QUALITY MANAGEMENT FOR REPORT

Project	Land adjacent 2 Poplar Avenue, Thongsbridge, HD9 7TL	Phase I Desk Study	
Client	Holme Valley Estates Ltd		
Date	February 2025		
Version	Issue 1		
Prepared by	Frances A Bennett	BSc (Hons), CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, MIEnvSci	Director Ashton Bennett Ltd

1. INTRODUCTION

1.1 The Report

This report describes the results of a Phase 1 Desk Study undertaken on land adjacent to 2 Poplar Avenue, Thongsbridge near Holmfirth, HD9 7TL. The work was commissioned by Holme Valley Estates Ltd and was carried out by the Ashton Bennett Consultancy.

It is proposed to construct a residential property in the existing garden of No 2 Poplar Avenue, replacing an existing double garage.

The purpose of this Phase 1 Study was to collate and assess information on the site including geological, hydrogeological and mining information, archival maps and historical review to determine past use, a database review, environmental data on water and soil, and to undertake a site reconnaissance to enable a desk top assessment of pathways of migration and potentially sensitive receptors, and to determine solutions to any geotechnical, environmental and mining concerns to the development of the site. This report assumes a residential development as being the most conservative for environmental assessment.

This report describes the research work carried out, presents the results of the desk study and from the conceptual model of the site makes recommendations for solutions to any environmental, geotechnical and mining concerns to any proposed redevelopment.

Archival Maps are presented in Appendix A. A Coal Authority Report is presented in Appendix B and a Conceptual Model is presented in Appendix C.

1.2 Site Location

The site lies to the immediate north of number 2 Poplar Avenue which lies to the west of Woodlands Avenue in Thongsbridge.

The site lies to the north of Thongsbridge centre, north of Holmfirth and south of Huddersfield in West Yorkshire, postcode HD9 7TL.

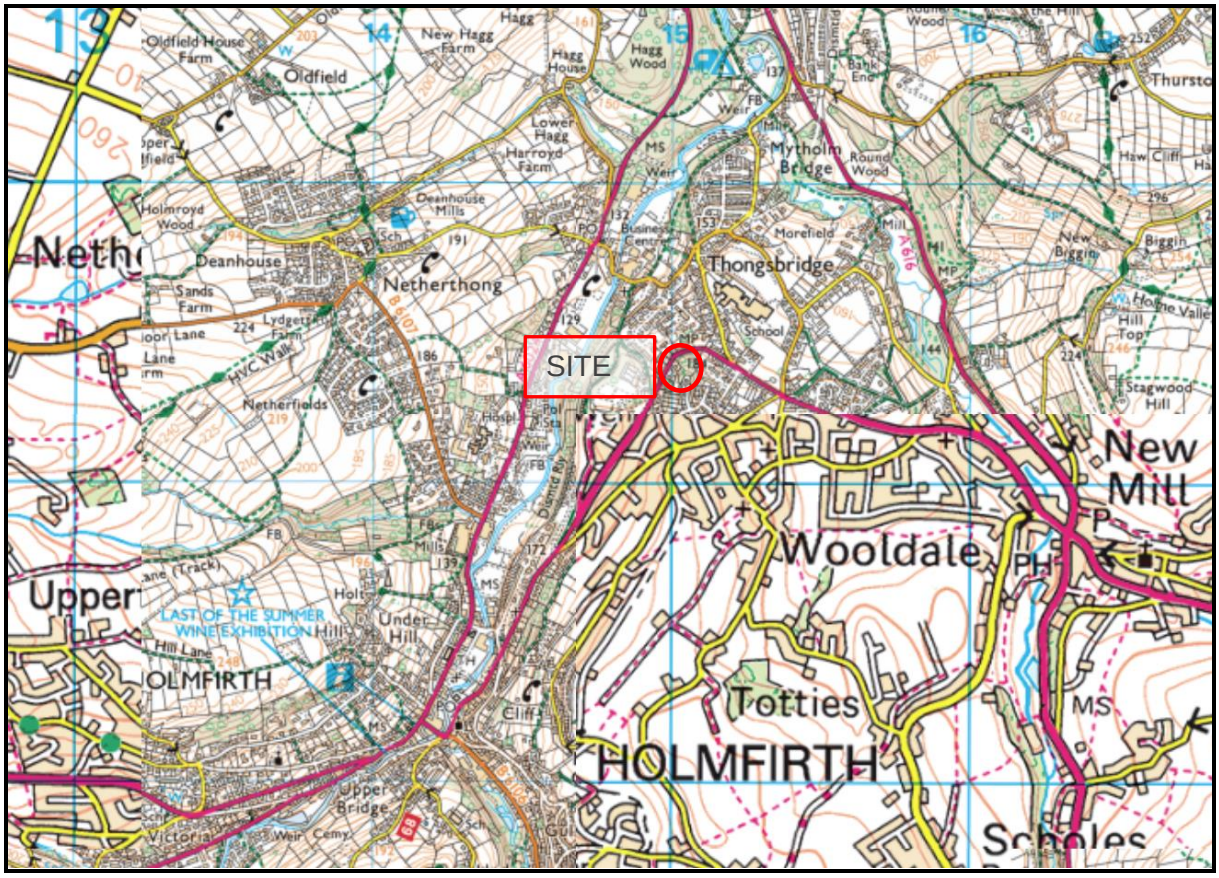

Figure 1 **Site Location Plan**

Figure 2 Detailed Site Location Plan

1.3 The Author

This report was prepared by Frances A Bennett an engineering geologist who has a degree in Geology, a postgraduate qualification in Soil Mechanics and is a Chartered Geologist CGeol, Chartered Environmentalist CEnv and Chartered Water and Environmental Manager C.WEM and FIMMM with 45 years of experience in the fields of geology, geotechnical engineering, hydrogeology, contamination, mining, slope stability and waste disposal.

1.4 Sources of Information

The following data have been referenced in relation to compiling this Report:

- Geological mapping from British Geological Survey 1:50,000,
- Geological mapping from British Geological Survey 1:10,000
- Karl Terzaghi, Ralph B Peck and Gholamreza Mesri, Soil Mechanics in Engineering Practice, John Wiley and Sons Inc., Third Edition (1996).
- BS 5930:2015, Code of Practice for Ground Investigations, British Standards Institute
- NHBC Part 4 Foundations, Chapter 4.4 Strip and Trench Fill Foundations,(2010 and 2020).
- The Coal Authority Report No. 51003475084001, January 2025.
- Groundsure Report CM-1203821-4873-230125HIS, January 2025

The information for this report is also from sources recommended by the Institute of Civil Engineers (ICE), the Association of Geotechnical and Geoenvironmental Specialists (AGS), Construction Industry Research and Information Association (CIRIA) and the Department of the Environment Transport and the Regions (DETR). The report has been compiled in accordance with the latest ICE, DETR, Department of Environment, Food and Rural Affairs (DEFRA), British Standard Draft Documents and British Standards, CIRIA, CLR 11 & other CLEA Reports and Eurocode 7.

2. THE SITE

2.1 Site Description

The site is currently occupied by a garden and double garage of 2 Poplar Avenue, Thongsbridge.

The site lies around National Grid Reference 415167E 410077N, covering 0.03ha.

A site visit on January 22nd 2025 confirmed the site to be occupied by level ground with a double garage and garden.

The site is bounded to the north by a footpath and trees within woodland. The site is bounded to the west by woodland. The site is bounded to the south by 2 Polar Avenue house and Poplar Avenue with residential houses beyond. The site is bounded to the east by residential houses and gardens with a recreation area beyond.

There are no materials seen on site that cause environmental concern.

2.2 The Proposals

It is proposed to develop the site for a residential house and garden.

3 HISTORIC MAPPING, LANDFILL and WASTE SITES, HISTORIC and CURRENT INDUSTRIAL LAND USE

3.1 Historic Mapping

The following maps and plans were inspected to assess the history of the site and its past environments. The archival Ordnance Survey maps are presented in Appendix A. The site is marked on the maps in Appendix A.

TABLE 1
Historical Maps Inspected

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
1854	1:10.560	The site is situated within Longlands Wood with a footpath crossing through the land.	The site is surrounded by open land with woodland and a mill stream and the River Holme to the north east, woollen mills to the north east and south west. The Lancashire and Yorkshire Railway line extends south west to north east to the east of the site. Luke Lane lies to the east of the site joining Miry Lane to Mytholm Bridge Mills. Several sandstone quarries are present within 500m of the site.
1888 1893	1:10,560 1:2,500	The site is still situated within Longlands Wood and is crossed by a footpath from Thongsbridge to Mytholm	No change to the surrounding area.

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
		Bridge Mills to the north east of the site.	
1904 1906 1918	1:10,560 1:2,500 1:2,500	The site is still situated within Longlands Wood although the wood has reduced in size.	Thongsbridge had extended in size with a cricket ground and larger mill buildings and a Size mill. The mill to the north east is renamed Upper Mytholm Bridge Mills. Woodland House is shown to the south
1929-33 1938 1948-1949	1:10,560	No change on site.	The area to the west of Luke Lane and south east and east of the site is shown as developed for housing.
1955-1956 1967 1965-70	1:10,560 1;2,500 1:10,560	No change on site. The footpath is shown to the north of the site.	Further houses had been constructed to the west of Luke Lane along Larch, Elm and Beech Avenues. A new road Woodlands Avenue extended from Miry Lane to the site with housing developed on Lime Avenue and Alder Avenue to the west of Woodlands Avenue. The railway is shown as dismantled. A refuse tip is shown 100m to the west of the site between Longlands Wood and the River Holme with access from Luke Lane to the north east of the site.
1977-84 1979-84 1987	1:10,000 1:2,500 1:2,500	These maps indicate the construction of a house immediately south of the site known as 2 Poplar Avenue.	Further houses have been developed west of Woodlands Avenue. All land between Woodlands Avenue and the footpath to the north is developed for housing. The refuse tip is no longer annotated.
1990 1993 1990-1994 1994 1992-95	1:10,000 1:2,500 1:2,500 1:2,500 1:2,500	No change on site.	The railway viaduct had been demolished. No other significant changes within 100m of the site.
2001 2003 2010 2025	1:10,000 1:1,250 1:10,000 1:10,000	No change on the site.	No significant change within 100m.

In summary, the area is shown on the OS maps to have been woodland and a residential garden since 1854. The surrounding area has been open land and residential housing.

3.2 Historic Industrial Land Use

The site area has not been occupied by any previous historic industrial activity.

In the surrounding area within 250m there has been historical industrial land use of a woollen mill 100m and 150m to the east and a further mill 250m to the south.

There have been no historical tanks, no electricity sub stations, historic petrol stations or garages within 250m of the site.

There has been no historical military land within 250m surrounding the site area.

There is a refuse heap marked at 73m west of the site and unspecified heaps at 270m south and unspecified ground works at 179m, 181m and 183m west of the site.

The local historic industrial land uses are unlikely to have detrimentally affected the nature of the site. A refuse site was marked on the OS maps at 73m west of the site between 1967 and 1987. It is likely that any methane or carbon dioxide production has ceased by now. However, it would be prudent to incorporate mitigating measures in construction.

