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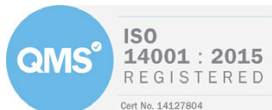


PHASE 1 ENVIRONMENTAL DESK STUDY & COAL MINING RISK ASSESSMENT REPORT

job number	C3018/22/E/4559	date	15.09.2022
site address	474 Bolton Road Bury BL8 2DU		
written by	E. S. Lewis	checked by	S. Alexander
issued by	E. S. Lewis		



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3.	Site Plan
4.	Photographs
5.	Coal Authority Report



Report on a Phase One Desk Study & Coal Mining Risk Assessment

Location:	474 Bolton Road Bury, BL8 2DU		
For:	Dr Rashad Nazir		
Architects:	Clarkes Bespoke Design Ltd		
Report No.	C3018/22/E/4559	Report date:	September 2022

For and on behalf of **Rogers Geotechnical Services Ltd**

	
Emma Lewis LLB ACIEH Managing Director	Scott Alexander BSc FGS Geo-environmental Engineer

1. Introduction

The site comprises a residential dwelling with driveway to the front, and gardens with mature trees and shrubs to the side and rear. The site is approximately 0.08 hectares in size and its National Grid reference is centred around 378578, 410025.

It is understood that the development proposals currently comprise the demolition of the existing dwelling and construction of a new residential property with driveway and garden. In order to assist with this decision-making process, and any planning and construction aspects of the development, a phase one environmental desk study has been commissioned and is the subject of this report.

In accordance with issued guidance, a site walkover was conducted on the 13th September 2022 and the following observations were made:

General site description/current site use

The site is an existing dwelling with gardens to the side and rear, and paved parking to the front.

Site boundaries/access

The site is accessible by vehicle off Bolton Road. There is access around the property for a small investigation drilling rig ie. a windowless sampler.

Topography

The site displays a slight downhill slope towards the south and east.

Surface cover of site

The front of the property is paved. The remaining areas are covered by gardens, trees and landscaping.

Visible evidence of contamination/ contaminative sources

The site was observed to be neat and tidy. A skip was present at the front of the property but there were no visible signs of contamination present during the time of the walkover. An area of either partially constructed or partially demolished raised decking underlain by demolition rubble was observed towards the north-western corner of the site.

Presence of vegetation and wildlife

Vegetation seems to be healthy with no evidence of degradation. There were no obvious signs of invasive flora, fauna, nesting birds, burrowing animals or edible plants observed during the time of the site walkover.

The site is bounded to the east and north by mature deciduous and coniferous trees and hedges. Most notably a conifer tree was observed on the south-eastern corner of the site and a large mature willow was noted towards the north-west corner.

Services

Buried services are present.

Site neighbours

The site is located within a residential area, with some shops nearby.

In order to ensure that the site is fully characterised and to comply with the Environment Act 1995¹, a Phase One Desk Study has been commissioned by Clarkes Bespoke Design Ltd on behalf of Dr Rashid Nazir. The desk study is intended to assess the environmental impact of historical, current and future factors on the development. This report will present the data obtained and provide a conceptual ground model and preliminary risk assessment as well as discussing the scope of any intrusive investigation that may be required. This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese Knotweed).

2. Review and Summary of Published Data

As a part of this desk study the following data has been considered.

- | | |
|--|--------------|
| • Groundsure Reports | - Appendix 1 |
| • Historical maps | - Appendix 2 |
| • Site Plan | - Appendix 3 |
| • Photographs | - Appendix 4 |
| • Coal Authority Consultants Mining Report | - Appendix 5 |

The data obtained from the above-mentioned sources has been summarised below².

¹S57 of the Environment Act 1995 inserted the contaminated land regime into the Environmental Protection Act 1990 (Part 2A). The regime **'provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment'** See <http://www.environment-agency.gov.uk/research/planning/40405.aspx>. This places a duty on local authorities to inspect their areas for contaminated land and require its remediation using the 'suitable for use' approach. Much of this duty is discharged via the planning regime under the Town and Country Planning Act 1990 as historical land contamination is a 'material planning consideration.' The local authorities are required to secure the removal of unacceptable risks via remediation of the land, to therefore ensure the site is suitable for its new use. This is fulfilled via completion of a Phase One Environmental Desk Study, Phase Two Intrusive Investigation, Phase Three Remediation Strategy and Phase Four Validation Report. Therefore, as a minimum, once a site has been developed it should not be capable of being designated as 'contaminated land' under Part 2A of the Environmental Protection Act 1990, as inserted by the Environment Act 1995 (see also PPS 23 Planning and Pollution Control Section 8)

² This report is a summary only and reference must be made in full to the information provided in the Groundsure Report.

2.1 Historical Land Use

Table 1: Historical Land Use³

HISTORICAL MAPPING SUMMARY		
Map Dates	On site	Within 250m
1850 - 1891	At the start of this period the site is undeveloped and forms part of large network of open fields. There are no buildings within 250m. A track crosses the north-east of the site leading towards a colliery and coal shaft towards the north-west of the site. By 1890 the site, whilst unchanged, can be seen to be located immediately north of 'Brick Field' and 'Coal Pit Lane'.	Brick field with ponds - 50m E, 50m S. Brick works (in-filled by 1908) – 10m to 175m E. Bury Barracks (later Wellington Barracks) – 250m NE. Railway – 225m SE. Ponds (small) – 50m E, 50m SW. Refuse Heap – 240m NW.
1908 - 1910	The site itself remains unchanged.	Wellington Barracks – 250m NE. Railway – 225m SE. Pond (small) – 50m E. Small residential houses – 75m NE Tramline along Bolton Road – Directly S
1927 - 1939	A row of houses has been constructed on Bolton Road, east and west of the site, the site being the only part of the row that has not been developed.	Wellington Barracks – 250m NE. Railway – 225m SE. Pond (small) – 50m E.
1956 - 1963	The present day dwelling has been constructed on the site.	Residential houses – Opposite side of Bolton Road Wellington Barracks – 250m NE. Railway (dismantled by 1971) – 225m SE. Pond (small; infilled by 1957) – 50m E. Allotment Gardens – 175m S. School – 100m NE. Electricity sub-station – 94m SW, 120m S, 247m NE.
1963-1969	The site itself remains unchanged.	Significant residential development – Immediately N and W
1974 - 2022	The site is unchanged.	Railway (dismantled) – 225m SE. Wellington Barracks dismantled subsequently replaced with residential houses – 250m NE Significant residential development – 50m S and SW School – 100m NE.

NB. All distances given are approximate only from nearest boundary.

