



e3p

Phase I Geoenvironmental Site Assessment
Brassey Street, Middleton
Reference:16-124-R1
Date: September 2022



PHASE I GEOENVIRONMENTAL SITE ASSESSMENT

Brassey Street
Middleton
Manchester
M24 6AR

Prepared for:



Report Ref: 16-124-R1

Date Issued: 26 September 2022

Brassey Street, Middleton

Phase I Geoenvironmental Site Assessment

September 2022

E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

+ 44 (0) 161 707 9612
<https://e3p.co.uk>

Registered in England
CRN: 08725262

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PREPARED BY	I Diack		
QUALIFICATIONS	Bsc (Hons)		
CHECKED BY	J Sheridan		
QUALIFICATIONS	MeSci, FGS		
AUTHORISED BY	S Cox		
QUALIFICATIONS	BSc (Hons), FGS, PIEMA, MIEEnvSci, CEnv		



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EXECUTIVE SUMMARY

Site Address	Land off Brassey Street, Middleton, M24 6AR.	
Grid Reference	E 387503 N406558	
Site Area	0.06 Ha.	
Proposed Development	Rochdale Metropolitan Borough Council intend to construct a mid-rise residential development comprising 6 residential apartment units over three storeys with associated landscaped areas, estate parking and utility infrastructure.	
Current Site Use	The subject site is a rectangular-shaped parcel of land located adjacent to 135 Brassey Street, approximately 1 km to the northeast of Middleton town centre. The site currently comprises an openly accessible parcel of maintained open green space associated with the neighbouring Boarshaw working men's club. Mature trees are present in the northeast corner and at the western boundary.	
Site History	The earliest mapping showed the site to comprise several fields separated by field boundaries. Terraced residential properties were constructed pre-1893 and were later demolished pre-1975, after which point the site remained vacant.	
Environmental Setting	Drift Geology	Glacial Till – SAND and GRAVEL.
	Bedrock Geology	Pennine Lower Coal Measures Formation – MUDSTONE, SILTSTONE AND SANDSTONE.
	Faults	The nearest geological fault is located circa 91 m southwest of the site trending roughly east to west.
	Hydrogeology	Secondary A bedrock and superficial aquifer are recorded. No groundwater abstraction licences are recorded within 1 km of the site boundary.
	Hydrology	The nearest off-site surface water feature is Whit Brook located 43 m southeast. Due to the local topography, it is likely that any shallow groundwater if present will flow in a south-westerly direction towards the brook and may over time discharge into Whit Brook.
	Flood Risk	Unaffected by flooding from rivers. The site is at moderate risk for groundwater flooding.
Utility Locations	A formal survey has not been completed. Statutory service plans do not record any services on-site.	
Landfill Sites and Ground Gases	No landfill sites (current or historic) are located within 250 m of the site.	
Radon	Less than 1% of houses above the 'Action Level' – no special precautions are required.	



Coal Mining/Land Stability	The site is located within a Coal Authority defined development high risk area and workings are recorded in the Arley Seam beneath the site at a depth of 159 m. Unrecorded shallow workings are also considered probable, associated with the Cannel Coal seam that is recorded to outcrop to the north of the site Geological maps indicate the Black Mine (BkM) to outcrop immediately north of the site, dipping beneath the site. (The Black Mine seam is inferred to represent the Cannel Seam recorded by the Coal Authority. Several mine entries are also recorded to the north, west and south of the site, associated with Tonge Colliery and Boarshaw Pit, indicating a legacy of mining in the wider area. Log annotations for the mapped mine entries on the 6-inch map record drift to 64-65 ft (19.5-20 m) bgl over sandstone, with coal at 79 and 96 ft (22.5 and 29 m). Based on the above, there is a moderate risk from shallow coal mining beneath the site (<30 m bgl).
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.
Initial Conceptual Site Model	The following potential off-site sources of contamination have been identified ✦ Made Ground – Heavy Metals, Speciated Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), asbestos and ground gas (CO₂ and CH₄). ✦ Historical Mine Gas – CO₂ and CH₄. The following potential off-site sources of contamination have been identified: ✦ Boarshaw Bleach, Dye and Print Works and infilled reservoirs – 80 m northeast. ✦ Boarshaw Cotton Mill – 225 m. Made Ground may underlie the site, associated with historical development within the site boundary, which may contain contaminants such as heavy metals, non-volatile PAH and asbestos. Given the proposed development will comprise apartments with limited soft landscaping, the potential for direct contact is therefore reduced. The risk to future residential end users is considered low/moderate Controlled waters receptors are identified as the underlying Secondary A drift and bedrock aquifers, together with the off-site Whit Brook. Significant sources of mobile contamination have not been identified on the site that may present a direct risk to controlled waters. The overall risk to controlled waters from the site is considered low.



