

A search of Bury Council's planning website identified the following relevant applications at and near the site.

Table 1: Planning applications at or near the site

Application No.	Year	Address	Proposal	Decision	Details
15211	1983	Land off Limefield Brow	59 dwellings	Approve	No documents available.
34791	1998	Land at Bury ITEC Limefield Brow (190m south of the site)	Approval of reserved matters: 46 dwellings and relocation of public open space	Approve with Conditions	No documents available.
64651	2019	Windacre Works, Mather Road (90m north of the site)	Residential development - No.4 dwellings with formation of access and highway works.	Approve with Conditions	Phase 1 identified potential significant linkages due to presence of made ground, past uses of the site and adjoining land and ground gases from made ground and infilled land/landfills within 250m of the site. A Phase 2 was then carried out including soil sampling, groundwater testing and gas monitoring. This report identified elevated concentrations of arsenic and lead as well as fibres of chrysotile asbestos. High groundwater levels were encountered, however, no elevated concentrations of contaminants were identified in groundwater or surface water samples. Gas monitoring identified methane concentrations above 1%v/v and carbon dioxide concentrations above 5%v/v, therefore, the gas regime at the site was considered to be representative of Characteristic Situation 2 as a precautionary measure.
66156	2020	Land adjacent to 101 Mather Road (100m north of the site)	Erection of 2 no. dwellings	Approve with Conditions	Phase 1 identified potential risks due to an historical builder's yard on the site and a disused dye works/recent bleach and engineering works off-site. There was considered to be a low risk from ground gases due to the distance, geology and topography restricting pathways as well as some natural attenuation of ground gases given the time since the last input date. A subsequent Phase 2 identified elevated concentrations of arsenic, lead and PAHs.

2.4 Site History

A detailed assessment of historical Ordnance Survey maps and associated data has highlighted the below on-site and off-site, current and historical land uses.

Table 2: Description of the site and surrounding area over time, according to historical maps

Year	Site Description	Surrounding Area
1893	No development on the site	Surrounding area is a mixture of industrial developments and rows of terraces dwellings (presumably workhouses) Row of terraced houses 40m north west Reservoir bordering the site to the south west associated with Cotton Mills 70m south west Refuse heap 70m north west Disused dye works 90m north (Walmersley Dye Works) and associated reservoir 150m north east Old quarry 260m east and active quarry (Gorses Quarry) 260m south east
1910		Cotton Mills to the west no longer labelled Disused dye works to the north now labelled as Walmersley Bleach & Dye Works Filter beds 90m north west New smaller reservoir 160m north associated with Walmersley Bleach & Dye Works
1930		Reservoir bordering the site to the south west partially infilled and land bordering the site shown as marshland Cotton Mills to the west removed and redeveloped to semi-detached dwellings and gardens Walmersley Bleach & Dye Works now labelled as Walmersley Bleach Works Walmersley Iron Works 120m south Stone Works at Gorses Quarry 400m south east
1961 - 1963		Reservoir to the south west fully infilled Walmersley Bleach & Dye Works now labelled as Works Filter beds to the north no longer labelled Small reservoir to the north infilled Walmersley Iron Works to the south now labelled as Works along with another building 120m south west Significant residential development 170m south
1978 - 1985		Garages adjacent to the site to the west New residential developments 20m south west, 70m south east, 130m north and 350m south west Former Walmersley Bleach & Dye Works to the north redeveloped to Engineering Works, Agricultural Machinery Works and Welding Works Filter beds removed
1987 - 1991		Semi detached dwellings bordering the site to the north New residential developments adjacent to the site to the south and east and 320m south east
2000	Aerial photo shows that the site is covered by grass with a tree in the centre	Builder's yard with lorries and machinery stored
2005		Engineering Works, Agricultural Machinery Works and Welding Works demolished
2022		Unchanged

3. Environmental Setting

The following section provides information on the environmental setting of the site, utilising data from the British Geological Survey (BGS), the Department for Environment, Food and Rural Affairs (DEFRA), the Coal Authority and Public Health England (PHE).

Table 3: Summary of the site's environmental setting

Environmental Factor		Details	
Hydrogeology	Aquifer Designation	Superficial	Secondary (Undifferentiated)
		Bedrock	Secondary A
	Groundwater Vulnerability	Superficial	Medium
		Bedrock	Low
	Source Protection Zones and Abstractions		Site does not lie within a Source Protection Zone, Drinking Water Protected Area or Drinking Water Safeguard Zone No surface water, groundwater or potable water abstractions within 1000m of the site
Hydrology	Water Network		Pigs Lee Brook at the surface 80m north west, 90m north west and 150m north east (flows north east to south west past the site and is culverted in various places)
Geology	Artificial Ground		Made ground 90m north, 170m west and 260m east Infilled ground at Gorses Quarry 250m east Worked ground 210m south east
	Superficial Deposits		Till, Devensian (Boulder Clay) – Diamicton comprising a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape
	Bedrock Geology		Rossendale Formation - fine to very coarse-grained and pebbly, feldspathic sandstone, interbedded with grey siltstone and mudstone, and subordinate marine black shales, thin coals and seatearths
	Superficial Permeability		Low to High (through mixed flow types)
	Bedrock Permeability		Low (through fracture flow)
	Borehole Records		No borehole records within 250m of the site
Workings	Mining and Ground Workings		No evidence of current or historical coal mining within 250m of the site Reservoirs bordering the site to the south west (1893-1961), 150m north east (1893-present) and 160m north (1910-1961) Refuse heap 70m north west (1893-present) Filter beds 90m north west (1910-1978)
Radon	PHE UKradon		3-5% probability of being above action level
Waste and Landfill	Historical Landfill		Pigsdon Farm inert landfill 220m west (completed in 1989)
	Permitted Waste Sites		None within 1km of the site

4. Initial Conceptual Site Model

The following section outlines potential contamination sources, pathways and receptors, utilising information gathered in the previous sections, to develop an initial conceptual site model.

4.1 Potential Contamination Sources

Information collated through detailed desk studies has identified the following potential sources of contamination.

Adjacent Garages

There are domestic garages adjacent to the site to the west and south west that were constructed around between 1961 and 1985 along with the adjacent dwellings. Any potential contamination from spillages and leakages of chemicals, fuels and oils is not likely to be significant and would be highly localised given the domestic use of these garages.

Infilled Reservoir

Historical maps show that there was previously a reservoir bordering the site to the south west associated with a nearby cotton mill which had been partially infilled by 1930 and fully infilled by 1961. Where contaminated material has been used as infill, this may impact the site given its proximity to the infilled ground. In addition, where putrescible material has been used as infill, ground gases may be produced when these materials degrade. The land bordering the site was redeveloped to dwellings by 1985 suggesting that significant contamination in this area is unlikely. Furthermore, the significant time elapsed since this infilling occurred (>60 years) suggests that the risk of ground gas production is likely to be low.

It should also be noted that the infilled reservoir is not identified as a landfill by the Environment Agency or identified as a landfill on historical maps, therefore, it is not likely to have been infilled with hazardous waste material or material with high organic content. Infilling is also not likely to be greater than 5m (or an average depth of more than 3m), therefore, it would be acceptable to simply install Characteristic Situation 2 protection as a precautionary measure.

Historical Industrial Activity

There have been a number of industrial developments in the surrounding area including a Bleach & Dye Works to the north from 1893 to 1978-1985 when it was redeveloped to an Engineering Works, Agricultural Machinery Works and Welding Works, Cotton Mills to the south west from 1893 to 1930 and an Iron Works to the south from 1930 which is currently an engineering works. While contamination from these developments is likely to have occurred, this is not likely to have impacted the site given their distance.