³ See Appendix 2

2.2 Published Geology and Geological Hazards

Table 2: Geological Data for the Site

BGS MAPPING DATA			
Strata Type	Strata Name ⁴	Previous Name ⁴	Description ⁵
Artificial Geology	Made Ground	N/A	Not indicated on site although previous construction may have resulted in the presence of made ground. Worked ground is indicated to be present 227m SE, associated with the railway cuttings.
Superficial Geology	Glacial Till (Devensian Age)	Boulder Clay	Generically described as a group of sediments laid down by the direct action of glacial ice. Comprises variable lithology, usually sandy, silty clay with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency.
Solid Geology	Pennine Lower Coal Measures Formation	Lower Coal Measures	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.

GEOLOGICAL FEATURES			
Type	Location	Features	Comments
Mining Activity	On site	Coal mining	The study site is located within the specified search distance of an identified mining area. The BGS records show a coal seam, named as Doe (Bottom Shuttles Coal) is shown to outcrop across the northern portion of the site with a dip towards the south. The coal mining report records this seam as inferred. The Coal Mining Report indicates a second coal seam is inferred to outcrop 41m north of the site. This seam absent on BGS records.
		Non-coal Mining	Surface workings are recorded 11m E, at the location of the historical brickworks. These are likely to have been backfilled as they are now developed by buildings.
Faults	17m S 32m SW	Fault	Normal fault trending north-west – south-east with downthrow towards the north.
Landslip Deposits	No data	No data	No data within 500m.
BGS BOREHOLE DATA			
Reference ⁶	Location	Strata Description	Depth
No detailed records within 500m	Limited borehole availability within 500m of the site and no relevant data within the same fault block.		
NATURAL GROUND SUBSIDENCE & HAZARDS ⁷			
Type		Risk Rating	
Potential for shrinking or swelling clay ground stability		Very low.	
Potential for running sand ground stability		Very low.	

⁴ Sources: British Geological Survey (NERC) Map Sheets 85; Manchester; Solid and Drift Edition, and Geology of Britain Viewer [online resource from www.bgs.ac.uk]

⁵ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

⁶ <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

⁷ See Groundsure report

Potential for compressible ground stability	Negligible.
Potential for collapsible ground stability hazards	Very low.
Potential for landslide ground stability	Very low.
Potential for ground dissolution stability	Negligible.
Radon	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protective measures are necessary.

2.3 Construction Issues

2.3.1 Foundation Construction

On the basis of the prevailing geology and assuming that there are no areas of significantly filled ground, and that the site is not adversely affected by the indicated fault, it is anticipated that shallow strip or spread foundations could be utilised at this site. It should be appreciated that an intrusive investigation will be required to validate this opinion.

Mature trees including conifer and willow trees have been observed on or near to the proposed development area, such trees have a high water demand and may introduce a risk of heave or desiccation where cohesive soils are present. The heights of trees shall be determined and the distance from proposed foundations to such trees shall be measured and proposed foundations depths shall be adjusted as per NHBC guidelines "*Section 4.2 Building Near Trees*".

As part of any investigation the volume change potential of any cohesive deposits shall be required to determine foundation depths. Consequently, it is possible that deeper or stepped foundations may be required where foundations enter influencing distances of the trees observed.

2.3.2 Site Won Materials

It would appear that cohesive soils are likely to be present at shallow depth. This material is likely to be relatively difficult to re-engineer as a construction material. Proof rolling of subgrade shall be undertaken to identify any soft or loose areas. A suitable thickness of compacted granular material shall be provided for road pavements and hardstanding.

2.3.3 Disposal of Site Materials

If made ground is present, then contamination/WAC testing may be required to establish the nature of the underlying soil if such material is to be disposed offsite to a licensed landfill site. However, it is anticipated that the naturally occurring soils would not be significantly contaminated, thus would probably be accepted by a waste disposal site catering for inert material.

2.4 Mining and Natural Cavities

2.4.1 Coal Mining

The Groundsure Report states that the site is within an area that may be affected by coal mining. A Consultant's Coal Mining Report has therefore been obtained that is included in appendix 5 of this report and may be summarised as follows:

Table 3: Summary of the Consultant's Coal Mining Report

Has the report highlighted evidence or potential of:			
Ref	Mining Feature	Yes/No	Comments
1	Underground Coal Mining	No	No past mining recorded.
2	Probable Unrecorded Shallow Workings	Yes	Shallow seams, if worked, could present a risk of instability to the property.
3	Spine Roadways at Shallow Depth	No	No spine roadway recorded at shallow depth.
4	Mine Entries	No	None recorded within 100 metres of the site boundary.
5	Abandoned mine plans	Yes	Plans of abandoned mine workings below the site are said to be available by the Coal Authority.
6	Outcrops	Yes	2 conjectured outcrops of coal: DOE seam – immediately N. Wigan Five Feet – 43.9m N.
7	Geological Faults	No	No faults, fissures or breaklines recorded.
8	Opencast Mines	No	None recorded within 500 metres of the enquiry boundary.
9	Coal Authority Managed Tips	No	None recorded within 500 metres of the enquiry boundary.
10	Site Investigations	No	None recorded within 50 metres of the enquiry boundary.
11	Remediated Sites	No	None recorded within 50 metres of the enquiry boundary.
12	Coal Mining Subsidence	Yes	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property. The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.
13	Mine Gas	No	None recorded within 500 metres of the enquiry boundary.
14	Mine Water Treatment Schemes	No	None recorded within 500 metres of the enquiry boundary.
15	Future Underground Mining	No	None recorded.
16	Coal Mining Licensing	No	None recorded within 200 metres of the enquiry boundary.
17	Court Orders	No	None recorded.
18	Section 46 Notices	No	No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.
19	Withdrawal of Support Notices	No	The property is not in an area where a notice to withdraw support has been given. The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.
20	Payments to Owners of Former Copyhold Land	No	The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

2.4.2 Non-Coal Mining

There Groundsure report holds no records of non-coal workings within 250m of the site. Surface workings are recorded 11m E at the location of the historical brickworks. Historical maps show numerous ponds in the brick fields to the south and east of the site, likely resultant of clay and shale quarrying. These are likely to have been backfilled as they are now developed by buildings.