	Made Ground, potential unrecorded shallow mine workings and infilled reservoirs (80 m northeast) are all potential sources of ground gas to the site. The underlying natural drift is likely to comprise moderate permeability granular strata, thus providing a viable migration pathway. The risk from ground gas is considered moderate.
Recommendations	It is recommended an intrusive geo-environmental ground investigation should be completed to confirm the conceptual site models anticipated contaminant sources throughout the site.



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DRAWING LIST

16-124-001 - Site Location Plan
16-124-002 - Proposed Development Plan
16-124-003 - Site Features Plan
16-124-004 - Historical Features Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P Ltd has been commissioned by AJ Cocker Associates on behalf of their client, Rochdale Metropolitan Borough Council, to undertake a Phase I Geoenvironmental Site Assessment at land off Brassey Street, Middleton, M24 6AR.

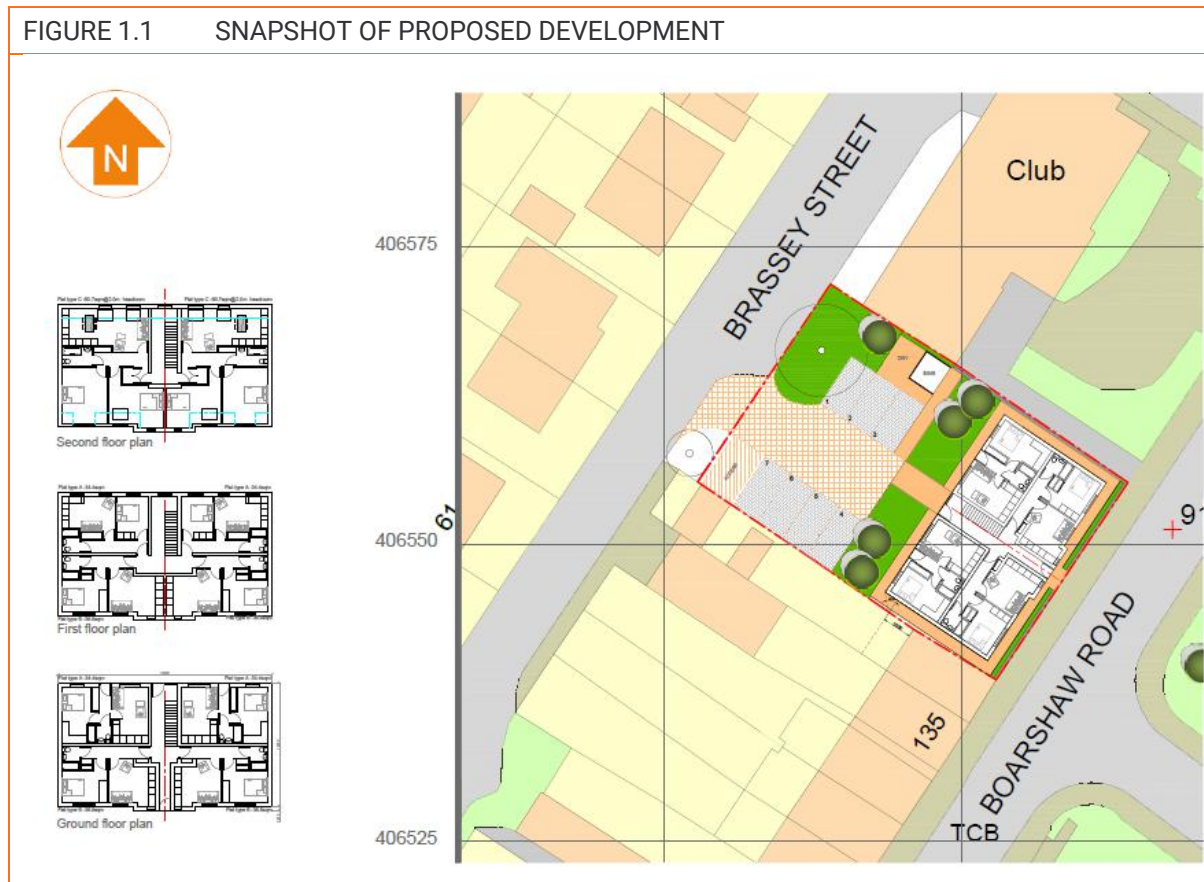
This report is required to determine potential contaminated land liabilities and geotechnical constraints as part of proposed site redevelopment.