Historical Landfill

Environment Agency records show that there is an historical landfill 220m west of the site. Records show that this was an inert landfill and was completed in 1989, therefore, the gas generation potential is considered to be very low and elevated ground gases are not likely to pose a risk to the site.

4.2 Potential Contamination Receptors

Based on the proposed use of the site and the identified sources of contamination, the following receptors are considered:

- Residential end users

Given the absence of any on-site sources of contamination, off-site receptors are not considered relevant.

4.3 Potential Contamination Pathways

Based on the expected on-site receptors, relevant pathways for the above receptors include:

- Ingestion/inhalation of contaminated soil dust
- Dermal contact with contaminated soil
- Inhalation of soil vapours
- Ingestion of homegrown produce
- Permeation into drinking water pipes
- Ground gas permeation into the building

Pathways between off-site sources and off-site receptors is beyond the scope of this assessment.

4.4 Risk Assessment Methodology

The potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the contaminant linkage on the receptor, if it is assumed to be present, and the probability of the contaminant linkage being present.

Severities are categorised from Minor to Severe and probabilities are categorised from Unlikely to High Likelihood to give a potential level of risk output.

Table 4: Risk Matrix

Probability	Severity of Consequence			
	Severe	Medium	Mild	Minor
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low / Moderate Risk
Likely	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low / Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low / Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Very High Risk

There is a high probability that severe harm could arise to a designated receptor from an identified source; or there is evidence that severe harm to a designated receptor is currently happening.

High Risk

Harm is likely to arise to a designated receptor from an identified source.

Moderate Risk

It is possible that harm could arise to a designated receptor from an identified source. It is relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild.

Low Risk

It is possible that harm could arise to a designated receptor from an identified source, however, it is likely that this harm, if realised, would normally be mild.

Very Low Risk

There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

4.5 Conceptual Site Model

The information in this section has been compiled to produce an initial conceptual site model outlining the potential sources, pathways and receptors to consider at the site. The level of risk was categorised by considering the severity and probability, as outlined in the previous section.

Table 5: Conceptual site model

Sources	Pathways	Receptors	Severity	Probability	Potential Level of Risk
Adjacent Garages	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Inhalation of soil vapours Ingestion of homegrown produce Permeation into drinking water pipes	Residential end users	Mild	Low Likelihood	Low Any potential contamination from spillages and leakages of chemicals, fuels and oils from the adjacent garages is not likely to be significant and would be highly localised given the domestic use of these garages.
Infilled Reservoir	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Inhalation of soil vapours Ingestion of homegrown produce Permeation into drinking water pipes Ground gas permeation into the building		Medium	Unlikely	Low Where contaminated material has been used to infill the historical reservoir bordering the site to the south west, this may impact the site given its proximity to the infilled ground. In addition, where putrescible material has been used as infill, ground gases may be produced when these materials degrade. The land bordering the site was redeveloped to dwellings by 1985 suggesting that significant contamination in this area is unlikely. Furthermore, the significant time elapsed since this infilling occurred (>60 years) suggests that the risk of ground gas production is likely to be low. It would be acceptable to install Characteristic Situation 2 protection as a precautionary measure.
Historical Industrial Activity	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Inhalation of soil vapours Ingestion of homegrown produce Permeation into drinking water pipes		Medium	Unlikely	Low While contamination is likely to have occurred at the industrial developments in the surrounding area, this is not likely to have impacted the site given their distance.
Historical Landfill	Ground gas permeation into the building		Medium	Unlikely	Low The historical landfill to the west of the site was an inert landfill and was completed in 1989, therefore, the gas generation potential is considered to be very low and elevated ground gases are not likely to pose a risk to the site.

5. Conclusions

5.1 Risk Evaluation

The initial conceptual site model identified the following potential contaminant linkages present at the site and the following conclusions have been drawn:

- There is a **low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce and permeation into drinking water pipes from the adjacent garages to the west and south west.
- There is a **low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce, permeation into drinking water pipes and ground gas permeation into the building from the infilled reservoir bordering the site to the south west.
- There is a **low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce and permeation into drinking water pipes from the historical industrial activity in the surrounding area.
- There is a **low risk** to residential end users from ground gas permeation into the building from the historical inert landfill to the west of the site.

Based on the findings of this Phase 1 Preliminary Risk Assessment, the risk to residential end users is considered to be low.

5.2 Further Investigation

Based on the above conclusions, further investigation is not considered necessary, however, it is recommended that Characteristic Situation 2 protection measures are implemented as a precautionary measures to protect the site from potential ground gases originating from the infilled reservoir to the south west of the site. These measures should include a block and beam floor design with a 2000 gauge DPM and an open void below, from which ground gas can be ventilated. The void will provide good protection against ground gas ingress and when designed and constructed correctly it will dilute any gas being emitted from the ground to acceptable levels.

Of concern is whether the membrane can withstand the construction process because, once torn or damaged, the membrane will cease to operate as an effective barrier. Adequate quality control during the laying of the membrane is extremely important so the membrane should be protected.

It is important to note that this conclusion is based on the proposed development plan.

If visible or olfactory evidence of contamination is identified during excavations at the site, work should cease in order to allow further investigation to be carried out. In addition, to ensure regulatory compliance, Waste Classification & Waste Acceptance Criteria (WAC) testing of excavated material from the site may be required prior to off-site disposal.

6. References

Bury Council. *Online maps.* [online] Available at: <maps.bury.gov.uk>.

British Geological Society. *GeoIndex.* [online] Available at: <mapapps2.bgs.ac.uk/geoindex>.

Coal Authority. *Interactive Map Viewer.* [online] Available at: <mapapps2.bgs.ac.uk/coalauthority>.

Department for Environment, Food & Rural Affairs (DEFRA). *Magic Map Application.* [online] Available at: <magic.defra.gov.uk>.