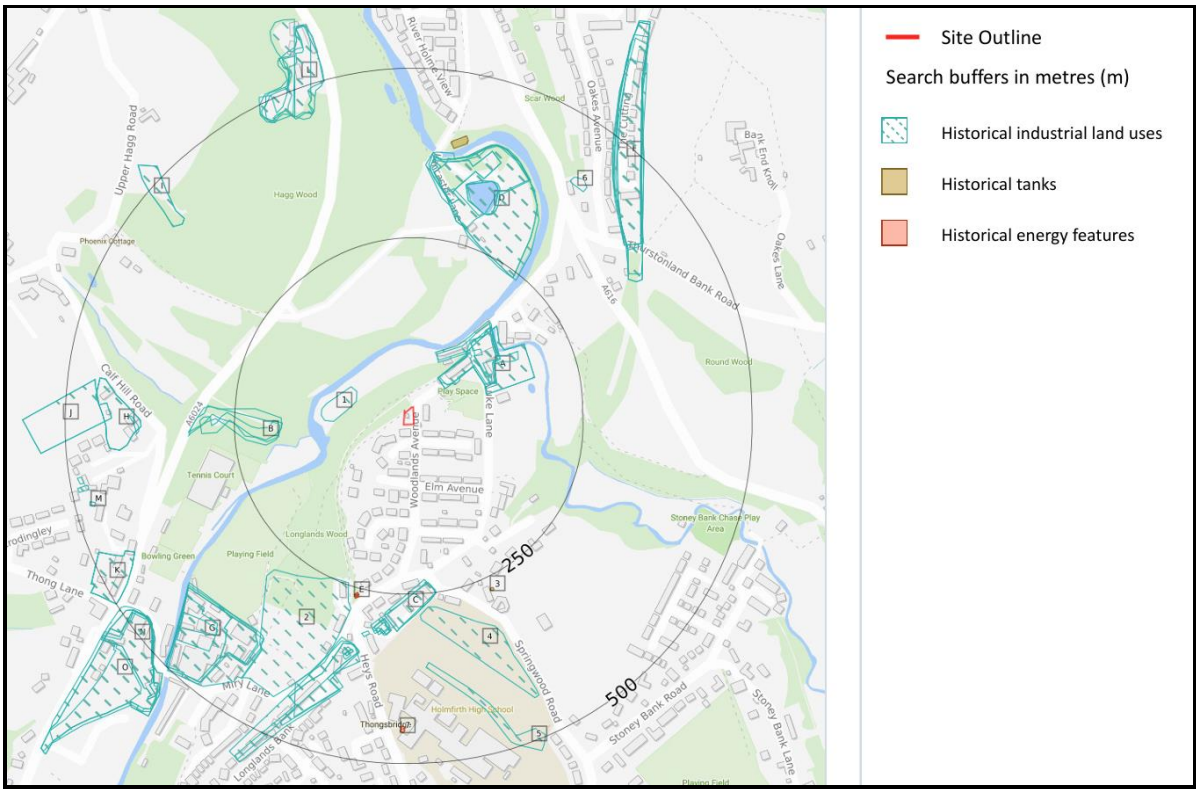

Figure 3 Historic Industrial Land Use Plan

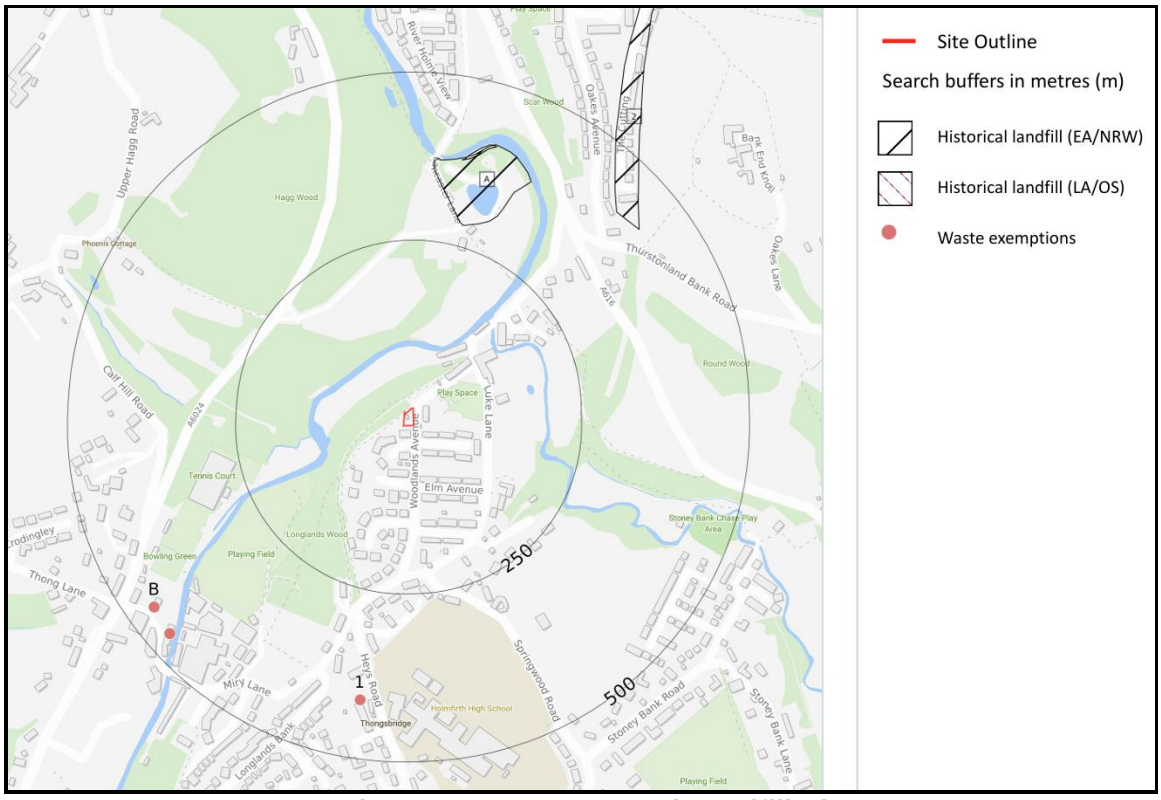

Figure 4 Waste and Landfill Sites

3.3 Landfill and Waste Sites, Made Ground, Reworked and Infilled Ground

There are zero active or recent landfill sites or recently closed landfill sites recorded within 250m of the site. The BGS records and LA/mapping records indicate no historical landfill within 250m of site. There were zero historical local authority (LA), Environment Agency (EA), or Natural Resourses Wales (NRW) landfills within 250m of site.

The records do not include the refuse tip 73m to the west of the site although it is recorded on the historic OS maps.

Three waste exemption licences exist within 500m of the site area. All are located >250m distant from the site.

Made ground is annotated 200m to the south east of the site associated with the former railway. Other made ground and worked ground is shown >250m from the site

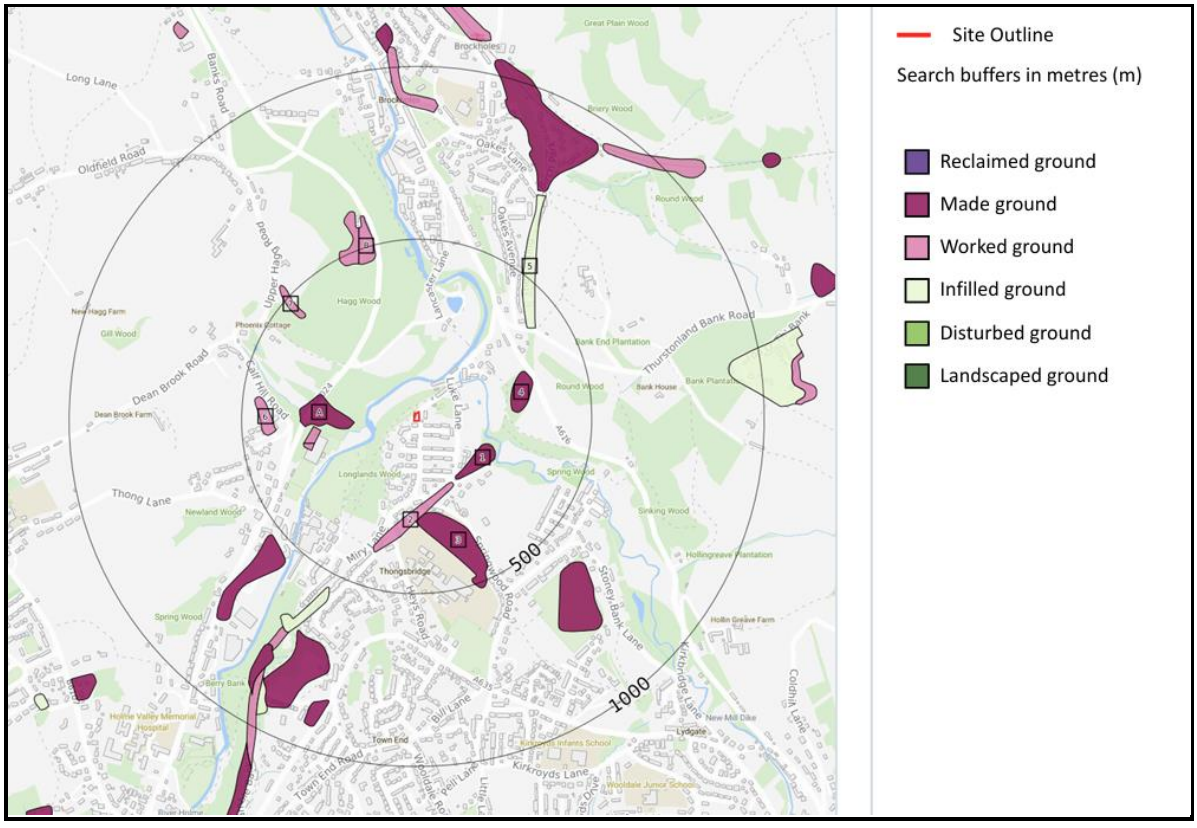

Figure 5 Made, Reworked and Infilled Ground

3.4 Current Industrial Land Use

The site area is currently occupied by open ground forming a residential garden.

There are no sites determined as Contaminated Land within 500m of the site.

Potentially contaminating industrial land use within 250m of the site are noted as the site of the former Upper Mytholm Bridge Mill.

Current industrial land uses beyond 100m are unlikely to detrimentally affect the site.

There are no local current petrol or fuel stations within 500m of the site.

There are no sites determined as contaminated land, National Grid High Voltage underground electricity transmission cables or high pressure gas transmission pipelines on, or within 500m of the site.

The local current industrial land uses are unlikely to have detrimentally affected the nature of the site.