1.2. PROPOSED DEVELOPMENT

Rochdale Metropolitan Borough Council intend to construct a mid-rise residential development comprising 6 residential apartment units over three storeys with associated landscaped areas, estate parking and utility infrastructure.

Drawing 16-124-002 (Appendix III) presents the proposed development layout. A snapshot of the proposed development layout is indicated in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.3. OBJECTIVES

- ✧ The objectives of the geoenvironmental investigation are as follows:
- ✧ Review historical plans, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available to complete a desk study in line with Environment Agency (EA) document Land Contamination: Risk Management (LC:RM) (2021).
- ✧ Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site concerning the future use of the site and to off-site receptors.
- ✧ Assess the desk-study information and, where possible, provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
- ✧ Provide recommendations regarding future works required and undertake a preliminary pre-construction cost appraisal.

1.4. SOURCES OF INFORMATION

Background information was sought from the following sources:

- ✧ Groundsure Search (GS-9028267);
- ✧ Historical mapping dated 1851 to 2019. A selection of historical maps are reproduced in Appendix V;
- ✧ On-line planning records held by Rochdale Metropolitan Borough Council;
- ✧ Consultations with representatives of Rochdale Metropolitan Borough Council;
- ✧ Magic Map Groundwater Vulnerability Map;
- ✧ Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007);
- ✧ British Geological Survey Map;
- ✧ Groundsure IO database;
- ✧ <https://zeticauxo.com/downloads-and-resources/risk-maps/>; and,
- ✧ <https://flood-map-for-planning.service.gov.uk>.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.



1.6. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

1.7. RISK CLASSIFICATION

E3P has utilised the available data to classify the site on the basis of its likely contaminated land liability and potential for geotechnical constraints in relation to the site development. The risk classification definitions are summarised in Table 1.1.

TABLE 1.1 RISK CLASSIFICATION

RISK	DEFINITION
Low	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
Low Moderate	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of future redevelopment of the site.
Moderate	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the site will likely require further site investigation.
Moderate High	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment, including intrusive ground investigations.
High	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine the level of risk and associated liability.



2. SITE SETTING

2.1. SITE DETAILS

TABLE 2.1 SITE DETAILS

Site Address	Land off Brassey Street, Middleton, M24 6AR
National Grid Reference	E 387503 N 406558
Site Area	0.06 Ha.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan is presented in Appendix III as Drawing 16-124-001.

2.2. CURRENT SITE USE

E3P has undertaken a site walkover of the entire site and a description of the key findings is summarised in Table 2.2.