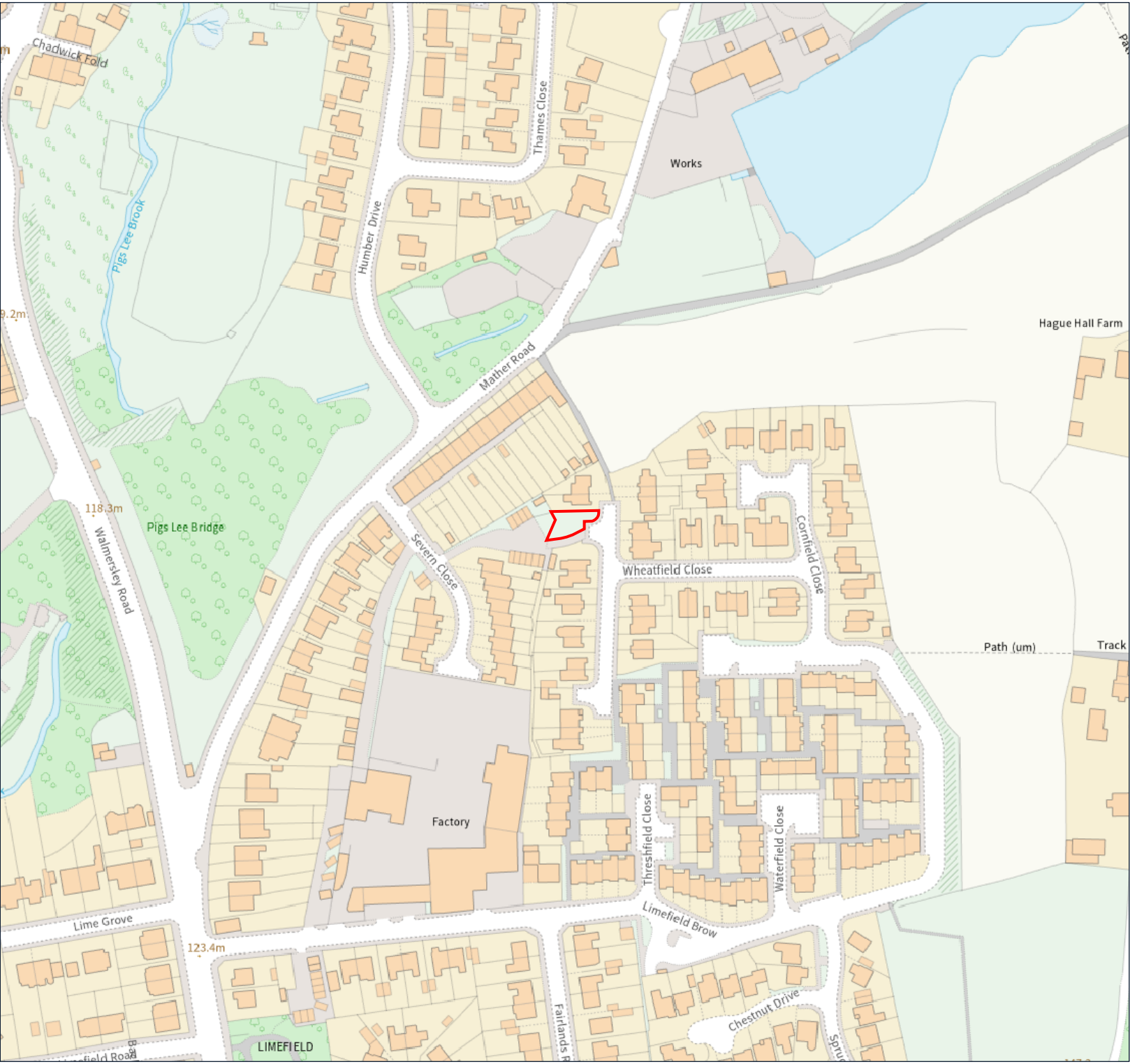
Environment Agency, 2021. *Land contamination risk management (LCRM).* [online] Available at: <gov.uk/government/publications/land-contamination-risk-management-lcrm>.

Historic England. [online] Available at: <historicengland.org.uk>.

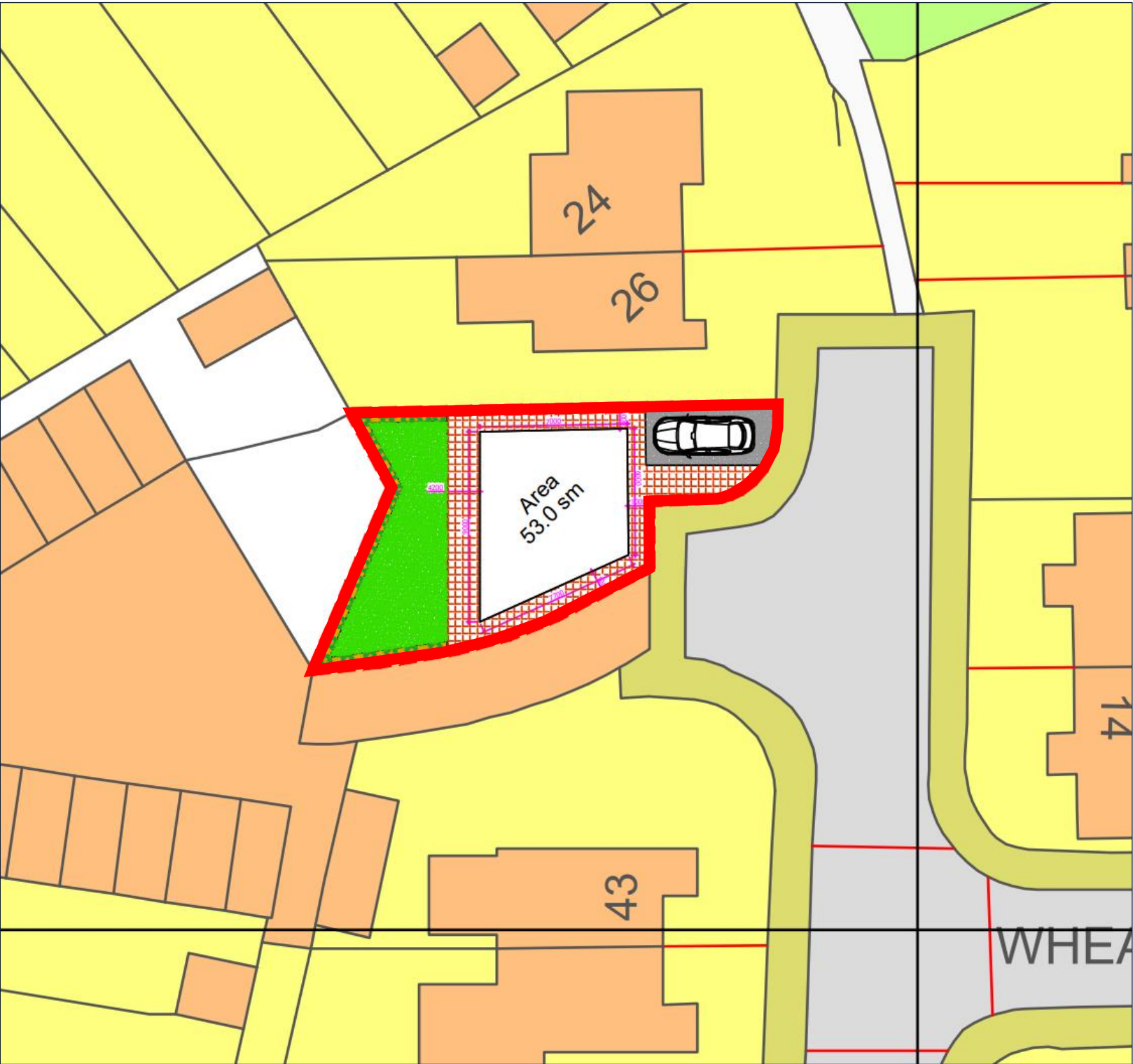
Landmark Information Group.

Ordnance Survey. [online] Available at: <ordnancesurvey.co.uk>.

Oakshire Environmental. Available at: <oakshireenvironmental.co.uk>.