2.5 Waste Management and Gas Monitoring

Table 4: Landfill Data and Artificial Ground, Recorded and Anticipated			
ENVIRONMENT AGENCY, LOCAL AUTHORITY, BGS & HISTORIC LANDFILLS			
Waste Type	Location	Comments	Monitoring Requirement
Active Landfill	-	None recorded within 250m	-
Historic Landfill	-	None recorded within 250m	-
Historic waste sites	-	None recorded within 250m	-
Licensed waste sites	-	None recorded within 250m	-
Waste Exceptions	-	None recorded within 250m	-
MADE GROUND & INFILLED GROUNDWORKINGS			
Description	Location	Comments	Monitoring Requirement
Records of Potentially Infilled Features	11m E	Infilled brickworks	Y
	38m S	Unspecified Ground Workings	Y
	50m E	Infilled Pond	Y

2.6 Hydrogeology, Hydrology

Table 5: Ground/Controlled Water Sensitivity and Flooding		
ENVIRONMENT AGENCY AQUIFER DESIGNATION ⁸		
Strata	Designation	Description
Superficial Geology On Site	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
Solid Geology On Site	Secondary A	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. These are generally aquifers formerly classified as minor aquifers.
GROUNDWATER SENSITIVITY ⁹		
Description	Location	Details
Source Protection Zone	-	None recorded within 250m.
Abstraction Licences	-	None recorded within 250m.

⁸ See Appendix 1

⁹ See Appendix 1

Records of Part A(2) and Part B Activities and Enforcements	-	None recorded within 250m.	
Records of Licensed Discharge Consents	-	None recorded within 250m.	
High Soil Leaching Potential	On Site	Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.	
CONTROLLED WATERS ¹⁰			
Description	Location	Details	
River Network Entries	-	None recorded within 250m.	
Surface Water Features	-	None recorded within 250m.	
POLLUTION INCIDENTS ¹¹			
Pollutant	Receptor	Location	Date
-	-	None within 250m	-
ENVIRONMENT AGENCY FLOOD RISK ¹²			
Description	Location	Details	
Zone 2	-	The site is not situated within a Zone 2 flood plain.	
Zone 3	-	The site is not situated within a Zone 3 flood plain.	
Flood Defences	-	None recorded within 250m.	
Groundwater Flooding Area	-	Limited potential for groundwater flooding to occur.	

2.7 Sensitive Land Use

Table 6: Sensitive Land Uses within 250m

REGISTERED SENSITIVE LAND USES¹³		
Description	Location	Details
Green Belt Land	224m SE	Mersey and Greater Manchester.

2.8 Industrial Land Use and Potential Sources of Contamination

In order for a conceptual site model and preliminary risk assessment to be completed the historical maps and Groundsure data requires analysis to identify any past or present activities on the site and in the area that may have the potential to cause contamination on the site. Guidance has been issued by the Environment Agency, NHBC and Chartered Institute of Environmental Health.¹⁴ Within this document, annex 3 provides examples of important contaminants that are associated with individual uses of land. This data assists in the formulation of any chemical testing regime.

¹⁰ See Appendix 1

¹¹ See Appendix 1

¹² See Appendix 1

¹³ See Appendix 1

¹⁴ Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008 Volume 1 and 2.

Those that we consider potentially contaminative according to the guidance are given below:

Table 7: Potentially Contaminative Sources		
HISTORICAL		
Land Use	Location	Classification
Historical construction	On site	Artificial/made ground.
Ponds – infilled	50m E, 50m SW	Waste recycling, treatment and disposal sites: landfills and other waste treatment or waste disposal sites.
Refuse Heap	240m NW	
Brickworks	11m E	
Allotment gardens	175m S	Unspecified works/factories/features.
Electricity Sub-station	94m SW, 120m S, 247m NE	
Railway	225m SE	
CURRENT		
Land Use	Location	Classification
Residential construction	On Site	Artificial/made ground.
Electricity Sub-station	105m NW, 124m S	Unspecified works/factories/features.
TANKS (Buried and Above Ground)		
Land Use	Location	Classification
Underground Storage Tanks	None within 250m	-
Overground Storage Tanks	None within 250m	-

3. Coal Mining Risk Assessment

3.1 Geological Appraisal

On the basis of the information revealed from the British Geological Survey¹⁵, it is noted that the site is situated within the uppermost unit of the Pennine Lower Coal Measures Formation. The regional younging direction is towards the south with older deposits, expected to be present beneath the site towards the north. There are no regional or local dip arrows shown in the vicinity of the site, however from the cross-section shown, the deposits likely present a shallow to moderate dip towards the south and west.

Comparison of the BGS geological records and the coal mining information suggests a degree of disparity between the records. The coal mining report suggests the Wigan Five Feet Coal outcrops 43.9m north of the site, however from the Generalised Vertical Section (GVS) from Sheet 85, there is shown to be approximately 90m of strata between the Doe (Bottom Shuttles) Coal, and the Wigan Five Feet. Furthermore, a significant named sandstone unit, Chamber Rock, shown to be between 15m and 60m thick on the GVS is mapped between the Doe (Bottom Shuttles) Coal, and the Wigan Five Feet.

Notwithstanding this there is an unnamed coal seam located approximately 400m north of the site, which following the stratigraphic succession is more likely to represent the Wigan Five Feet or the overlying Lower Chamber (Little) Coal. As this coal seam is unnamed in every outcrop it can only be reliably deduced that this coal seam represents one of five named seams between the Doe and the Trencherbone seam.

As a result cognisance should be given to the accuracy and reliability of the records available for the area.

There is one notable coal seam that is shown to outcrop within the local area. Information regarding this seam is summarised as follows:

Table 8: Summary of Coal Seams Within the Vicinity of the Site.

Seam Name	Seam thickness ^{5*}	Outcrop distance from site ^{5*}	Anticipated depth below surface of site
Doe (Bottom Shuttles) Coal	Unknown	On site	10m to 20m below ground level*

*Conjectured from seams stratigraphic location, geological mapping records, and assumed thickness of superficial deposits.

There is very little information recorded on the presence of this coal seam or the geological strata expected beneath the site. Borehole records between 250m and 500m from the site, indicate a minimum of 6.1m of superficial deposits from the surface and borehole scans from the nearby colliery indicate potentially up to 11m of superficial deposits recorded as “marl” of the borehole scans.

Given the very limited information and the records from the Coal Authority indicating that there is a development high risk area and area of possible unrecorded shallow coal workings related to this coal seam present on the site, it is likely that intrusive works to either prove or disprove the presence of workings within this coal seam are likely to be required.

In view of the absence of any reliable records it is difficult to predict the depth or thickness of this coal seam however from geological mapping and assumed thicknesses of superficial deposits it is expected to lie at a depth of between 10m and 20m below the surface of the site.

Contrary to the records from the Coal Authority, it is unlikely that any other coal seams are likely to be encountered within influencing distance of the surface of the site.

3.2 Risk Assessment

The risk to the stability of the proposed residential development has been evaluated from the data obtained and with reference to the following ratings and definitions:

- Low - The possibility of instability is unlikely therefore no further action is necessary.
- Moderate - The possibility of instability is likely and further investigation or remedial action may be required.
- High - The possibility of instability is highly likely and further investigation or remedial action will be necessary.