TABLE 2.2 SITE DESCRIPTION

Occupancy/Use	The subject site is a rectangular-shaped parcel of land located adjacent to 135 Brassey Street, approximately 1 km to the northeast of Middleton town centre. The site currently comprises an openly accessible parcel of maintained open green space associated with the neighbouring Boarshaw Working Men's Club. Mature trees are present in the northeast corner and at the western boundary.	
Surface Cover (%)	Buildings	0%
	Hardstand	5%
	Soft Cover	95%
Structures	No structures have been identified on site.	
Access	The site is openly accessible from Brassey Street along the north-western boundary and from the south-eastern site boundary from Boarshaw Road. Concrete bollards are present along Brassey Street.	
Slope	The site is uniform in topography with an even flat terrain with approximate elevation of 93 m AOD.	
Retaining Structures	There are no retaining structures present on site.	
Vegetation/Ecology	Managed grassland is present across the site, with two mature trees located at the north-west and south-east site boundary respectively.	
Hazardous Material Storage	No above-ground storage tanks (ASTs) or underground storage tanks (USTs) were observed at the site during the preliminary site walkover. Due to the previously undeveloped nature of the site, it is unlikely that hazardous materials storage will have occurred on the site.	
Asbestos-Containing Material (ACM)	No evidence of ACM was noted across the site during the site walkover.	
Polychlorinated Biphenyls (PCBs)	There is no equipment identified that may contain PCBs within the site boundary.	



Waste Storage	Potentially hazardous waste streams are unlikely to be generated at the site and none were observed during the preliminary site inspection.
Drainage/Utilities	A formal survey has not been completed. Statutory service plans do not record any services on-site.

2.3. SURROUNDING AREA

The surrounding area land uses are summarised in Table 2.2.

TABLE 2.2 SURROUNDING LAND USES

DIRECTION	LAND USE
North	Residential units
East	Boarshaw Working Men's Club
South	Whit Brook, Boarshaw Road, residential units
West	Residential units



3. SITE HISTORY

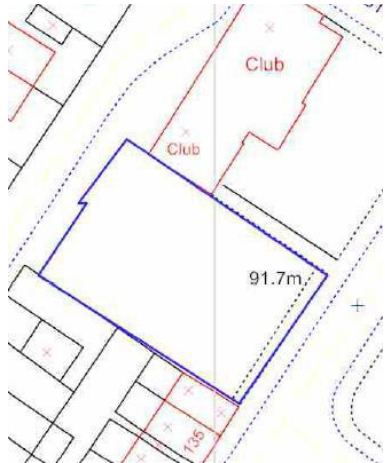
3.1. ON-SITE HISTORICAL DEVELOPMENT

A review of historical mapping and historical aerial imagery pertinent to the site is summarised in Table 3.1. In addition, historical site features are presented on Drawing No 16-124-003 in Appendix III.

TABLE 3.1 HISTORICAL DEVELOPMENT

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1851 1:1,056	The site consists of agricultural fields, separated into 6 parcels with two structures recorded in the centre-south.	
1893 1:2,500	The site is no longer recorded as agricultural fields. Rows of presumed terraced houses are present along the north west and south east boundaries.	
1909 1:2,500	A small outbuilding is recorded adjacent the southern site boundary.	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1954 1:1,250	An additional small boundary segment is recorded belonging to the dwelling at the south eastern site boundary. Properties are now referenced by number.	
1975 1:1,250	All structures have been removed.	
2003 1:1,250	No changes have been noted and the site is recorded to match present day composition.	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
2019 Aerial Photograph	Most recent aerial photograph depicting the sites current composition and displaying no changes since 2003 mapping.	

3.2. OFF-SITE HISTORICAL DEVELOPMENT

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 250 m radius of the site is summarised in Table 3.2.

TABLE 3.2 SURROUNDING HISTORICAL DEVELOPMENT

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Boarshaw Mill Then: Mill Then: No longer recorded	56 m	Pre 1907–Pre 1932 Pre 1960–1990 Pre 1990 - Present	North East
Unspecified Pit Then: No longer recorded	115 m	Pre 1923–Pre 1932 Pre 1932 - Present	East
Boarshaw Bleach Works Then: Boarshaw Bleach Dye & Print Works Then: No longer recorded	167 m	Pre 1893–Pre 1932 Pre 1932–Pre 1954 Pre 1954 - Present	East
Cromer Ring (Cotton Spinning Mills) Then: marked as Cromer Industrial Estate Then: No longer marked	240 m	Pre 1954–Pre 1978 Pre 1978–Pre 1995 Pre 1995–Present	South East

3.3. PLANNING HISTORY

E3P has undertaken a review of online planning records held by Rochdale Metropolitan Borough Council and no environmentally pertinent information has been obtained for the site.

3.4. ANECDOTAL INFORMATION

No anecdotal information has been obtained for this site.