Appendix - Site Maps & Plans	
Description	
Site location plan	
Sources	
Contains OS data © Crown copyright and database rights	
Key	
	Site boundary
	North



Appendix - Site Maps & Plans	
Description	
Proposed site plan	
Sources	
UHDesign	
Key	
	Site boundary
	North

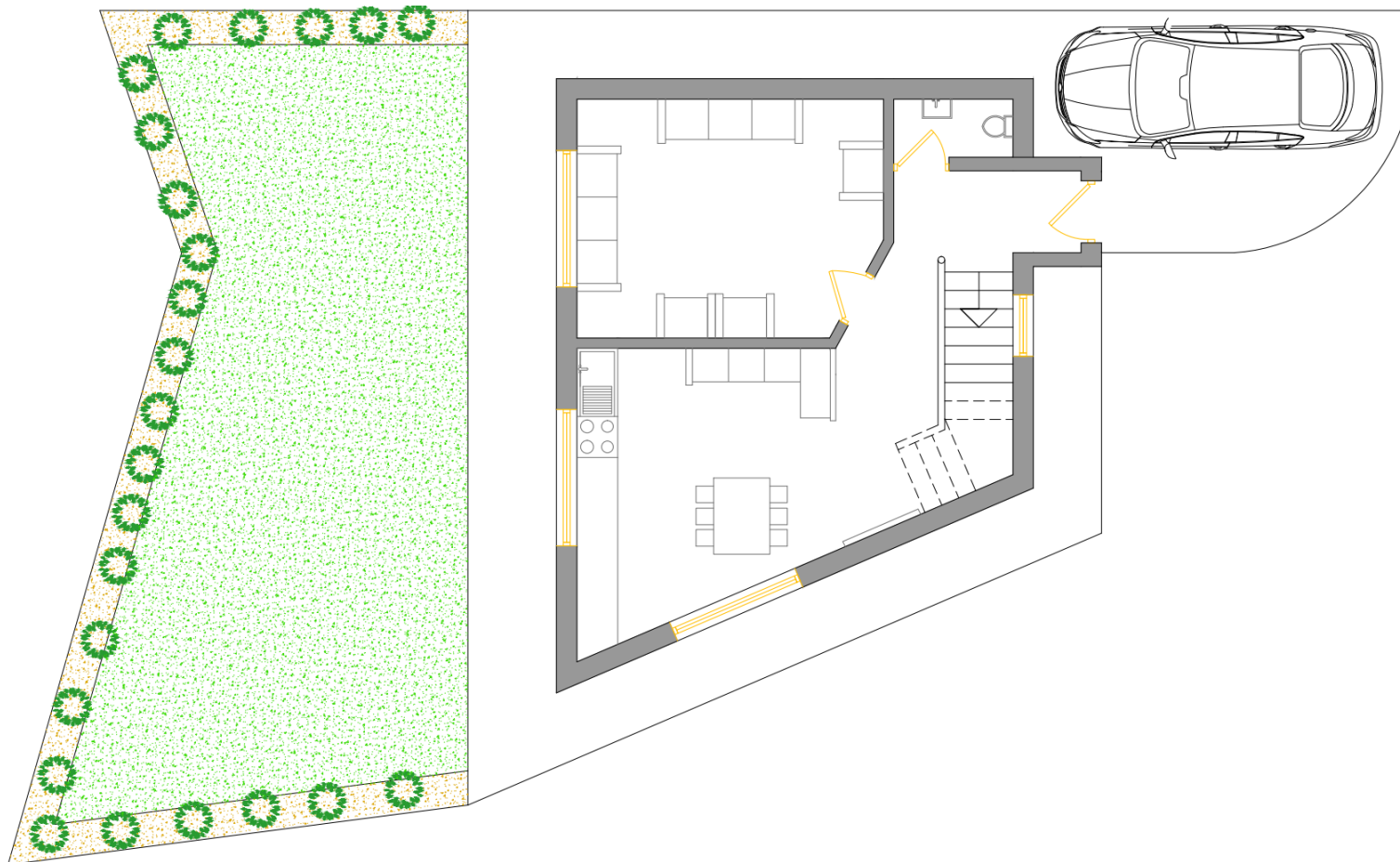
Appendix - Site Maps & Plans

Description

Proposed ground floor plan

Sources

UHDesign





Appendix - Site Photos

Description

Photo of grass at the east of the site and adjacent footpath to the south, facing north east