Table 9: Development Specific Risk Assessment

Item	Risk attributed to	Coal Seam(s) Considered	Risk Rating
4.3	Shallow coal workings	Doe	Moderate to high
4.4	Coal workings at depth	The Coal Authority report indicates that the property is not within a surface area that could be affected by past underground mining.	Low
4.5	Mine gas	Shallow coal workings.	Moderate to high
4.6	Mine shafts	No mine entries within influencing distance of the surface of the site.	Low

3.3 Risks Posed by Shallow Coal Workings

On the basis of all of the information provided above, the Doe (Bottom Shuttles) Coal could be present within 30m of the surface at the site. The thickness of this seam is unknown, and the possibility of the seam being worked below the site cannot be ruled out. Historic coal mining activity is evident in the nearby area, and therefore it is considered that if coal was known to be close to ground level it could have been removed illicitly via shallow mining methods with relative ease.

It may be noted that guidance available from both the NHBC and the CIRIA publication, SP32 - *construction over abandoned mine workings*, suggests that competent overburden thickness above a coal seam should be greater than 10 times the thickness of a seam plus seam thickness in order that the collapse of workings would pose a low risk to surface structures.

Due to the ambiguity with the projected depth and thickness of the seam beneath the site, it is possible that there may not be a sufficient thickness of competent overburden above the shallowest seam in order to prevent the risk of instability posed by the presence of any illicit workings. Therefore, a moderate to high risk rating has been assigned to this seam, and further investigation is recommended to prove or disprove the presence of illicit mining activity.

3.4 Risks Posed by Coal Workings at Depth

In regard to deeper mining which could affect the site, the property is not identified by the Coal Authority to be within a surface area that could be affected by past underground mining.

3.5 Risks Posed by Mine Gas

This assessment has identified that there is potential for shallow mine workings to be present beneath the proposed development. Whilst the Consultants Coal Mining Report has not reported any incidents of mine gas within the vicinity of the development, shallow mining activity represents a credible source of ground gas. As such, a moderate risk rating has been assigned, and further assessment may be required. Should evidence of workings be proven via further intrusive works, it is strongly recommended that a detailed gas risk assessment is undertaken in accordance with relevant guidance

3.6 Risks Posed by Mine Entries

There are no recorded mine entries recorded within influencing distance of the surface of the site. Given the mining legacy in the nearby area it should be noted that there may exist entries for which no accurate or reliable records exists.

4. Preliminary Qualitative Risk Assessment

The potential of contamination hazards on the land has been identified and the risks associated with them are assessed in the following preliminary risk assessment in accordance with industry practice and the 'suitable for use' approach. This has been conducted using the source-pathway-receptor approach. This method dictates that there must be a risk contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed, DEFRA and The Environment Agency state that **'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'**

R&D Publication 66: 2008 states that the groups at risk of harm (receptors) can be identified by the following categorisation:

1. Humans: site personnel, end users, visitors and adjacent land users.
2. The water environment – receptors: groundwater, surface water, coastal waters and artificial drainage.
3. Ecosystems: plants and animals.
4. Construction/building materials/services

In order to complete a conceptual site model and therefore a preliminary risk assessment, an appraisal of the sources of contamination, potential and actual, on and in the area of the site has therefore been completed with reference to this pollution linkage.¹⁵

¹⁵ This assessment has been based on the information as to the proposed development that has been provided by the client. If the plans should change, the assessment should be re-evaluated.

4.1 Conceptual Ground Model & Preliminary Qualitative Risk Assessment

It is understood that the development proposals currently comprise the construction of a replacement dwelling with driveway and garden areas. In view of the sensitivity of the end users it is considered that the soil screening values (SSVs) for a residential with plant uptake end use should be employed.

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

- | | |
|-------------------|---|
| N/A - | A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required. |
| Low - | A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence. |
| Moderate - | The linkage exists but further field or laboratory data is required to confirm that the contaminant has reached the receptor and the levels of contaminant are harmful. |
| High - | The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary. |

Table 10: Conceptual Site Model and Preliminary Qualitative Risk Assessment

CONCEPTUAL SITE MODEL			PRELIMINARY RISK ASSESSMENT	
Pathways	Receptor	Linkage Present?	Risk Rating	Notes
Direct contact/dermal absorption/soil ingestion	Operative	Yes – operatives are likely to come in contact with the soil.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site.
	End User	Yes – end users are likely to come in contact with the soil.	Moderate	Any on site sources of contamination could migrate to neighbouring properties.
	Neighbours	Yes – possible source on site and immediate neighbours are present.	Moderate	Further testing required to reach a firm conclusion.
Inhalation of Dust/Vapours	Operative	Yes – contact with soil likely during works and vapours may accumulate in enclosed spaces.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site.
	End User	Yes – vapours may accumulate in enclosed spaces.	Moderate	Construction activities may create dust on and off site, which, if contaminated, could adversely affect operatives and end users. In the event that harmful vapours are present they may accumulate in enclosed spaces, affecting operatives and end users.
	Neighbours	Yes – neighbouring properties present and possible inhalation of dust during the works.	Low	Further testing required to reach a firm conclusion. On site sources of contamination are unlikely to be present at a level that presents more than a low risk to neighbours.
Ingestion of fruit/vegetables and/or waters	Operative	No – no edible plants or contained water sources in the area of the proposed new works.	N/A	There are potential on and off-site sources of contamination that may have caused contamination of the site. Further testing required to reach a firm conclusion.
	End User	Yes – garden areas proposed as part of the new development.	Moderate	On site sources of contamination are unlikely to be present at a level that presents more than a low risk to neighbours.
	Neighbours	Yes – residential dwellings present within 250m of the proposed development.	Low	

Migration of hazardous gases via permeable strata	Operative	Yes – possible off-site sources and potential source on site associated with historical construction.	Moderate	Possible source on site and within 250m. A programme of monitoring is recommended but is suggested to be limited to 4 readings over one month in the first instance. If significant made ground considered capable of producing harmful gases is revealed during the investigation works, the monitoring regime may require reassessment to consider a higher potential risk.
	End User		Moderate	
	Neighbours	Yes – possible source on site due to historical construction.	Low to Moderate	It is not considered likely that any made ground that has been brought onto site for the construction of the demolished development will produce high levels of gas. This should be re-assessed during any intrusive works should this be proven to the contrary.
Spillage/loss/run off direct to receiving water	Controlled Waters	No – no controlled waters within 250m.	N/A	There are potential on and off-site sources of contamination that may have caused contamination of the site.
Migration via permeable unsaturated strata	Controlled Waters	Yes – possible source on site and Secondary A aquifer beneath the site.	Low	Secondary A aquifer underlies the site within the solid geology. However it is overlain by what be acting as an aquiclude thereby preventing migration to the Secondary A aquifer. Permeability of underlying geology should be assessed.
Run off via drainage/sewers etc	Controlled Waters	Yes – possible source on site.	Low	On site sources of contamination are unlikely to be present at a level that presents more than a low risk to the drainage network.
Direct contact with contaminated soils	Plants	Yes – gardens areas are planned as part of the proposed development.	Low - Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site.
Uptake via root system			Low - Moderate	On site sources of contamination are unlikely to be present at a level that presents more than a low risk to surrounding plant life. Further testing required to reach a firm conclusion.
Direct contact with contaminated soils/ Direct contact with contaminated groundwater	Building Materials	Yes – possible source on and off site and foundation and service installation materials may be affected by the site soil.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site. Further testing required to reach a firm conclusion.