3.5. PREVIOUS REPORTS

No previous reports have been obtained for this site.



4. ENVIRONMENTAL SETTING

4.1. GEOLOGY AND HYDROGEOLOGY

The British Geological Survey (BGS) map for the site, (1:50,000, Solid and Drift editions) and online records indicate the site is underlain by the geological sequence presented in Table 4.1.

TABLE 4.1 SUMMARY OF UNDERLYING GEOLOGY

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift	Glaciofluvial Sheet Deposits	SAND and GRAVEL	Secondary A aquifer
Solid	Pennine Lower Coal Measures Formation	MUDSTONE, SILTSTONE, SANDSTONE	Secondary A aquifer

TABLE 4.2 SUMMARY OF BGS BOREHOLE RECORDS

LOCATION	DEPTH	MADE GROUND	DRIFT	SOLID
210 m E	78.03 m	None Encountered	CLAY and GRAVEL > 10 m	Grey Shale (17.67m)

TABLE 4.3 FAULTING

LOCATION	DESCRIPTION
91 m SW	Fault, inferred
159 m NE	Fault, inferred
244 m SE	Fault, Inferred

The Groundsure report indicates that the site is not located within a groundwater source protection zone. Furthermore, there are no groundwater/potable abstractions within 2 km of the site.

It is considered likely that shallow groundwater, if present, will flow in a south westerly direction, following the topographical gradient towards Whit Brook to the south.

4.2. NATURAL LANDFORM AND GEOMORPHOLOGY

Based on the initial geological assessment, a review of available topographic data and pertinent mapping, E3P has undertaken a preliminary geomorphological assessment of the landform and its possible mechanism for formation.

A river flows in a south westerly direction to the south of the subject site at a lower elevation than that of the site with a steep, partially wooded embankment. The current site level plateau will have been formed by the placement and upfilling of material before the construction of the historical development.

It is possible that the historical level raising has resulted in greater thicknesses of Made Ground overlying the natural glacial till and alluvial soils associated with the stream.

Prior to development, it is possible that the valley side falling to the river was at a lesser gradient and reduced angle compared to the current situation.



4.3. GEOTECHNICAL DATA

Geotechnical data presented within a commercially available environmental database is summarised in Table 4.4.

TABLE 4.4 SUMMARY OF GEOTECHNICAL DATA

HAZARD	DESIGNATION
Shrink-Swell Clay	Low risk
Landslides	Very low risk
Ground Dissolution	No hazard
Compressible Ground	Moderate risk
Collapsible Deposits	Very low risk
Running Sand	Low risk

4.4. COAL MINING

The Groundsure report states the site is in an area that may be affected by coal mining.

A CA mining report was obtained (Ref: 51003309357001) dated 5th September 2022.

The CA operates a risk-based approach to the assessment of potential instability issues associated with future development of land located within the predefined CA consultation areas. This risk-based approach subdivides the potential risk into “low” and “high” risk categories.

The risk categories can be defined as:

Low-Risk Sites – Deemed to be land where coal mining has taken place, however, it was at such depth not to pose a risk to new development and it, therefore, contains no known recorded risks and as such no further assessment is required.

For low-risk sites, the CA categorically states:

If your proposed development is within the Development Low Risk Area there is no need for you to submit any coal mining information with your planning application and The Coal Authority will not be consulted by the LPA. The LPA will include our Standing Advice as an informative note within the decision notice.

High-Risk Sites – Deemed to be landholdings located within an area known to contain legacy risks that include:

- ✧ Mine entries (shaft or adit);
- ✧ Shallow coal workings (recorded and probable);
- ✧ Workable coal seam outcrops;
- ✧ Mine gas sites and areas;
- ✧ Recorded coal-mining-related hazards;



- Geological features (fissures and break lines); and
- Former surface mining sites (sometimes using historic opencast extraction methods).