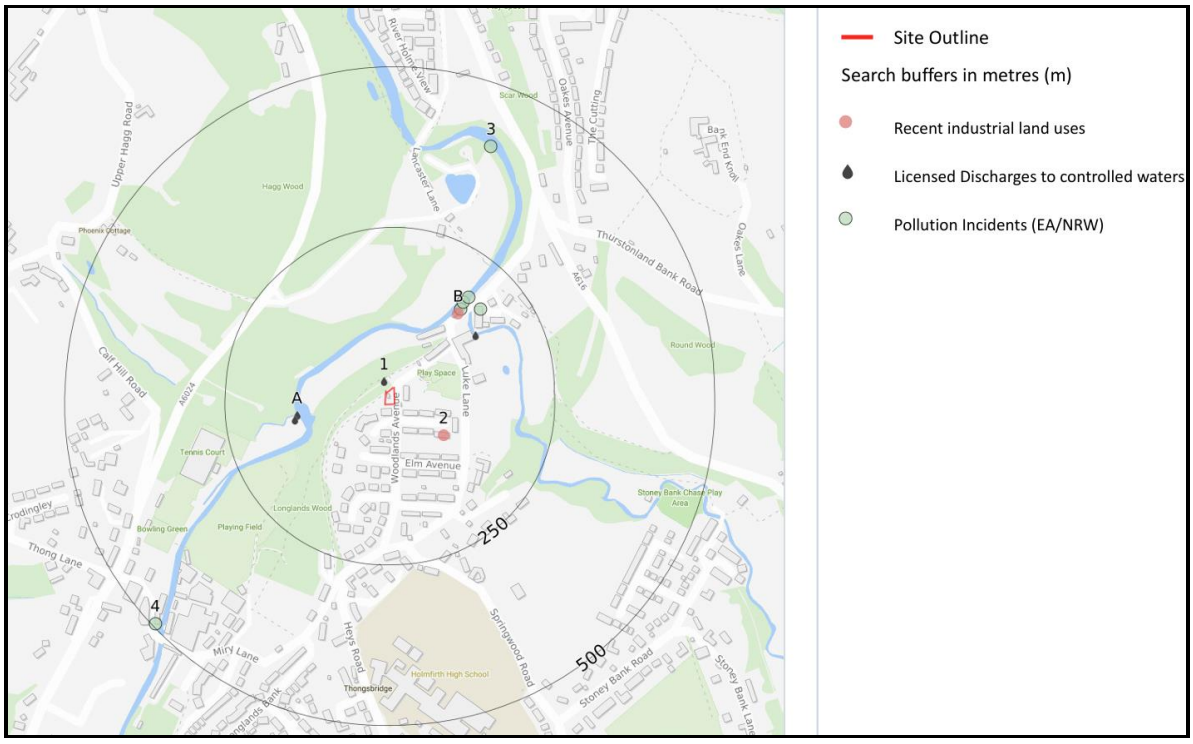

Figure 6 Current Industrial Land Use Plan

4. REGULATED INDUSTRIES AND INFRASTRUCTURE

4.1 Authorisations, Incidents and Registers

Results of searches for regulated industries are presented in Table 2.

TABLE 2
Authorisations, Incidents and Registers

	On SITE	Within 250m	DETAILS
Potentially Contaminative Uses identified in mapping	None	None	
Historical Tanks	None	None	
Historical Petrol/Fuel Site	None	None	
Historical Garage/Motor Vehicle Repair	None	None	
Potentially infilled land	None	1	73m west of site
Historic IPC Authorisations	None	None	
Part A(1) and IPPC Authorised Activities	None	None	
Records of Red List Discharge Consents	None	None	

	On SITE	Within 250m	DETAILS
Records of List 1 Dangerous Substances Inventory Sites	None	None	
Records of List 2 Dangerous Substances Inventory Sites	None	None	
Records of Part A(2) and Part B activities and enforcements	None	None	
Records of Category 3 or 4 Radioactive Consents	None	None	
Records of Licensed Discharge Consents	None	4	17m north, 139m west, 143m west and 150m north east of site from sewage discharges to River Holme and New Mill Dyke.
Records of Planning Hazardous Substance Consents and Enforcements	None	None	
Records of COMAH and NIHHS sites	None	None	
Records of National Incidents Recording System List 1	None	None	
Records of sites determined as contaminated land under Section 78R of EPA 1990	None	None	
Records from EA landfill Data	None	None	
Records of Operational Landfill Sites	None	None	
Records of EA historic landfill sites	None	None	
Records of non operational landfill sites	None	None	
Records of local authority landfill sites	None	None	
Records of operational and non operational waste treatment, transfer, exemptions or disposal sites	None	None	
Pollution inventories	None	None	
Records of EA licensed waste sites	None	None	
Current Industrial Land Use	None	None	
Petrol and Fuel Sites	None	None	
Underground High Pressure Oil and Gas Pipelines	None	None	
Residential Property (within 250m)	No	Yes	Yes, residential properties within 250m of the site to the south and east of site.
Radioactive Substances Authorisations	None	None	
Radon Protection Required	YES	-	The property is within a Radon Affected Areas as between 5% and 10% of properties are above action level within the site area. Basic Radon protection is required according to BR211 by the Building Research Establishment.
Registered as Contaminated Land under Part IIA EPA 1990	No	No	-

Results of searches for regulated industries, pollution incidents and registered authorisations are presented in Table 2 above and indicate that the site is unlikely to be affected by current on or off-site activity, with the exception of the refuse tip at 73m west of the site.

Radon is a radioactive gas derived from naturally occurring uranium found in small quantities in soils and rock. The National Radiological Board recommends that where radon concentration exceeds the Action level of 200 Bqm^{-3} the householder should take measures to reduce it.

According to the BGS the site is in an area where basic radon protection measures are required in new buildings. According to the National Radiological Protection Board, the site lies within an area where between 5% and 10% of houses lie above the action level.

5. ENVIRONMENTAL, VISUAL and CULTURAL, AGRICULTURAL and HABITAT DESIGNATIONS

5.1 Environmental

The site does not lie within or within 2000m of a National Nature Reserve, a Local Nature Reserve, a RAMSAR site, a World Heritage Site, an Environmentally Sensitive Area, an Area of Outstanding Natural Beauty, a Nitrate Vulnerable Zone, a Special Area of Conservation, Special Protection Areas, Site of Special Scientific Interest(SSSI) or a Nitrate Sensitive Area.

Several areas of Designated Ancient Woodland exist around the site, namely Longlands Wood and Hagg Wood as shown on Figure 7.

The site does lie within an SSSI Impact Zone, which are developed to allow assessment of any potential risks to SSSIs posed by development proposals.

There are no Biosphere Reserves, Forest Parks or Marine Conservation Zones.

The site lies adjacent to South and West Yorkshire Green Belt as shown on Figure 7.

The site is unlikely to detrimentally affect these environmentally sensitive areas.

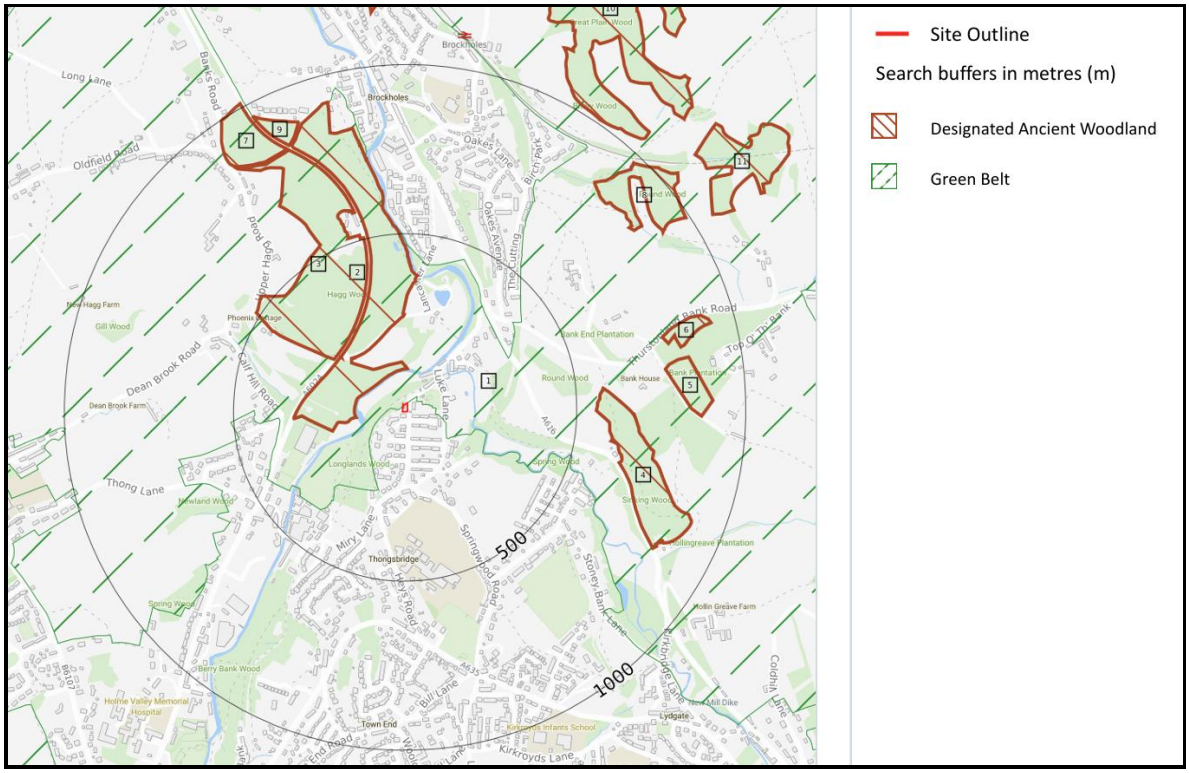

Figure 7 Designated Ancient Woodland and Green Belt

5.2 Visual and Cultural

The site does not lie within 250m of a World Heritage Site, Area of Outstanding Natural Beauty, National Park, Conservation Area, Scheduled and Ancient Monument or Registered Parks and Gardens.

The site lies within 250m of a Listed Building recorded as Mytholm Bridge.

5.3 Agricultural

The Agricultural Land Classification for the site is Grade 4 or poor quality.

The site does not lie within 250m of any Open Access Land, Tree Felling Licenses, Environmental or Countryside Stewardship Schemes.

5.4 Habitat

There are records within 250m of the site of habitats of principle importance named under the Natural Environment and Rural Communities Act (2006). These are deciduous woodland lying north of the site.

There is no sites verified as Open Mosaic Habitat within 250m of the site. These are brownfield sites that are identified as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

The site is unlikely to detrimentally affect the environmental, visual, cultural, agricultural or habitat designations.

6. POTENTIAL CONTAMINATION

The site has historically been part of a deciduous woodland residential garden and residential garage of the adjacent house 2 Poplar Avenue

Potential contamination is unlikely based on local historical land use. Made ground may be present on site. There is a potential for methane and carbon dioxide to migrate to the site from the former refuse tip.

7. SITE GEOLOGY

7.1 Geology

The published British Geological Survey Map (BGS) at a scale of 1:10,000 shows the site to be underlain by sandstones, mudstones and siltstones of the Namurian Millstone Grit Formation of the Carboniferous Geological Age. The site is immediately underlain by the Rough Rock Sandstone.

Superficial drift deposits are shown not to overlie the solid strata in the site area. Alluvial deposits associated with the River Holme and New Mill Dike are present to the west and east of the site and are unlikely to affect the land on the site.