Migration of mine gas via permeable strata	Operative	Yes – in an area affected by coal mining activity and where shallow worked seams may be present.	Low to Moderate	Further knowledge required to reach a firm conclusion.
	End User			
Exposure to Radon	Operative	No – not in a radon affected area.	N/A	The publication BR211 states that no protection measures are necessary.
	End User			
Mining Instability	End User	Yes – in an area affected by coal mining activity and where shallow worked seams may be present.	Low to Moderate	Further knowledge required to reach a firm conclusion.
Unexploded Ordnance (UXO) Risk	Operative	Yes – the Zetica ¹⁶ online maps indicate that the site is at low risk from UXO.	Low	Unlikely to be affected by UXO.

Notes:

1. The above data and table is a qualitative assessment of the probable risks identified at this site, based on the information made available to us from the client, third party professional data and walkover survey.
2. Should any additional or new data come to light, the risk assessment should be revisited and any necessary changes made to any recommendations resulting from this study.
3. Where further testing is recommended as part of the risk assessment, this is in order to provide a quantitative assessment of any contamination issues. It should at all times be considered that uncertainties may remain, and therefore any testing regime and ground investigation philosophy should be ready to accommodate any necessary alterations should any data come to light or it become evident that it has not been previously considered.

¹⁶ Pre-desk study assessment [online resource from www.zeticauxo.com].

5. Intrusive Investigation

5.1 Site Investigation Philosophy

The information from the Phase 1 Desk Study shows there are potential sources of contamination on the site and in the surrounding area. In view of the above, any intrusive investigation should be undertaken in accordance with the sampling strategies given in BS10175: 2011 +A2:2017 and CLR4:1994. These two sampling strategies may be classified as:

- Non-Targeted – using a defined sampling pattern (BS10175)
- Targeted – based on prior knowledge and professional judgement (CLR4)

These sampling strategies are considered in more detail below. However, it is emphasised that they can be used individually or in combination depending on the depth of site knowledge.

Non-Targeted Sampling

If no obvious 'hot spots' of contamination have been identified on a site, it would be recommended that a stratified random pattern of sampling points be considered. This work should be undertaken with reference to BS10175: 2011 +A2: 2017 *Investigation of potentially contaminated sites – Code of practice: 7.6*, and BS5930 2015 + A1:2020, *Code of practice for ground investigations*.

Targeted Sampling

If a possible 'hot spot' of contamination has been identified on a site, it is recommended that a herringbone pattern of sampling points be considered in the immediate vicinity. If strong evidence of contamination has then been identified, it is recommended that sampling be highly focused to reflect that evidence and the investigator's experience. This work should be undertaken with reference to CLR4, *Sampling Strategies for Contaminated Land, 1994*.

The density of sampling required is defined in BS10175: 2011: +A2: 2017: 7.7.2.2.3, which indicates that an *exploratory* investigation usually requires a lower density sample spacing than does a *main* investigation. The BS goes on to state that *the actual density should depend upon the confidence and robustness required of decisions that will be based on the information obtained. Thus, the area and depth of interest will be related to the contaminants present, the pathways and the receptors. Typical densities of sampling grids can vary from 25m to 50m centres for exploratory investigations, and 10m to 25m centres for main investigations.*

5.2 Site Specific Investigation

In view of the information provided above it is considered that an investigation of the site should include the following main elements.

5.2.1 Contamination Assessment

It may be appreciated that BS 10175 clause 7.7.2.2.3 suggests that the number of sampling points at the site should be based on a minimum of three testing locations or the size of the site with respect to the appropriate grid spacing, whichever the greater. On the basis of the site area being 0.08ha, the number of sampling points at the site should be considered with respect to the table below.

Table 11: Summary of Sampling Strategy					
NUMBER OF SAMPLING POINTS					
	Soil	Water	Asbestos	Standpipes	Standpipe Readings
Exploratory Investigation 50m x 50m grid	3	-	3	3	A minimum of 4 readings over 1 month would be required as per risk assessment, however any regime must take into account the guidance detailed below.
Target Areas	None.				

Chemical testing should be undertaken on the above grid spacing and the following standard testing regime should be undertaken:

- **Metals** – Cd, Cr, Cu, Hg, Ni, Pb, Zn, V.
- **Semi Metals and Non-Metals** – As, Se, Free Cyanide and Phenols.
- **Hydrocarbons** – Polycyclic aromatic hydrocarbons (PAH EPA16), Total petroleum hydrocarbons (TPH CWG).
- **Others** – pH, Organic Content.
- **Asbestos**

Sampling Method

Investigation should include the installation of three gas monitoring standpipes for subsequent monitoring. Furthermore, soils should be obtained for chemical sampling. The sampling strategy should employ the non-targeted strategy given above in the first instance, i.e. at least three sampling points, if it is anticipated that made ground is significant across the site. However, if the made ground at the site is thought to be localised to specific areas, then the targeted strategy should be used.

It should be possible to carry out the above work with a windowless sampling drilling rig.

Gas Monitoring

The final gas monitoring regime should be undertaken in accordance with Table 4.2 of CIRIA C665: 2007: *Assessing risks posed by hazardous ground gasses to buildings*. In that document guidance for the frequency of monitoring is provided on tables 5.5a and 5.5b *Typical/idealised frequency and period of monitoring* on page 60. For convenience, these tables have been combined and reproduced below.

Table 12: Typical/idealised Frequency and Period of Monitoring.