Sources

Umar Hussain



Appendix - Site Photos

Description

Photo of grass at the east of the site, facing east

Sources

Umar Hussain



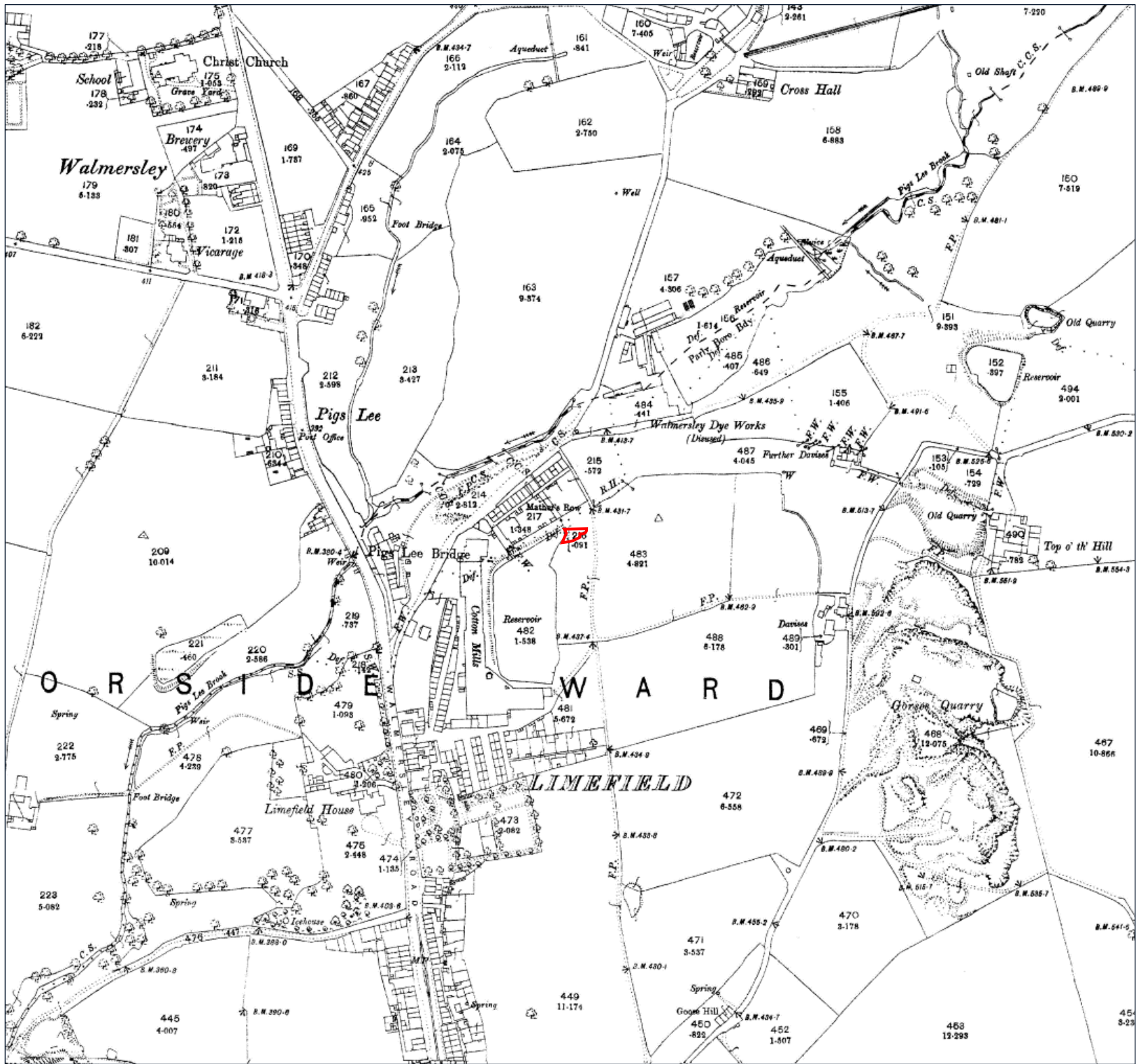
Appendix - Site Photos

Description

Photo of the site and adjacent garages from the east, facing west

Sources

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Appendix – Historical Maps

Description

Historical map dated 1893

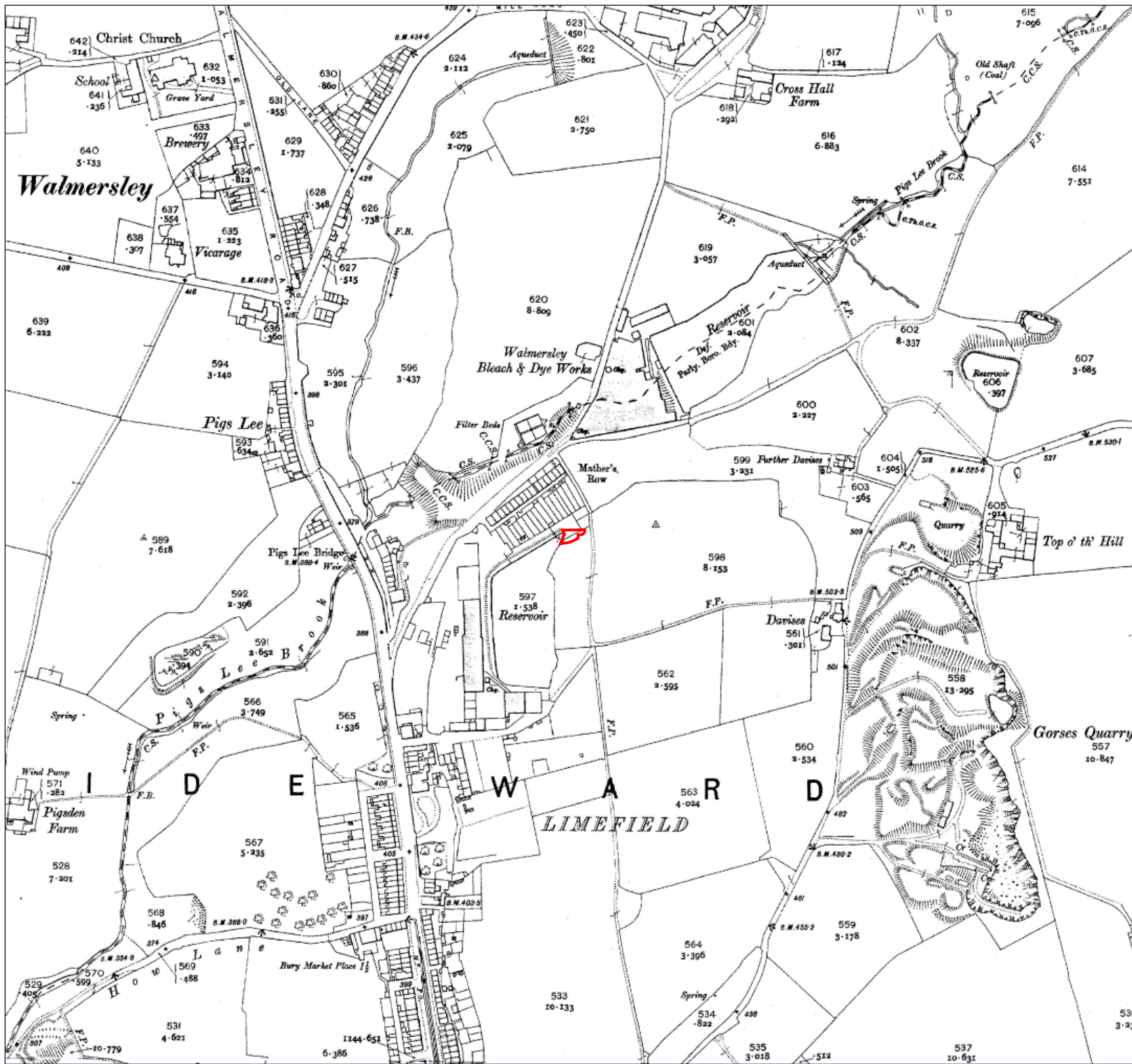
Scale: 1:2,500

Sources

Landmark Information Group

Key

	Site boundary
▲	North



Appendix – Historical Maps	
Description	
Historical map dated 1910	
Scale: 1:2,500	
Sources	
Landmark Information Group	
Key	
	Site boundary
	North



Appendix – Historical Maps	
Description	
Historical map dated 1930	
Scale: 1:2,500	
Sources	
Landmark Information Group	
Key	
	Site boundary
	North