The site geology is presented in Figures 8 and 9.

7.2 Geological Faults

The BGS maps do not indicate the presence of any geological faults crossing the site. The maps show the presence of a fault to the west of the site striking north west to south east. It is possible that smaller faults sub parallel to this may exist in the strata causing fissuring and

fracturing to the rock. Due to the cessation of tectonic activity in the area, faulting is unlikely to detrimentally affect the stability of the site.

7.3 Engineering Geology

Made ground may be present on the site and is unsuitable founding strata. The strata of the Namurian Formation Rough Rock Sandstone provides good bearing strata where unweathered and unfaulted for carrying the bearing pressures imposed by low rise development without undue settlement.

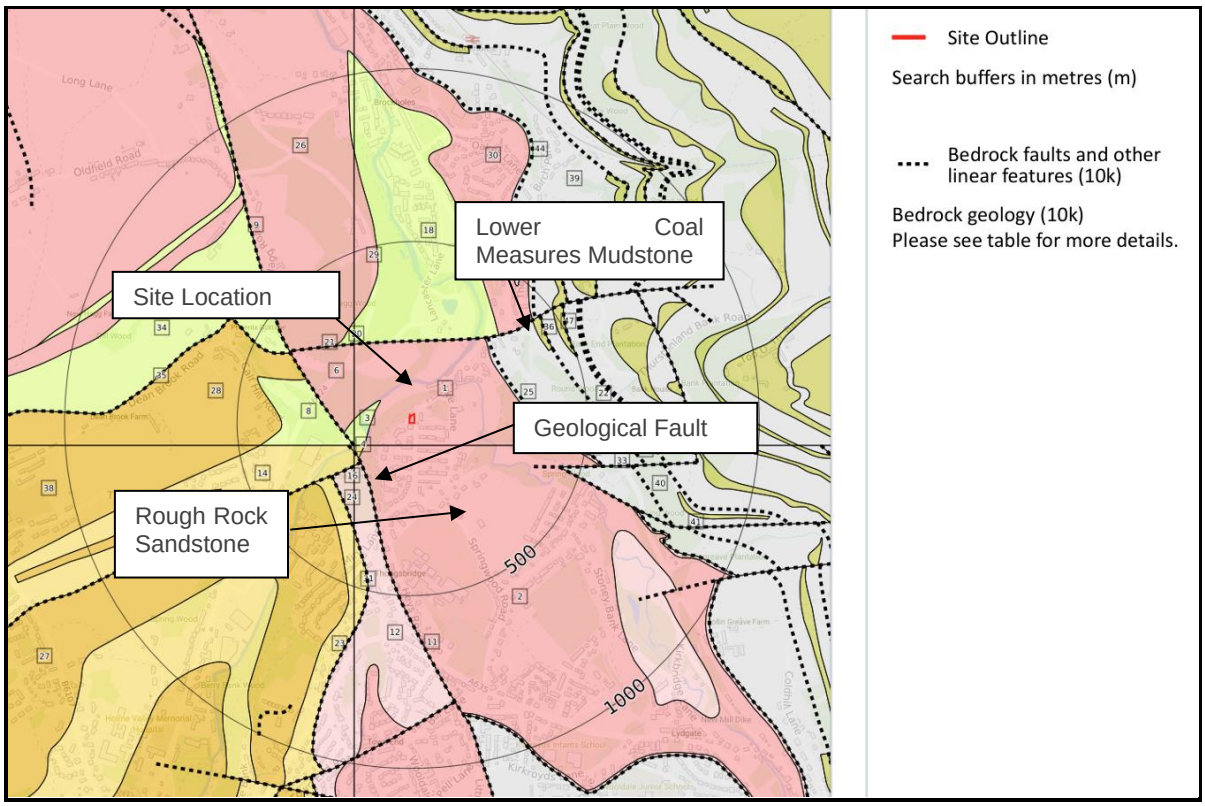

Figure 8 Geological Fault and Bedrock Geology Plan

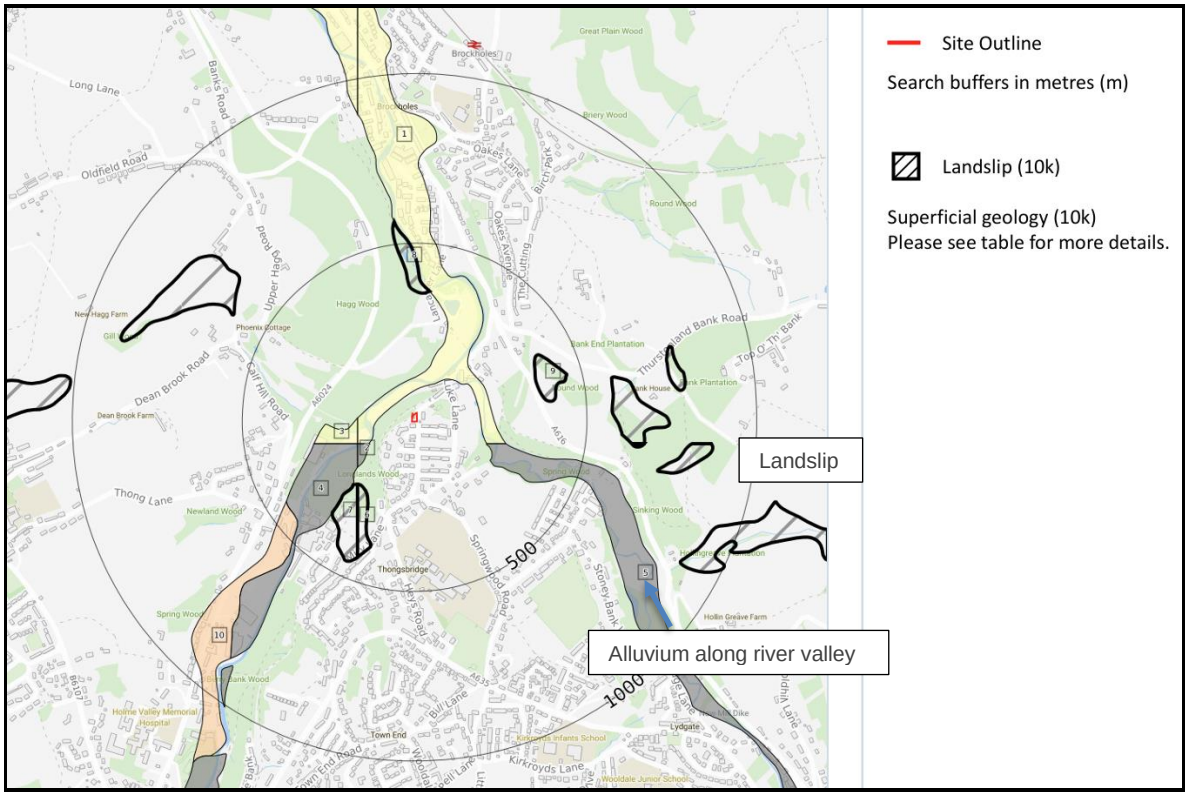

Figure 9 Superficial Geology Plan

7.4 Geological Hazards

According to the British Geological Survey there is a very low risk of landslides and collapsible deposits. There is a negligible to very low risk of shrink and swell hazard from clays, negligible risk of running sands, ground dissolution of soluble rocks and compressible deposits.

There is a very low risk of a landslide.

This is based on the geology and excludes made ground.

7.5 Archival Boreholes

Archival boreholes held by the British Geological Survey (BGS) in the vicinity are shown in Figure 10.

Boreholes SE11SE1 and SE11SE71 to the north of the site encountered alluvium and clay overlying mudstone and sandstone bedrock at 2.20m bgl. Borehole SE10NE31 to the south of the site encountered circa 4.80m of made ground overlying mudstone.

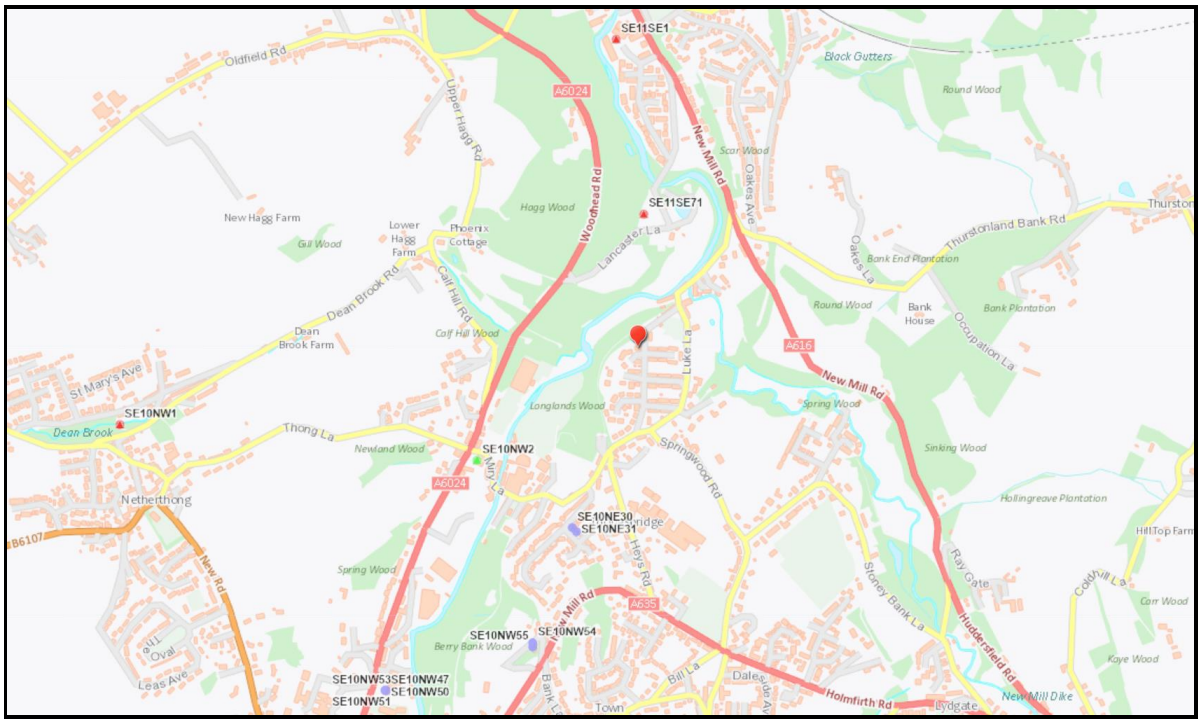

Figure 10 BGS Archival Boreholes

8. HYDROLOGY, FLOODING AND HYDROGEOLOGY

8.1 Hydrology

The rainfall over the area of the site will drain into the closest surface water of the River Holme or New Mill Dike. These are not affected by tidal action.

The site is shown by the Environment Agency to not lie within a fluvial Flood Zone, flooding is unlikely to occur. There is a risk of surface water flooding within 50m of site for 1 in100 year to 1 in 1000year rainfall events associated with the mill race and River Holme. There are no historical flood events on or within 250m of the site area. There are no areas benefitting from flood storage within 250m of the site. There is no risk according to RoFRaS of flooding from rivers and seas.