Sensitivity of development	Generation potential of source				
	Very low	Low	Moderate	High	Very High
Low (commercial)	4/1	6/2	6/3	12/6	12/12
Moderate (flats)	6/2	6/3	9/6	12/12	24/24
High (residential + gardens)	6/3	9/6	12/6	24/12	24/24

Notes:

- a) The first number is the minimum number of readings and the second number is the minimum period in months, for example 4/1 – four sets of readings over 1 month.
- b) At least two sets of readings must be at low and falling atmospheric pressure (but not restricted to periods below 1000mb) known as worst case conditions.
- c) The frequency and period stated are considered to represent typical minimum requirements. Depending on specific circumstances fewer or additional readings may be required (e.g. any such variation subject to site specific justification). The NHBC guidance is also recommending these periods/frequencies of monitoring.
- d) Historical data can be used as part of the data set.
- e) Not all sites will require gas monitoring. However, this would need to be confirmed with demonstrable evidence.
- f) Placing high sensitivity end use on a high hazard site is not normally acceptable unless the source is removed or treated to reduce its gassing potential. Under such circumstances long-term monitoring may not be appropriate or required.
- g) This guidance should be read in conjunction with BS 8576:2013 figure 6 which may justify fewer readings in the first instance, where the generation potential is considered to be very low to low. However, this should be undertaken pragmatically, and further readings obtained according to the above table, where a potentially significant source is identified and initial readings suggest that remedial measures are not necessary.

5.2.2 Geotechnical Assessment

In addition to the above contamination assessment which is likely to be required by planning authorities and insurance providers, the following investigation strategy could be considered:

Sampling Method

It is anticipated that a windowless sampling drilling rig will be able to gain sufficient data in regard to the near surface soils. Moreover, such equipment should be able to undertake Standard Penetration Testing (SPT) and/or Dynamic Probing.

Soakaway Design

From the BGs Records available it is expected that the shallow deposits are likely to comprise impermeable cohesive deposits and soakaways are unlikely to be feasible. Should soakaway data be required for drainage design, trial pits could be excavated and infiltration tests conducted. Alternatively, these tests could be undertaken within boreholes, especially where access for excavation equipment is not possible.

Geotechnical Testing

An allowance for geotechnical testing of the soils should be included in any ground investigation. This should include characterisation of volume change potential of any cohesive soils encountered.

Coal Mining

The property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. Further investigation is strongly recommended in order to prove or disprove the presence of illicit mining activity and to assess the thickness of competent overburden.

General practice is to undertake rotary openhole boreholes at three locations across the site to mitigate against the potential for drilling through intact columns associated with pillar and stall workings. Furthermore, it is normal to investigate the ground to 30m below ground level; any workings below this depth are unlikely to result in significant instability. However, in this case, the risk of instability is due to shallow workings, therefore, drilling to these depths may not be necessary and the objective should be to ensure that the shallow seams are un-worked or have sufficient competent cover. It may therefore be possible, in the first instance, to undertake one borehole to 30m below the top of the rockhead, with the remaining boreholes proving the depth and continuity of the coal seam(s). In any event, it is considered that approval should be sought with the Local Authority as to the efficacy of this approach.

5.2.3 Reporting

The above data will need to be formulated into a formal assessment that should include the following:

- o Geotechnical recommendations, particularly if existing loads are to increase.
- o Contamination assessment.
- o Contamination remediation strategy.
- o Any recommendations for further work, if required and including validation reports where site remediation is necessary.

As soon as is practicable, and prior to the above, this Phase 1 report should be forwarded to the relevant authorities, in order to ensure they have sufficient time to review and discuss any issues.

6. References

- British Standards Institution (2015), BS5930 2015 + A1:2020: *Code of practice for site investigations*, B.S.I., London.
- British Standards Institution (2007), Amendment No 1 to BS5930: *Code of practice for ground investigations*, B.S.I., London.
- British Standards Institution (2011) +A2:2017, BS 10175: *Investigation of potentially contaminated sites – Code of Practice*, British Standards Institute.
- British Standards Institution (2013), BS 8576 Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds.
- Department for Environment, Food and Rural Affairs and the Environment Agency, DEFRA R&D Publications, Environment Agency, Bristol.
- CLR 2, 1994, *Guidance on preliminary site inspection of contaminated land*, Volume 1.
- CLR 4, 1994, *Sampling Strategies for contaminated land*.
- R&D Publication 66: 2008 Guidance for the Safe Development of Housing on Land Affected by Contamination.
- CIRIA Report C665 (2007), Assessing risks posed by ground gasses in buildings.
- The Environment Agency: Groundwater source protection.

Appendix 1

Groundsure Reports

474, BOLTON ROAD, BURY, BL8 2DU

Order Details

Date: 02/09/2022
Your ref: C_3018_22_E_4559__PO-2299
Our Ref: GS-9025286

Site Details

Location: 378576 410027
Area: 0.08 ha
Authority: [Bury Metropolitan Borough Council](#)



Summary of findings

p. 2

Aerial image

p. 8

OS MasterMap site plan

p.12

groundsure.com/insightuserguide

Contact us with any questions at:

info@groundsure.com

08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
13	1.1	<u>Historical industrial land uses</u>	0	2	13	43	-
16	1.2	Historical tanks	0	0	0	0	-
16	1.3	<u>Historical energy features</u>	0	0	3	10	-
17	1.4	Historical petrol stations	0	0	0	0	-
17	1.5	Historical garages	0	0	0	0	-
17	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
18	2.1	<u>Historical industrial land uses</u>	0	2	21	56	-
21	2.2	Historical tanks	0	0	0	0	-
22	2.3	<u>Historical energy features</u>	0	0	10	18	-
23	2.4	Historical petrol stations	0	0	0	0	-
23	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
24	3.1	Active or recent landfill	0	0	0	0	-
24	3.2	Historical landfill (BGS records)	0	0	0	0	-
25	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
25	3.4	<u>Historical landfill (EA/NRW records)</u>	0	0	0	1	-
25	3.5	Historical waste sites	0	0	0	0	-
25	3.6	Licensed waste sites	0	0	0	0	-
26	3.7	Waste exemptions	0	0	0	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
27	4.1	<u>Recent industrial land uses</u>	0	0	5	-	-
28	4.2	Current or recent petrol stations	0	0	0	0	-
28	4.3	Electricity cables	0	0	0	0	-
28	4.4	Gas pipelines	0	0	0	0	-
28	4.5	Sites determined as Contaminated Land	0	0	0	0	-



29	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
29	4.7	Regulated explosive sites	0	0	0	0	-
29	4.8	Hazardous substance storage/usage	0	0	0	0	-
29	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
29	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
30	4.11	Licensed pollutant release (Part A(2)/B)	0	0	0	0	-
30	4.12	Radioactive Substance Authorisations	0	0	0	0	-
30	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	0	2	-
30	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
31	4.15	Pollutant release to public sewer	0	0	0	0	-
31	4.16	List 1 Dangerous Substances	0	0	0	0	-
31	4.17	List 2 Dangerous Substances	0	0	0	0	-
31	4.18	<u>Pollution Incidents (EA/NRW)</u>	0	0	0	3	-
32	4.19	Pollution inventory substances	0	0	0	0	-
32	4.20	Pollution inventory waste transfers	0	0	0	0	-
32	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
33	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
35	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
37	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
38	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
38	5.5	Groundwater vulnerability- local information	None (within 0m)				
39	5.6	<u>Groundwater abstractions</u>	0	0	0	0	5
41	5.7	<u>Surface water abstractions</u>	0	0	0	0	37
50	5.8	Potable abstractions	0	0	0	0	0
50	5.9	Source Protection Zones	0	0	0	0	-
50	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
51	6.1	Water Network (OS MasterMap)	0	0	0	-	-