Appendix – Historical Maps

Description

Historical map dated 1961 - 1963

Scale: 1:2,500

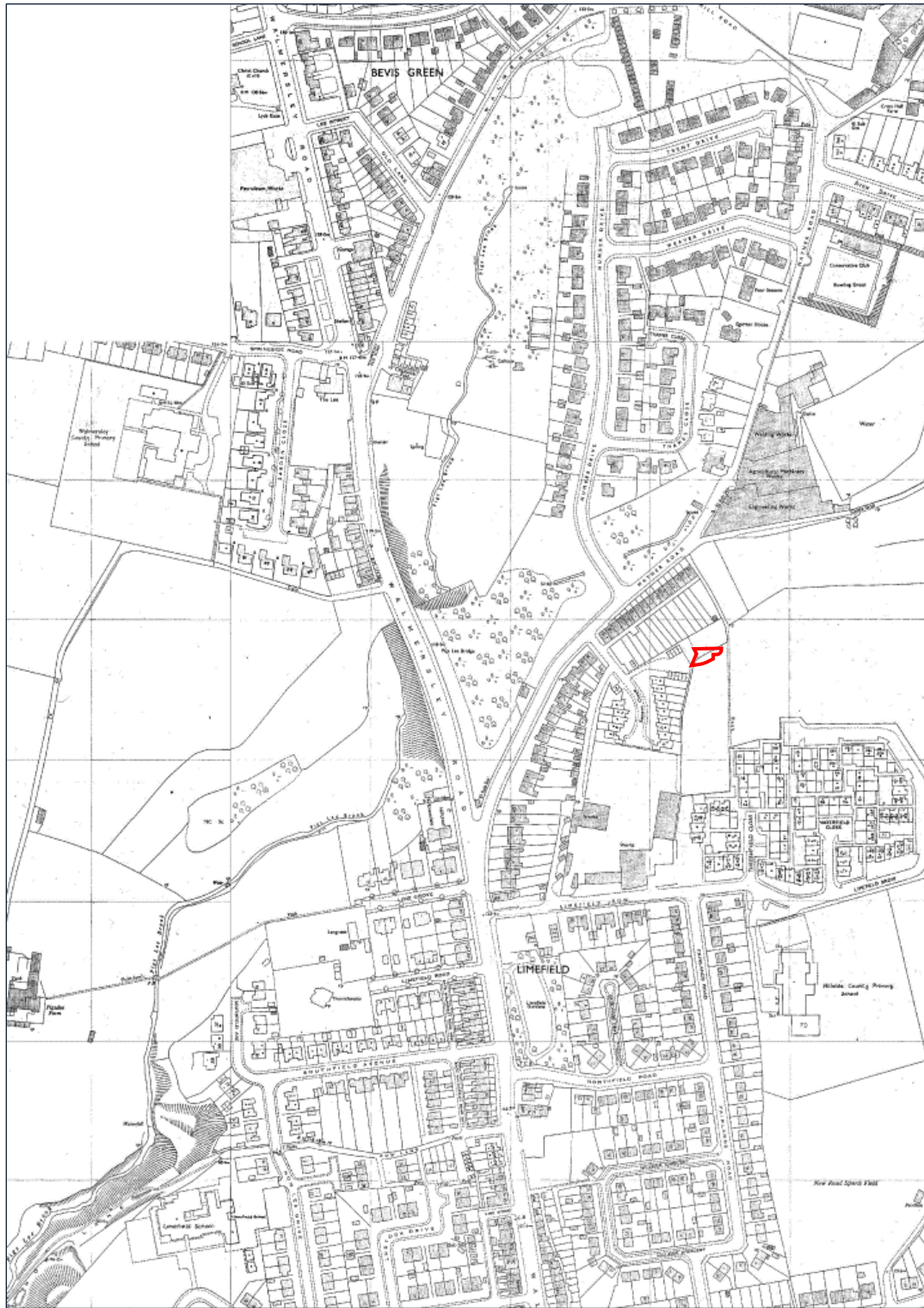
Sources

Landmark Information Group

Key

Site boundary

North



Appendix – Historical Maps

Description

Historical map dated 1978 - 1985

Scale: 1:1,250

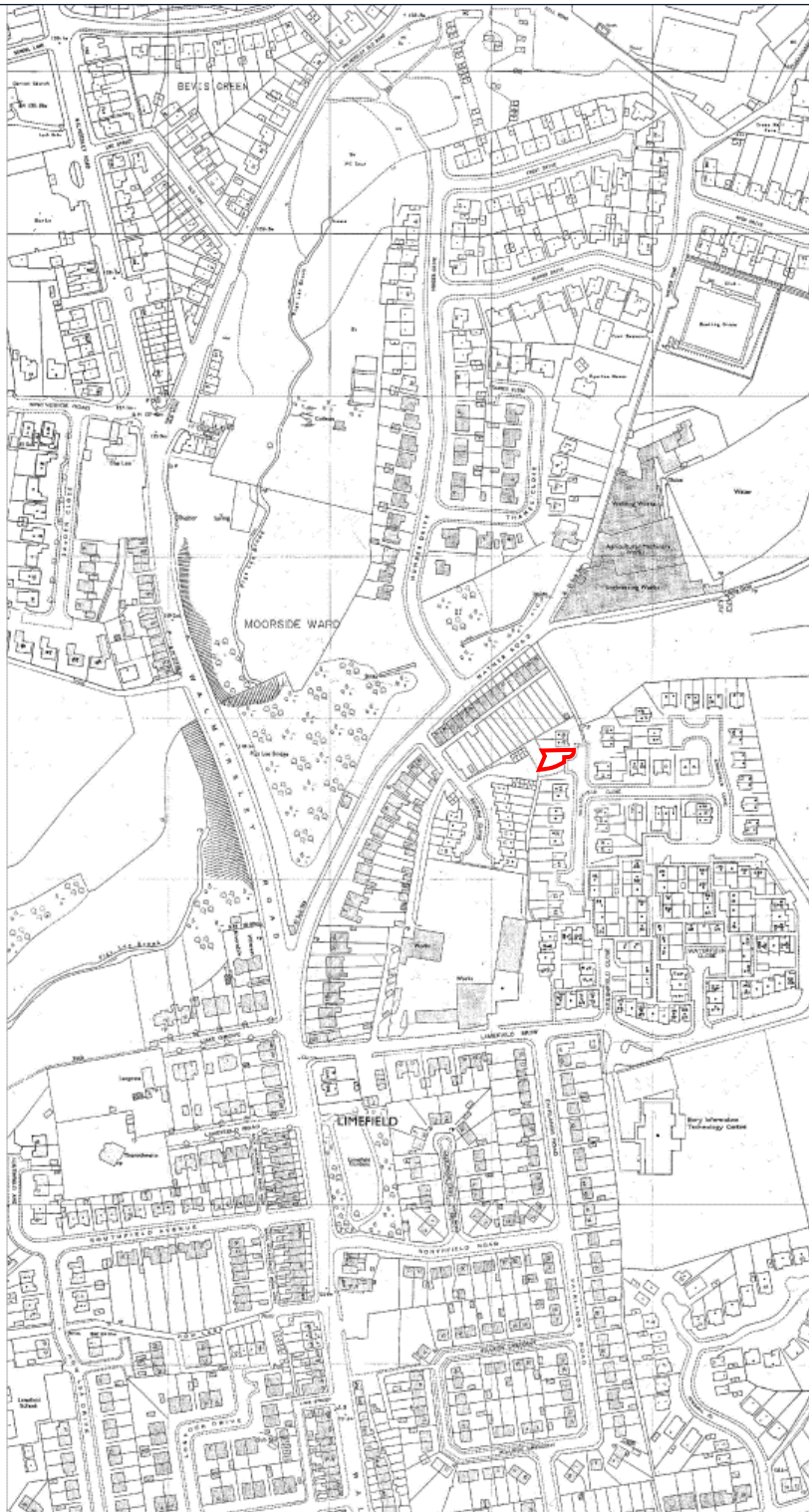
Sources

Landmark Information Group

Key

Site boundary

▲ North



Appendix – Historical Maps

Description

Historical map dated 1987 - 1991

Scale: 1:1,250

Sources

Landmark Information Group

Key

Site boundary

▲ North



Appendix – Historical Maps

Description

Aerial photograph dated 2000

Sources

The GeoInformation Group

Key

Site boundary

North



Appendix – Historical Maps	
Description	
Aerial photograph dated 2005	
Sources	
Infoterra Ltd & Bluesky	
Key	
	Site boundary
▲	North