There are zero recorded surface water abstractions within 1400m of the site and 3 between 1400m and 2000m from the site.

It is important that any contamination found on site is not allowed to detrimentally affect any watercourses or ponds. It is unlikely that the site could be detrimentally affecting water courses.

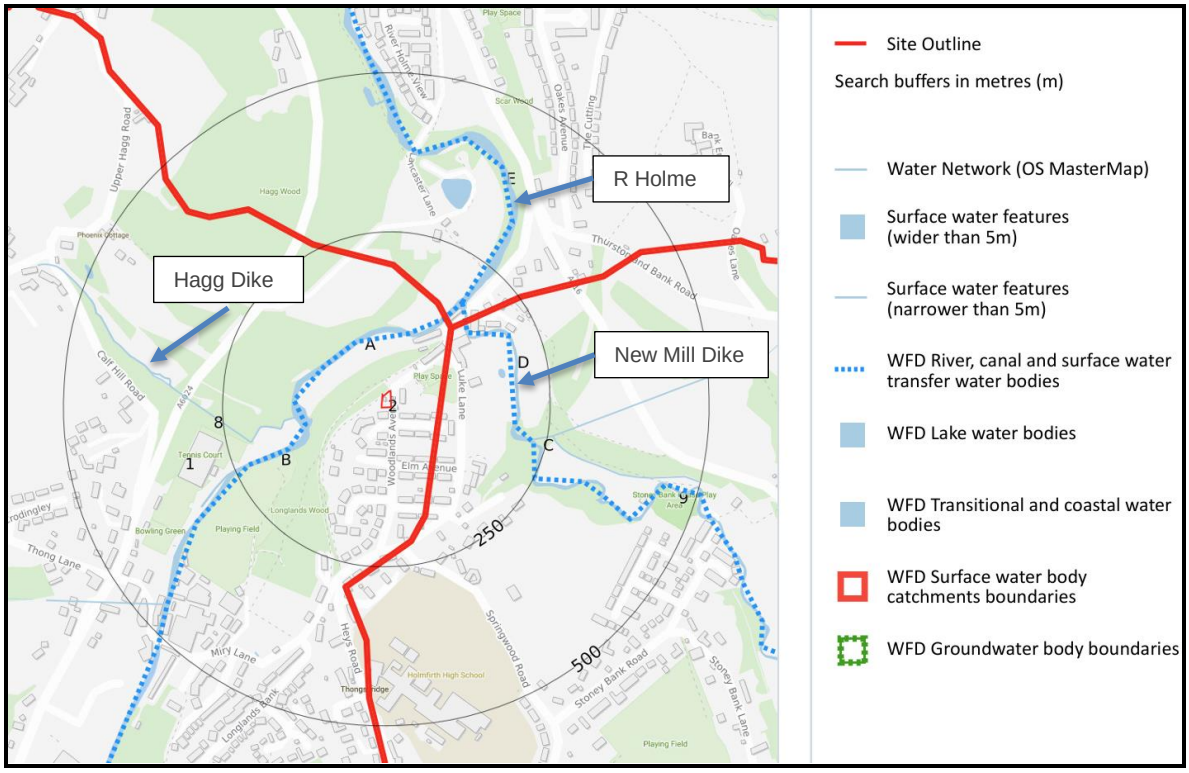

Figure 11 Hydrology Plan

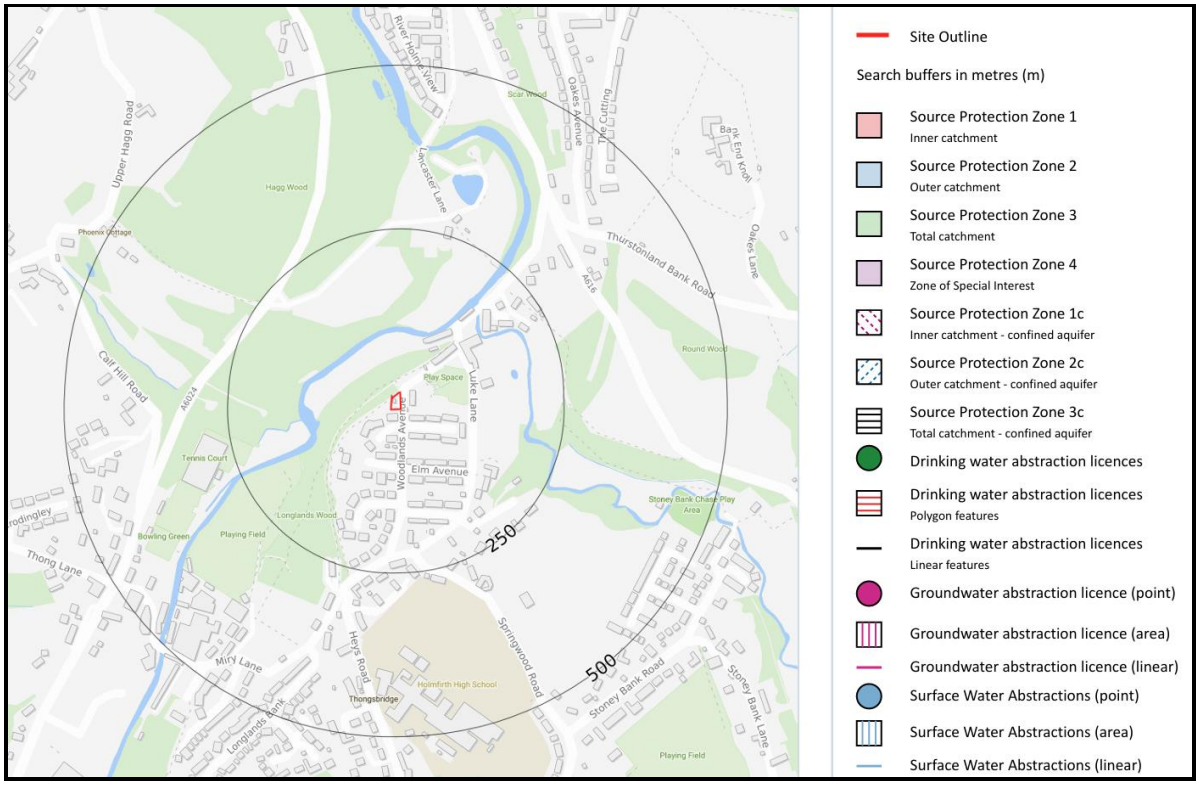

Figure 12 Source Protection and Water Abstractions

8.2 Flooding

The site is not at risk of flooding from rivers or seas as detailed in Figure 12. There are no records of historical flood events.

The site is not at risk of surface water flooding as detailed in Figure 13.

The site is at negligible risk of groundwater flooding as detailed in Figure 14.

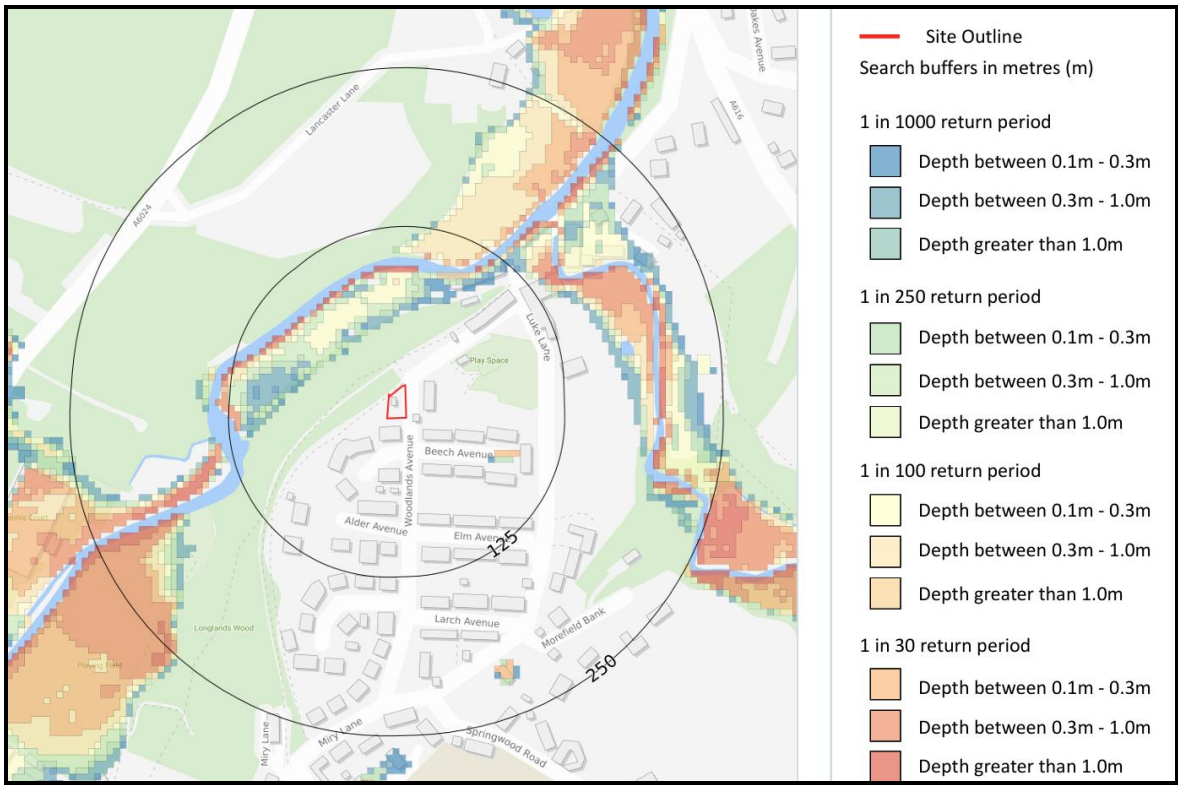

Figure 13 Surface Water Flooding

Figure 14 Groundwater Flooding

8.3 Hydrogeology

The geological maps produced by the BGS indicate the site to be underlain by the Rough Rock Sandstone of the Millstone Grit strata which is a Secondary A Aquifer. This is predominantly permeability 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. These are generally aquifers formerly classified as minor aquifers.

There are no superficial deposits on the site

The ground vulnerability beneath the site area is classified as having a high vulnerability within the bedrock. This implies the site is able to easily transmit pollution to groundwater.

There is a negligible risk of groundwater flooding.

There are zero potable water abstractions within 2000m of the site.

The site is shown to not lie within a Source Protection Zone total catchment. There are zero recorded groundwater abstractions within 1200m of the site and 8 within 1200m to 2000m.

Other unrecorded or unlicensed wells may be present close to the site. Historic wells may exist within 500m of the site. As the local groundwater may be utilised for abstraction from old unlicensed wells, it is important that it is protected from pollution. It is an offence to pollute the groundwater, whether or not it is used for abstraction.