51	6.2	Surface water features	0	0	0	-	-
52	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
52	6.4	<u>WFD Surface water bodies</u>	0	0	0	-	-
53	6.5	<u>WFD Groundwater bodies</u>	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
54	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
54	7.2	Historical Flood Events	0	0	0	-	-
54	7.3	Flood Defences	0	0	0	-	-
55	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
55	7.5	Flood Storage Areas	0	0	0	-	-
56	7.6	Flood Zone 2	None (within 50m)				
56	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
57	8.1	Surface water flooding	Negligible (within 50m)				
Page	Section	Groundwater flooding					
58	9.1	<u>Groundwater flooding</u>	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
59	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
60	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
60	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
60	10.4	Special Protection Areas (SPA)	0	0	0	0	0
60	10.5	National Nature Reserves (NNR)	0	0	0	0	0
61	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
61	10.7	Designated Ancient Woodland	0	0	0	0	0
61	10.8	Biosphere Reserves	0	0	0	0	0
61	10.9	Forest Parks	0	0	0	0	0
62	10.10	Marine Conservation Zones	0	0	0	0	0
62	10.11	<u>Green Belt</u>	0	0	1	2	1
62	10.12	Proposed Ramsar sites	0	0	0	0	0



62	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
63	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
63	10.15	Nitrate Sensitive Areas	0	0	0	0	0
63	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
64	<u>10.17</u>	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
65	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
66	11.1	World Heritage Sites	0	0	0	-	-
66	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
66	11.3	National Parks	0	0	0	-	-
66	11.4	Listed Buildings	0	0	0	-	-
67	11.5	Conservation Areas	0	0	0	-	-
67	11.6	Scheduled Ancient Monuments	0	0	0	-	-
67	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
68	<u>12.1</u>	<u>Agricultural Land Classification</u>	Grade 4 (within 250m)				
69	12.2	Open Access Land	0	0	0	-	-
69	12.3	Tree Felling Licences	0	0	0	-	-
69	12.4	Environmental Stewardship Schemes	0	0	0	-	-
70	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
71	13.1	Priority Habitat Inventory	0	0	0	-	-
71	13.2	Habitat Networks	0	0	0	-	-
71	13.3	Open Mosaic Habitat	0	0	0	-	-
71	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
72	<u>14.1</u>	<u>10k Availability</u>	Identified (within 500m)				
73	<u>14.2</u>	<u>Artificial and made ground (10k)</u>	0	0	1	4	-
75	<u>14.3</u>	<u>Superficial geology (10k)</u>	1	1	1	1	-



76	14.4	Landslip (10k)	0	0	0	0	-
77	14.5	<u>Bedrock geology (10k)</u>	1	3	4	29	-
79	14.6	<u>Bedrock faults and other linear features (10k)</u>	1	4	3	14	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
81	15.1	<u>50k Availability</u>	Identified (within 500m)				
82	15.2	Artificial and made ground (50k)	0	0	0	0	-
82	15.3	Artificial ground permeability (50k)	0	0	-	-	-
83	15.4	<u>Superficial geology (50k)</u>	1	0	1	0	-
84	15.5	<u>Superficial permeability (50k)</u>	Identified (within 50m)				
84	15.6	Landslip (50k)	0	0	0	0	-
84	15.7	Landslip permeability (50k)	None (within 50m)				
85	15.8	<u>Bedrock geology (50k)</u>	1	1	3	17	-
87	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
87	15.10	<u>Bedrock faults and other linear features (50k)</u>	1	1	2	11	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
89	16.1	BGS Boreholes	0	0	0	-	-
Page	Section	Natural ground subsidence					
90	17.1	<u>Shrink swell clays</u>	Very low (within 50m)				
91	17.2	<u>Running sands</u>	Very low (within 50m)				
93	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
94	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
95	17.5	<u>Landslides</u>	Very low (within 50m)				
97	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
99	18.1	Natural cavities	0	0	0	0	-
100	18.2	BritPits	0	0	0	0	-
100	18.3	<u>Surface ground workings</u>	0	2	14	-	-
101	18.4	<u>Underground workings</u>	0	0	0	1	6
101	18.5	Historical Mineral Planning Areas	0	0	0	0	-



101	18.6	Non-coal mining	0	0	0	0	0
102	18.7	Mining cavities	0	0	0	0	0
102	18.8	JPB mining areas	None (within 0m)				
102	18.9	<u>Coal mining</u>	Identified (within 0m)				
102	18.10	Brine areas	None (within 0m)				
103	18.11	Gypsum areas	None (within 0m)				
103	18.12	Tin mining	None (within 0m)				
103	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
104	19.1	<u>Radon</u>	Less than 1% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
105	20.1	<u>BGS Estimated Background Soil Chemistry</u>	1	4	-	-	-
105	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
106	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
107	21.1	Underground railways (London)	0	0	0	-	-
107	21.2	Underground railways (Non-London)	0	0	0	-	-
108	21.3	Railway tunnels	0	0	0	-	-
108	21.4	Historical railway and tunnel features	0	0	0	-	-
108	21.5	Royal Mail tunnels	0	0	0	-	-
108	21.6	<u>Historical railways</u>	0	0	2	-	-
109	21.7	Railways	0	0	0	-	-
109	21.8	Crossrail 1	0	0	0	0	-
109	21.9	Crossrail 2	0	0	0	0	-
109	21.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 23/05/2019