Appendix – Historical Maps

Description

Aerial photograph dated 2022

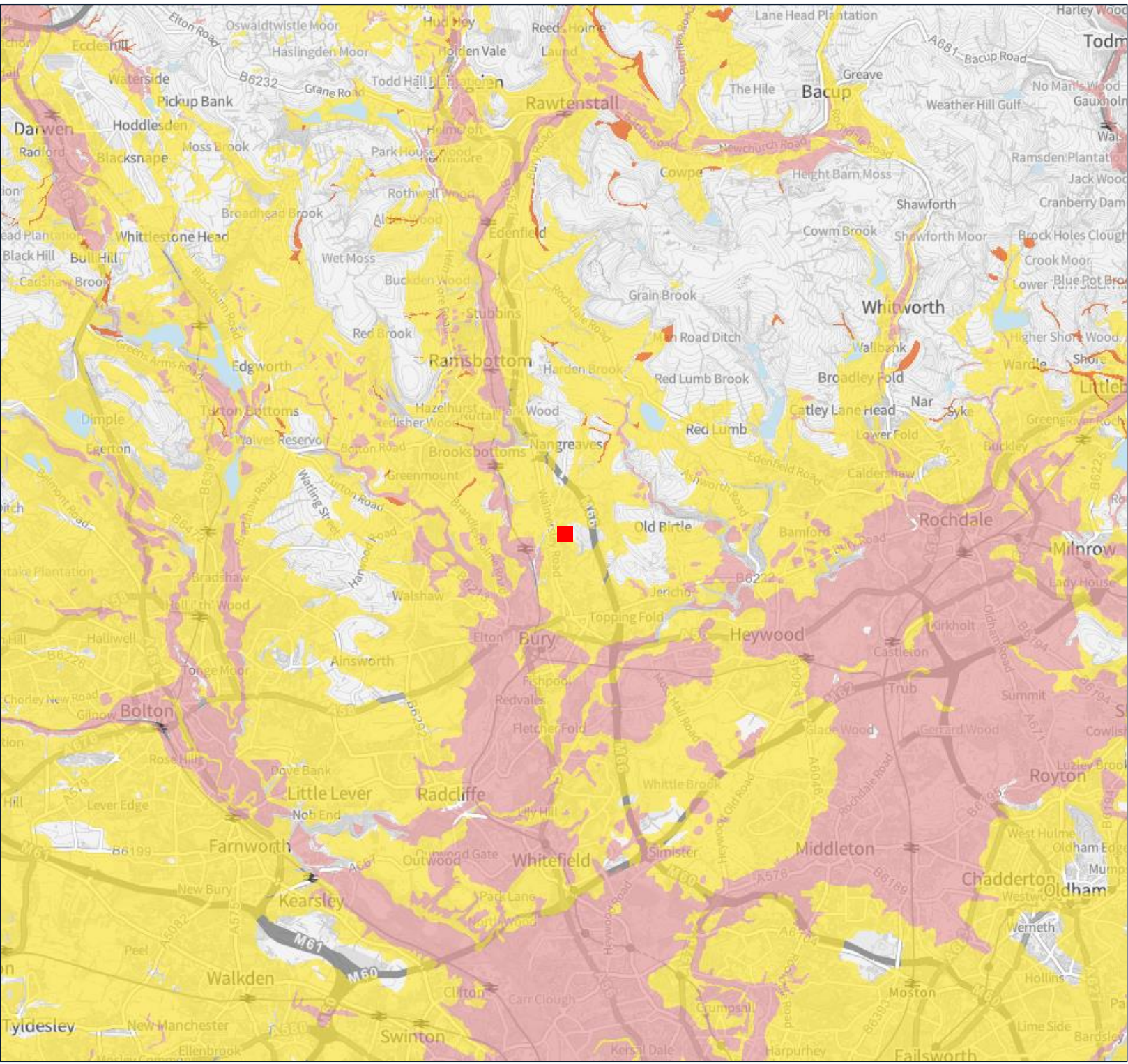
Sources

Google Earth

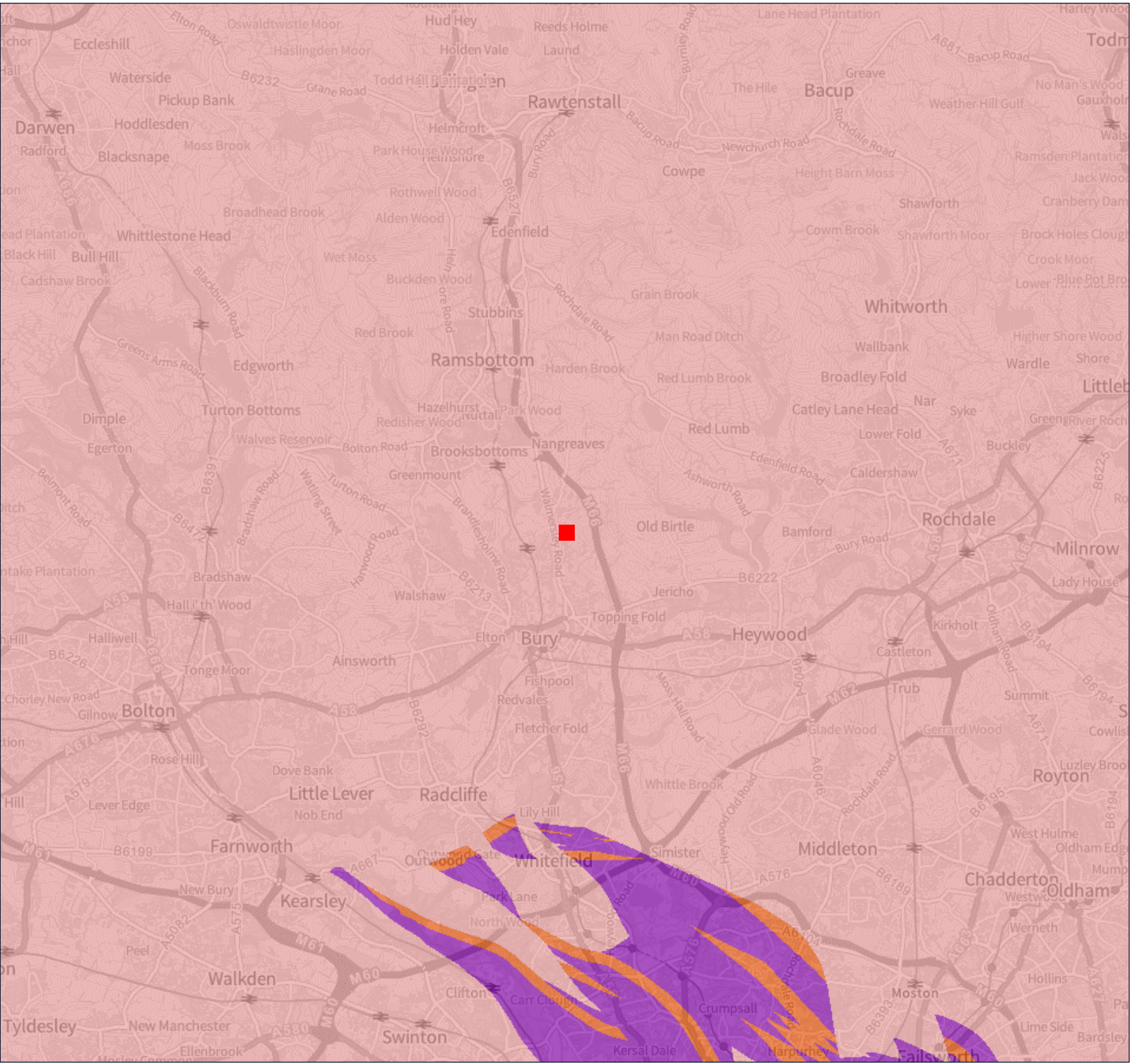
Key

Site boundary

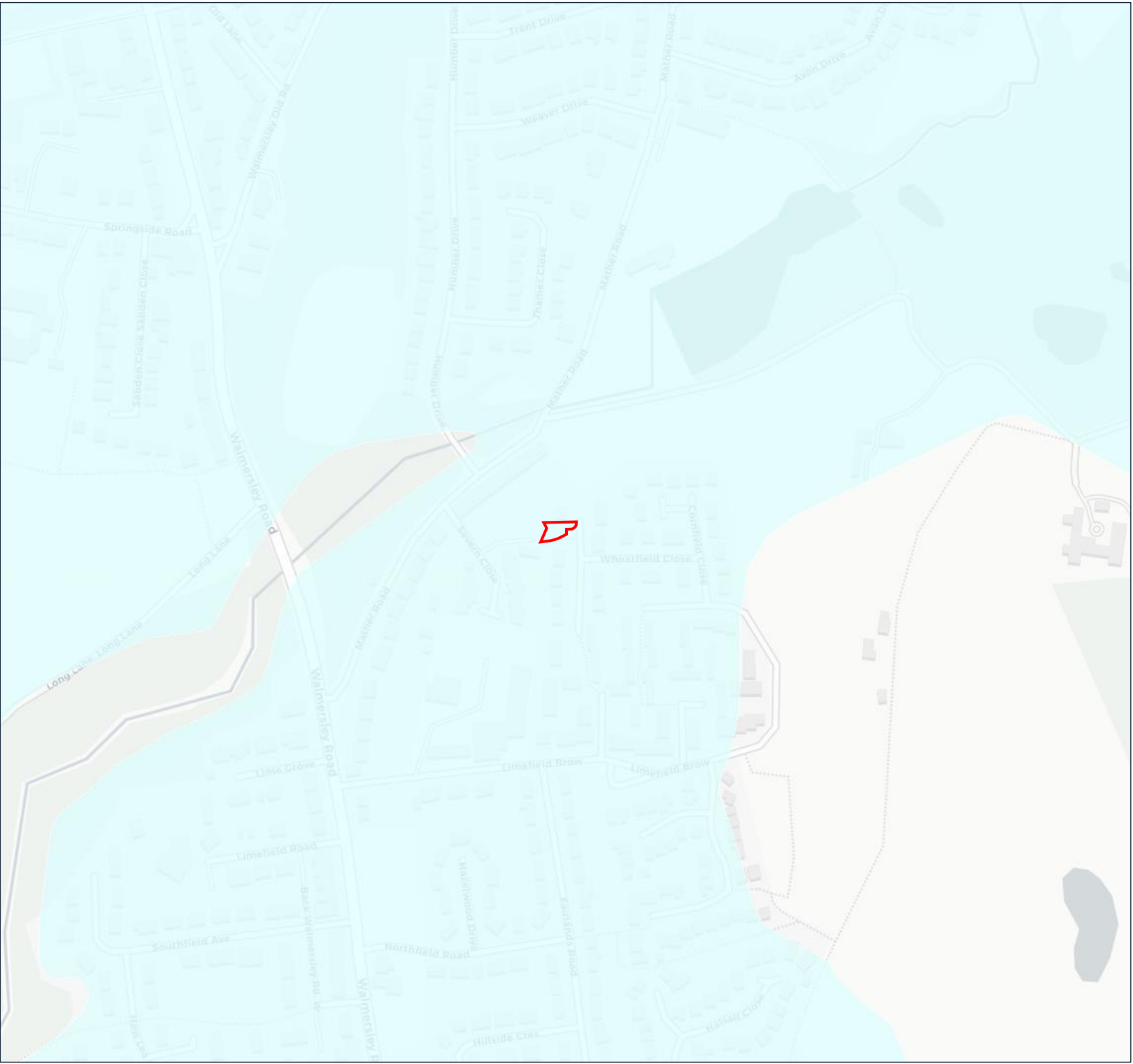
North



Appendix - Geological Maps	
Description	
BGS map showing superficial hydrogeology on site	
Sources	
DEFRA Magic Map British Geological Survey	
Key	
	Site location
	Principal
	Secondary A
	Secondary B
	Secondary Undifferentiated
	Unproductive
	North



Appendix - Geological Maps	
Description	
BGS map showing bedrock hydrogeology on site	