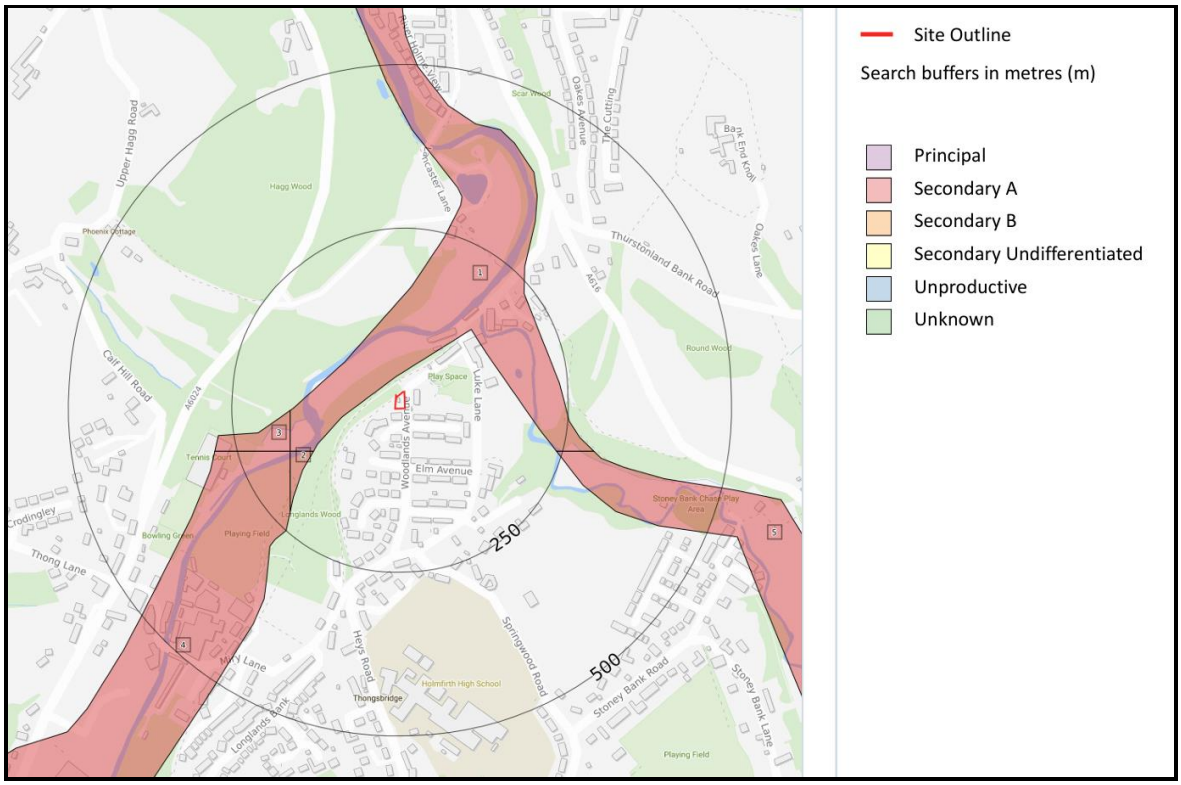

Figure 15 Hydrogeology of Superficial Deposits

Figure 16 Hydrogeology of Bedrock

9. QUARRYING AND MINING

9.1 Quarrying

The British Geological Survey Mines and Quarries Survey 1998 does not indicate any existing quarries on or within 100m of the site. However, this does not imply that local quarrying for stone for houses and outbuildings has not taken place on the site in the past.

9.2 Coal Mining

The property is not within a surface area that could be affected by any past recorded underground coal mining as the Coal Measures lie stratigraphically above the Millstone Grit strata.

The property is not within a surface area that could be affected by present underground coal mining,

The property is not in an area where the Coal Authority has received an application for, and is currently considering, whether to grant a licence to remove or work coal by underground methods. The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future. There are no recorded mine entries known to the Coal Authority within, or within 20m of the boundary of the property.