Site Area: 0.08ha



Recent site history - 2011 aerial photograph



Capture Date: 02/05/2011

Site Area: 0.08ha



Recent site history - 2001 aerial photograph



Capture Date: 07/05/2001

Site Area: 0.08ha



Recent site history - 2000 aerial photograph



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Capture Date: 07/05/2000

Site Area: 0.08ha



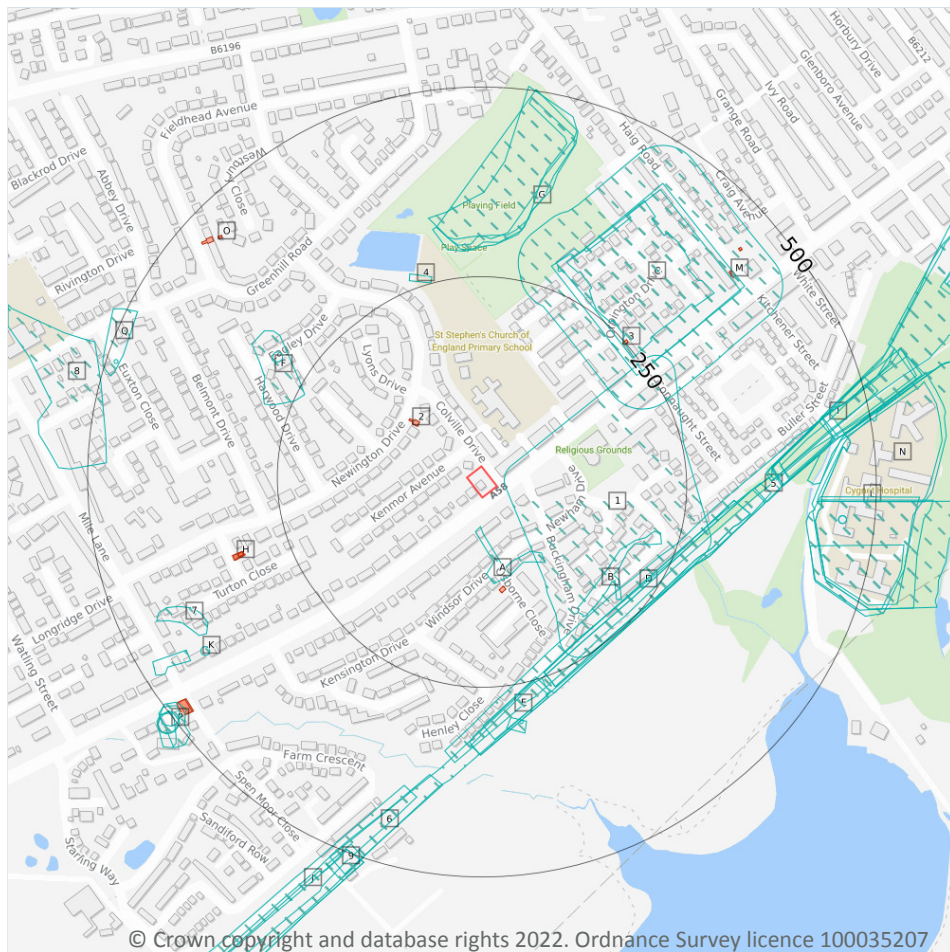
OS MasterMap site plan



Site Area: 0.08ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical energy features

1.1 Historical industrial land uses

Records within 500m

58

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
1	11m E	Brick Works	1890	668938



ID	Location	Land use	Dates present	Group ID
A	38m S	Unspecified Ground Workings	1890	648154
B	182m SE	Unspecified Ground Workings	1890 - 1908	778055
C	194m NE	Barracks	1956	694329
D	208m SE	Cuttings	1851	720214
B	223m SE	Cuttings	1955	698292
B	223m SE	Cuttings	1965 - 1991	729230
E	223m SE	Cuttings	1890	701945
B	228m SE	Cuttings	1938	727226
D	228m SE	Cuttings	1908 - 1927	708349
C	235m NE	Barracks	1890 - 1938	708446
F	240m NW	Refuse Heap	1890	678004
C	245m NE	Barracks	1969	715475
E	247m S	Cuttings	1938 - 1955	761520
C	247m NE	Barracks	1851	743377
E	250m S	Cuttings	1965 - 1991	756415
4	251m N	Shed	1851	659595
G	284m N	Unspecified Ground Workings	1938	648123
G	286m N	Unspecified Heap	1956	773699
F	289m NW	Unspecified Shaft	1890	665141
E	292m S	Colliery	1851	645272
E	298m S	Coal Pit	1851	654381
G	301m N	Unspecified Heap	1969 - 1980	760208
5	340m E	Cuttings	1938	702825
I	355m E	Railway Sidings	1938	730632
I	357m E	Railway Sidings	1908 - 1938	785633
I	363m E	Railway Sidings	1969	713999
I	363m E	Railway Sidings	1956	773017
I	364m E	Cuttings	1938	720188



ID	Location	Land use	Dates present	Group ID
6	372m S	Cuttings	1965 - 1977	727032
I	373m E	Cuttings	1956	719829
I	375m E	Cuttings	1890	788570
7	391m SW	Refuse Heap	1890	678003
J	393m S	Cuttings	1851	760694
K	408m SW	Unspecified Shaft	1890	665142
L	410m E	Infectious Diseases Hospital	1908 - 1938	697707
L	418m E	Unspecified Commercial/Industrial	1977	643342
L	420m E	Hospital	1890	762580
L	422m E	Hospital	1991	693938
L	422m E	Hospital	1980 - 1988	748572
N	423m E	Hospital	1956	728131
N	428m E	Hospital	1969 - 1974	710178
K	434m SW	Pumping Station	1890	671665
I	438m E	Cuttings	1938	696639
I	448m E	Cuttings	1956	704829
L	452m E	Unspecified Tank	1965	674785
L	452m E	Chimney	1977	684359
8	475m W	Colliery	1890	645273
P	480m SW	Unspecified Heaps	1965	679641
Q	481m W	Colliery	1851	645271
Q	485m W	Coal Pit	1851	654379
P	487m SW	Unspecified Heap	1955	701881
9	488m S	Cuttings	1955	731096
P	493m SW	Unspecified Heap	1938	756456
P	496m SW	Unspecified Heap	1927	764480
J	497m S	Cuttings	1938 - 1955	729900
J	497m S	Cuttings	1908 - 1927	754167



ID	Location	Land use	Dates present	Group ID
P	499m SW	Unspecified Old Shafts	1890	788759

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	0
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Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	13
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Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 13**

ID	Location	Land use	Dates present	Group ID
2	94m NW	Electricity Substation	1968	50318
A	120m S	Electricity Substation	1972 - 1992	52011
3	247m NE	Electricity Substation	1982 - 1995	52628
H	309m W	Electricity Substation	1968 - 1992	53480
H	311m W	Electricity Substation	1973	53798
H	311m W	Electricity Substation	1987	50868
H	311m W	Electricity Substation	1966	56049
M	415m NE	Electricity Substation	1957	53559
M	444m NE	Electricity Substation	1982 - 1995	52714
O	452m NW	Electricity Substation	1968	45016



ID	Location	Land use	Dates present	Group ID
O	457m NW	Electricity Substation	1968	45017
P	471m SW	Electricity Substation	1973 - 1992	51406
P	473m SW	Electricity Substation	1987	51661

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m

0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m

0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