Sources	
DEFRA Magic Map British Geological Survey	
Key	
	Site location
	Principal
	Secondary A
	Secondary B
	Secondary Undifferentiated
	Unproductive
	North



Appendix - Geological Maps

Description

BGS map showing superficial deposits on site

Sources

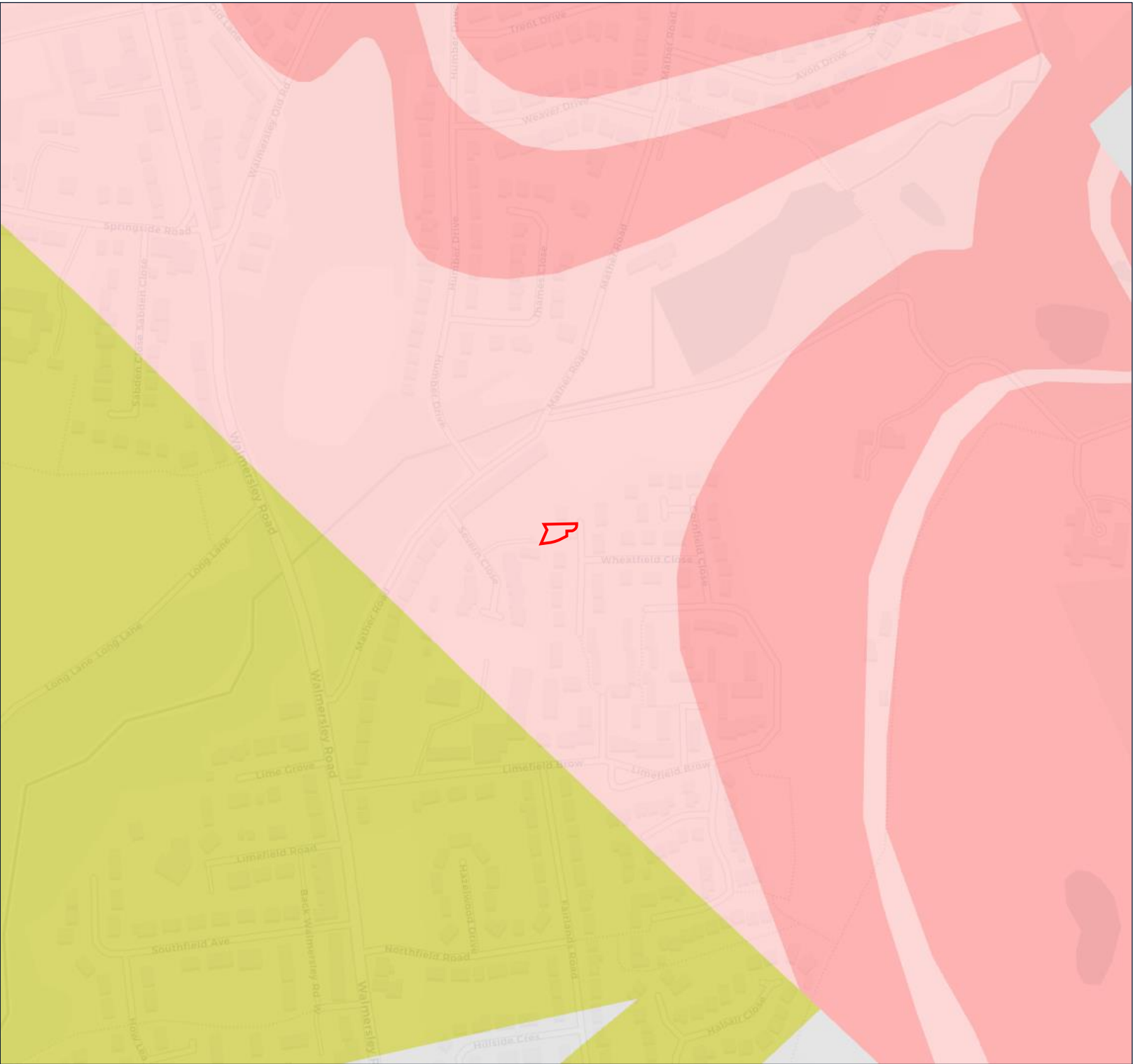
British Geological Survey

Key

Site boundary

Till, Devensian

North



Appendix - Geological Maps	
Description	
BGS map showing bedrock geology on site	
Sources	
British Geological Survey	
Key	
	Site boundary
	Rossendale Formation
	Upper Haslingden Flags
	Old Lawrence Rock
	North