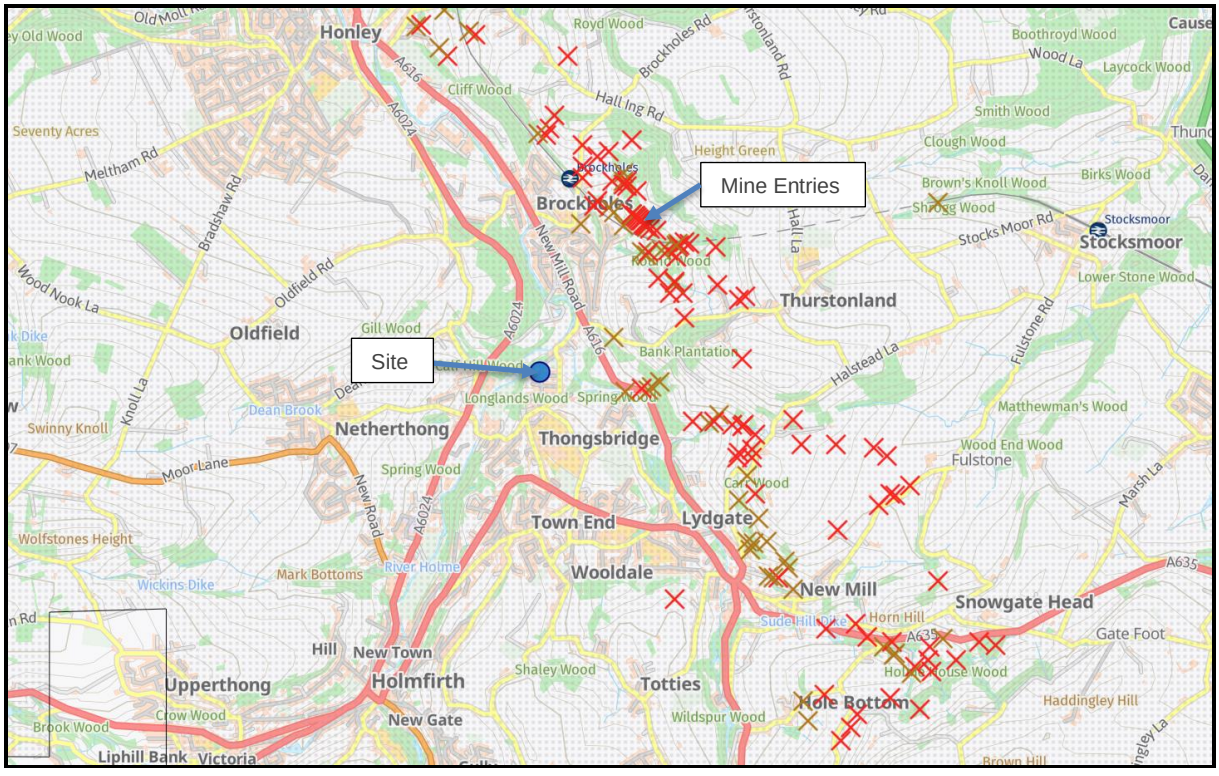

Figure 17 Mine Entry Plan

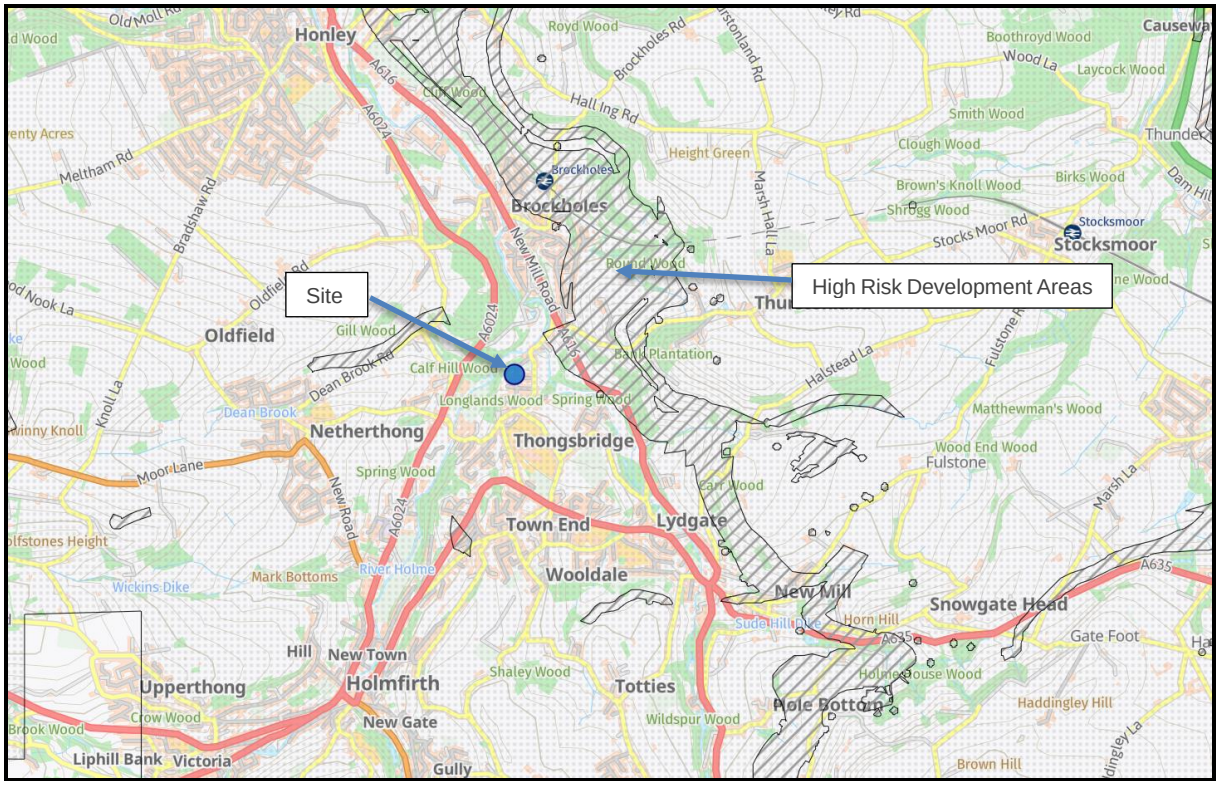

Figure 18 Development High Risk Areas

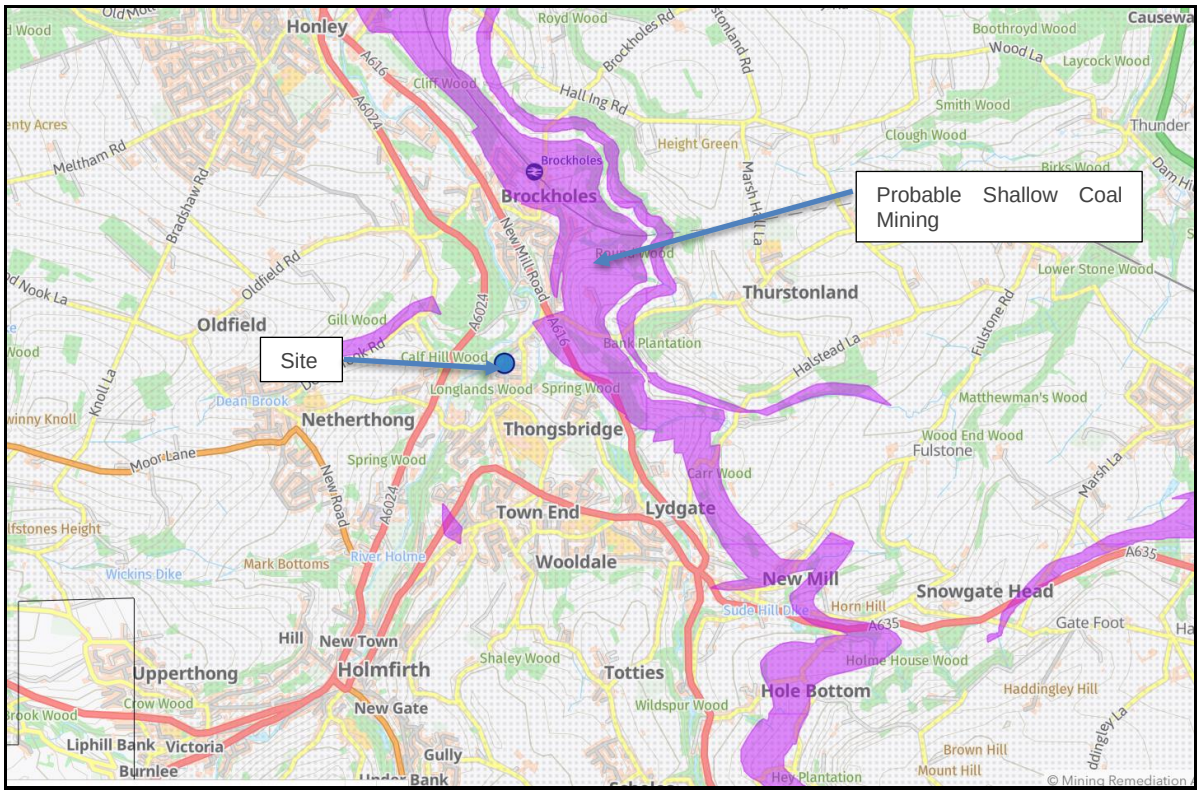

Figure 19 Probable Shallow Coal Mining

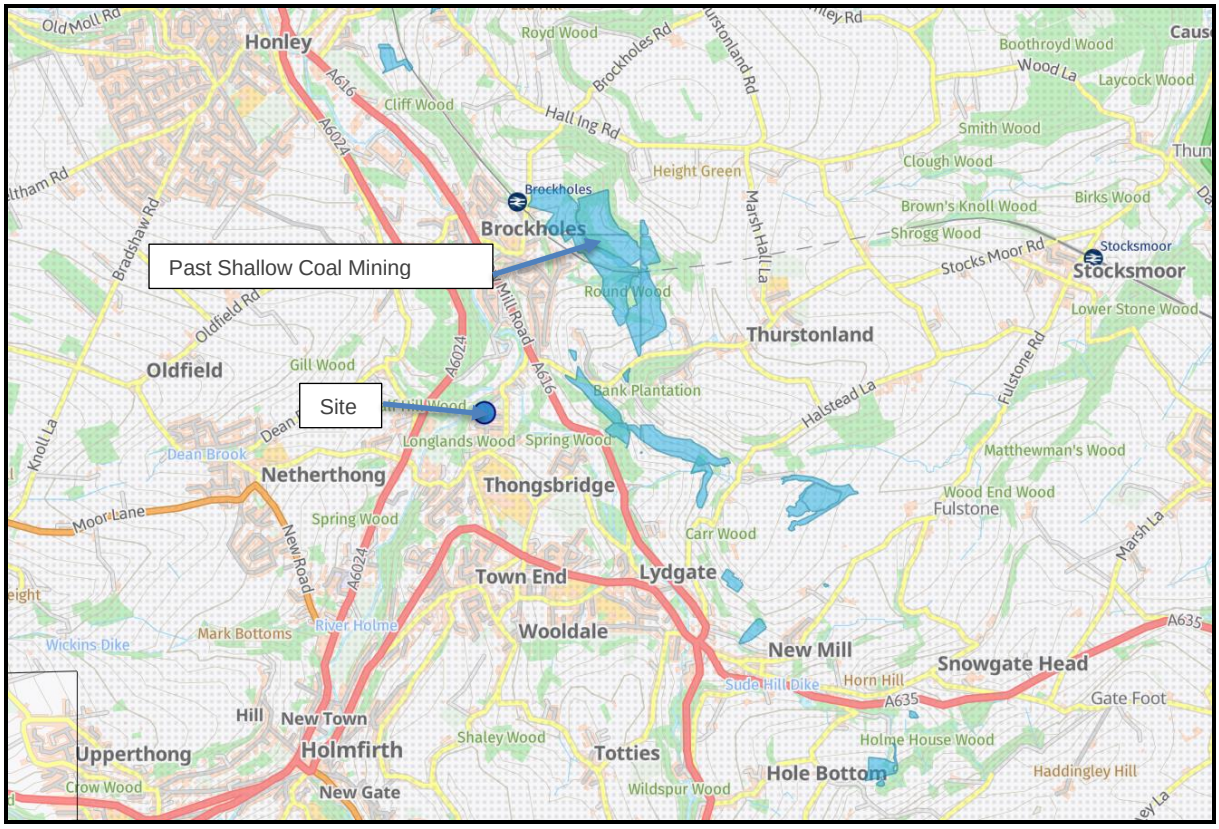

Figure 20 Past Shallow Coal Mining

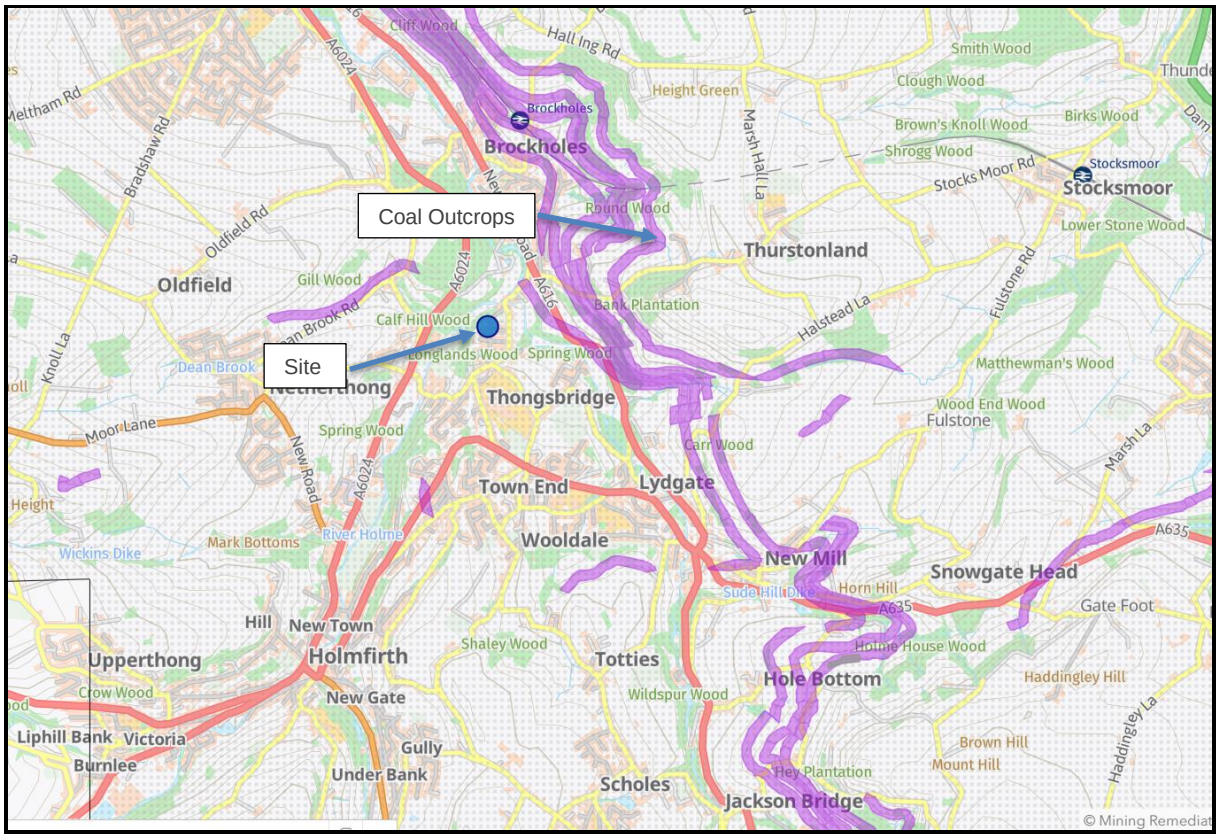

Figure 21 Coal Outcrops

The Coal Authority Records indicate that the site does not have any mine shafts on site or in close vicinity of 20m. The records indicate the site does not lie in an area of high risk development, it is improbable that it is underlain by shallow coal mining and it is not underlain by any recorded shallow mining, as detailed in Figures 17 to 21.

The Coal Authority Mining Report is presented in Appendix B and should be read in full.

10. ENVIRONMENTAL RISK ASSESSMENT
10.1 Environmental Risk
10.1.1 General

Sources of contamination were investigated through the desk study. The environmental liabilities of the site and risk assessments have been undertaken for proposed residential use. If the site use changes then a further risk assessment may be required.

Environmental risk considerations on the site have been assessed by adopting a site specific qualitative approach to identify the risk, if any, of environmental harm. In accordance with the DETR Statutory Guidance on Contaminated Land the approach is by identifying a hazardous source, establishing links between the source via exposure pathways to a potential receptor.

The hazard is a contaminant or potentially polluting substance that is in, on or under the land and which has the potential to cause harm or to cause pollution to controlled waters. The receptor is a living organism or organisms, an ecological system or piece of property, which is being harmed, interfered with or polluted by the contaminant. The pollutant linkage is by means of the pathway which is one or more routes by or through which that receptor is being, or could be, exposed to, or affected by, that contaminant. Thus the presence of a hazard on a site does not necessarily mean that there are risks unless pathways and receptors are present and are receptive to being affected by that specific hazard or contaminant.

- SOURCE - release of pollutant - eg. oil spills
- PATHWAY - route to receptor - eg. permeable strata
- RECEPTOR eg. - river

The likelihood of contamination affecting the environment depends on the migration and persistence of contaminants which varies with the nature of the contaminant and the ground and groundwater conditions, and the presence of sensitive receptors.

The following tables (Tables 3, 4, 5 and 6) which are extracted from CIRIA C552 ‘Contaminated Land Risk Assessment – A Guide to Good Practice’ have been used to assess the risk to sensitive receptors from site contamination. Any category which shows as medium risk or above may require investigation and if high risk is proven, remediation may be required following investigation.

TABLE 3
Risk Matrix – Comparison of Consequence and Probability

Risk = Probability x Consequences		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

TABLE 4
Classification of Probability

Probability Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

TABLE 5
Classification of Consequence

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem or organisation forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. **Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).**
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem or organism forming part of such ecosystem, (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a species within a designated nature reserve. **Lesser toxic and asphyxiate effects of carbon dioxide**
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

TABLE 6
Classification of Risks and Likely Action Required

Risk Classification	Definition
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe. If any harm were to occur, it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst 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.

Any category which shows as moderate risk or above may require investigation and possibly subsequent remediation.

10.1.2 Sources of Contamination

It is a low risk that contamination exists on the site based on the past use of the site and its surroundings.

10.1.3 Potential Pathways for Migration

a) *Ingestion of and/or skin contact with contamination in the soil*
Low Likelihood to Unlikely – There is a low potential for ingestion/skin contact with any contamination in soil due to the sites past use as a woodland and residential garden. Any risk to workmen which could be mitigated by appropriate use of Personal Protective Equipment.

b) *Ingestion of contamination and uptake of contamination in plants/vegetables/animals/pets*
Low likelihood to Unlikely - Vegetables and plants may be grown on the site. It is considered that animals in the food chain will not be present, but pets may be present on site. If made ground is encountered on site it would be prudent to test it for a suite of potential contaminants.

c) *Ingestion of contaminated drinking water through leaching of contamination into groundwater flowing to underlying aquifers/water abstractions*
Low Likelihood to Unlikely – The site is underlain by sandstone a Secondary A Aquifer. Leaching of any contamination is unlikely to detrimentally affect groundwater. The site does not lie within a Source Protection Zone for abstractions. There are no active groundwater water abstraction within 1400m of the site or active potable water abstraction within 2000m of the site. The site is unlikely to detrimentally affect controlled water due to distance of local abstractions.

d) *Inhalation of vapours produced by landfill/radon/hydrocarbons/old mines*
Low Likelihood to Unlikely – There are no recorded landfill sites within 50m of the site from which toxic gases may migrate. There is a former refuse site from 1967 to 1987 at 73m west of the site and it is probable that any gases produced will have dissipated by now, after 38 years. Mitigating measures in the form of a 2000 gauge methane resistant membrane should be used in construction. The site lies within an area that requires basic radon protection. There is no recorded or probable mining beneath the site.

e) *Inhalation of contaminated airborne dust*
Low Likelihood to Unlikely – The appropriate safety measures must be exercised to protect both the workers and the local residents from dust during construction. Provided this work is carried out diligently, the ongoing risk is low.

f) *Contamination of controlled waters*
Low Likelihood to Unlikely – Leaching of contamination from the site into surface water is unlikely due to the lack of contamination expected. There is a high potential for leaching of any contaminants into groundwater and underlying Secondary A aquifer within the bedrock due to permeable bedrock sandstone, however contamination is not expected.

10.1.4 Potential Sensitive Receptors

Potential Sensitive Receptors to any undetected contamination on the site could include future occupants and workmen.

10.2 Summary of Environmental Risk

By considering where a viable pathway exists which connects a source to a receptor, this assessment will identify where pollutant linkages may exist. If there is no pollutant linkage, then theoretically there is no risk. Therefore, only where a viable pollutant linkage is established does this assessment go on to consider the level of risk. On this site there is unlikely to be contamination and a low potential for undetected contamination and toxic gases to be present. The site may be used in the future for the high sensitivity land use scenario of residential use.

The risk is assessed by the combination of the probability of the risk and the severity of the risk in line with CIRIA recommendations and the risks are presented in Table 7. If any material is likely to be removed from site for development, then waste categorisation will be required to categorise the soils.

TABLE 7
Risk Assessment for a Residential Site Use

Pathways	Receptors	Perceived Risk	Probability of Risk	Consequence of Risk	RISK
Environmental					
Inhalation of vapours such as methane from landfill and hydrocarbons from ground contamination	Existing/future occupants of the buildings and workmen.	Methane & Carbon Dioxide	Low Likelihood to Unlikely	Severe-Methane can be explosive in air. Carbon dioxide can be fatal. Hydrocarbon can have long term health effects.	Low – Landfill within 73m, mitigating measures required for protection from toxic gases. Made ground may be on site Hydrocarbons unlikely to be present. No shallow mining.
Ingestion of and/or skin contact from contaminated soil	Existing/future occupants of the building and workmen	Contaminated Soil	Low Likelihood To Unlikely	Mild	Low - Unlikely contamination present from past site uses as woodland and garden.
Ingestion of contaminated drinking water	Local abstraction wells	Contamination of potable water	Low likelihood to Unlikely	Medium-prosecution can occur if site is affecting controlled waters	Low – No Potable boreholes located <2000m. Site does not lie in source protection zone for potable water.
Transportation by surface and/or groundwater	Groundwater	Contamination of shallow groundwater by hydrocarbons	Low Likelihood to Unlikely	Medium-prosecution can occur if site is affecting controlled waters.	Low - It is unlikely that contamination is on site and could be affecting groundwater.. Closest active groundwater abstraction >1400m
	Surface Water	Contamination of surface water	Unlikely		Low - Surface water >100m.
Ingestion and uptake of contamination in plants/animals/ vegetables.	Future occupants	Ingestion of contamination via home grown produce	Low Likelihood to Unlikely	Medium	Low– vegetables and plants may be grown on site. Made ground possible on site. Contamination not expected
Inhalation of airborne dust	Workmen, occupants of building, neighbouring users	Dust during any future demolition or construction.	Low likelihood to Unlikely	Medium	Low - provided good construction practice on site.

Irradiation	Humans	Radon gas	Unlikely	Mild	Low provided basic Radon protection is installed in new buildings
Geotechnical					
Settlement or Heave	Buildings and car park	Damage to hard surface and buildings	Unlikely	Medium	Low – provided foundations placed on suitable strata
Landslip	Buildings	Level site	Unlikely	Severe	Low – site is very low risk of landslide
Chemical attack	Buildings	Sulphate can, under certain conditions, attack concrete.	Low likelihood	Medium	Low – Tests for soluble sulphate required on soil for design of underground concrete
Groundwater	Buildings	Rising groundwater	Unlikely	Medium	Low
Mining					
Shallow Mining	Land and Structures	Damage to hard surface and buildings	Unlikely	Medium	Low – No recorded or probable shallow mining
Deep Mining	Buildings	Damage to hard surface and buildings	Unlikely	Severe	Low risk – No recorded deep mining

The potential sensitive receptors on the site which could be detrimentally affected by any contamination, mining and geotechnical risks are assessed in Table 7.

The risk assessment has been based on the future use of the site for residential use with gardens and with hard cover. If the site is to be used for any other purpose a reassessment of the risk may be necessary.

In line with CIRIA, a risk assessment has indicated that there is a low risk of any contamination detrimentally affecting humans or the environment. The site is unlikely to detrimentally affect controlled waters. There is a potential for methane and radon to affect the site and mitigating measures should be employed to reduce this risk.

Workmen should always take the usual precaution of wearing gloves when handling soil.

11. ASSESSMENT AND RECOMMENDATIONS

11.1 Introduction

A Desk Study has been undertaken to assess the potential geotechnical, mining and environmental conditions for the proposed development of the site.

This section of the report provides an interpretation of the findings in the form of a ground model, and provides advice and recommendations with respect to the proposed development.

11.2 Geology and Groundwater

The site is underlain by the Rough Rock Sandstone of the Millstone Grit. There are no superficial deposits recorded by BGS, but there may be made ground on the site.

It is not expected that groundwater will be a concern during development, and any water during and after heavy rainfall could be dealt with by sump pumping. Any softened ground due to water ingress should be removed prior to pouring of concrete for foundations or services.

Due to lack of anticipated contamination, the site is unlikely to detrimentally affect controlled waters.

11.3 Coal Mining Risk Assessment

The Coal Authority mining report states that the site is not undermined for coal.

A Coal Mining Risk Assessment has confirmed that the site does not lie in an area of high risk for development. The site does not lie in an area of recorded shallow mining or probable shallow mining. The site does not within or within 20m of a mine entry.

The Coal Authority Mining Report is presented in Appendix B and should be read in full.

11.4 Contamination and Toxic Gas

Ordnance Survey maps inspected indicated the site has been occupied by open land and a residential garden. There is one landfill site within 73m of the site which was active 1967 to 1987. It is expected that any toxic gases will have dispersed by now, and therefore toxic gases are unlikely to detrimentally affect the site. It is recommended that a 2000 gauge methane and radon protective membrane should be used in construction.

There is a low risk of any contamination detrimentally affecting humans. Due to the lack of contamination expected from historical and current land use it is unlikely groundwater will be detrimentally affected. Surface water is unlikely to be detrimentally affected by the development.

The site does not lie within a Source Protection Zone. There are no active potable water abstractions within 2000m of the site area.

Due to the previous land uses adjacent to the site it is unlikely that contamination may be present in the soils, although made ground may present.

As a precaution all builders should also use gloves when handling soil for Health and Safety and work in accordance with HSE and CIRIA guidelines.

Basic radon protection measures are required on this site according to BRE BR211.

11.5 Excavations

Excavations for services could be achieved by mechanical excavator and breaker. All excavations for foundations and services may require temporary support for construction in the short and long term.

Groundwater may be encountered especially during and after heavy rainfall. If rainwater falls into the excavations it is expected to be easily dealt with by sump pumping. If this occurs, the softened surface of the strata should be removed prior to any pouring of concrete.

11.6 Underground Concrete

If made ground is encountered on site, then tests should be undertaken for soluble sulphate to determine if any special precautions are required for design of underground concrete.

11.7 Waste Disposal

Any spoil arising from excavations or landscaping works will need to be disposed of to a licensed tip in accordance with the EP (Duty of Care) Regs 1991 and Landfill (England and Wales) Regulations (2002) amended. Under the European Waste Directive landfills are classified as accepting inert non-hazardous or hazardous wastes in accordance with the EU Waste Directive.

11.8 Foundation Recommendations

It is proposed to develop the site for a residential house and garden.

Any made ground encountered is unsuitable material on which to construct foundations due to its low strength and variable nature both laterally and vertically.

The underlying sandstone bedrock of the Millstone Grit would provide suitable strata for construction using strip footing or pad foundations, and where unweathered has an adequate bearing capacity for low rise housing. If any high rise or high ground bearing development is proposed a reassessment of foundation type will be required.

If made ground or weathered rock is encountered to a depth that is too deep for the construction of strip or pad foundations, then piled foundations should be employed sunk into the bedrock. Piling Contractors will advise on the diameter and length of pile based on their individual pile design.

Due to the presence of made ground within 73m it would be prudent to install a 2000 gauge methane resistant membrane in construction of the dwelling.

If during and after heavy rainfall the surface of excavations are softened, then the softened material should be removed before pouring of concrete.

Care should be taken to ensure foundations are constructed on similar strata. If varying strata is exposed beneath the site, then a reinforced raft or piled foundations should be employed.

Care should be taken to ensure no liquid waste or waste materials fall into Shepley Dike during demolition and construction.

12. GENERAL REMARKS

This report truly reflects the conditions found during the desk study. Whilst the desk study was undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research, the results portrayed only pertain to the information attained, and it is possible that other undetected information and undetected ground and gas conditions, undetected mining conditions and undetected contamination may exist. The desk study was only undertaken within the site boundaries and should not be used for interpretation purposes elsewhere. These conclusions are only a brief summary of the report, and it is recommended that the report is read in full to ensure that all recommendations have been understood.

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