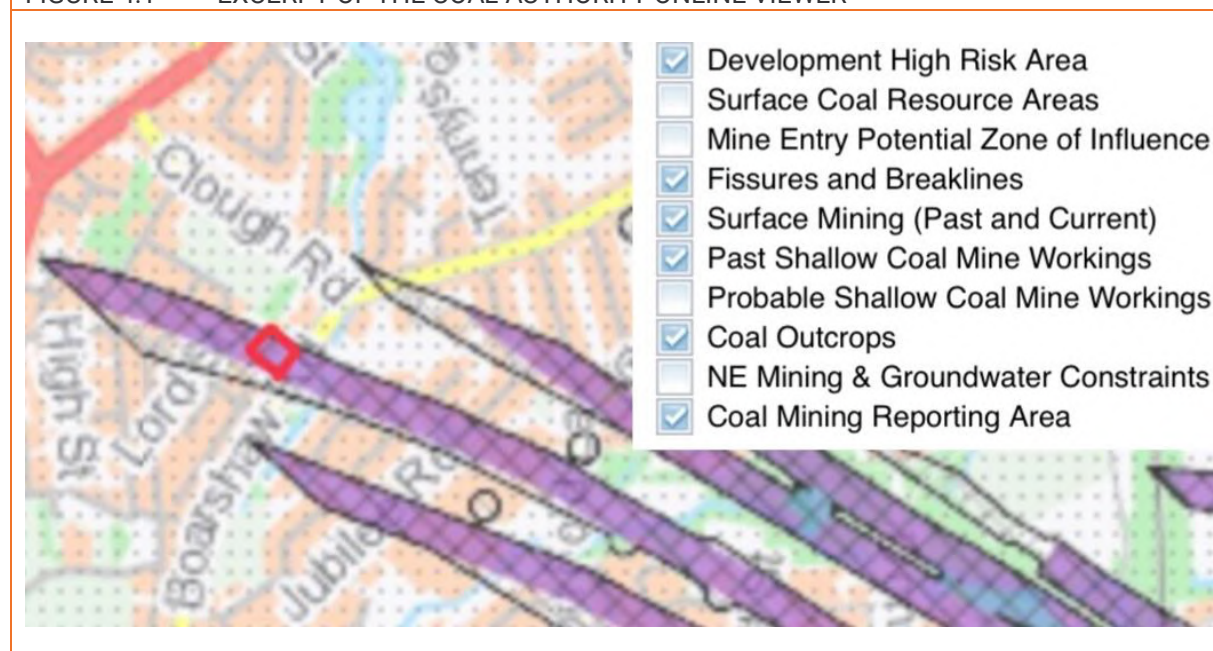
4.5. COAL MINING INFORMATION

Prior to the enactment of the Coal Mines Regulation Act (1872), which came into force on the 1st January 1883, there was no statutory requirement to record the extent of abandoned mine workings and as such, the CA has no knowledge of extensive workings throughout the UK Coal Fields where shallow workings are present at a depth that could result in a subsidence event in the future (through successive cavitation) associated with failure of the support mechanism.

To determine if a site may have unrecorded or recorded coal mine workings requires the consideration of a wide range of information, and E3P has completed a review of relevant information in relation to potential coal mining activities.

In the first instance, E3P has reviewed the Coal Authority Online Viewer, and an excerpt of this is presented as Figure 4.1. This map shows that the site lies within a development high-risk area associated with an outcropping coal seam to the north.

FIGURE 4.1 EXCERPT OF THE COAL AUTHORITY ONLINE VIEWER



As the site is within an area affected by Coal Mining E3P, have consulted with the Coal Authority, who have provided a Consultant Coal Mining Report for the site (ref: 51003309357001).

Table 4.5 provides a summary of pertinent coal mining information with this report.

TABLE 4.5 COAL MINING INFORMATION

SOURCES OF INFORMATION	SUMMARY
Known Past Underground Mining	Workings are recorded in the Arley Seam beneath the site at a depth of 159 m. The seam was reportedly last worked in 1874.



SOURCES OF INFORMATION	SUMMARY
Probable Unrecorded Workings	Yes.
Spine Roadways at Shallow Depth	No Spine roadways recorded at shallow depth.
Mine Entries Within 100 m of the Site	None recorded within 100 m of the boundary.
Mine Abandonment Plans	Yes
Known Outcrops	The Cannel Coal Seam is recorded to outcrop 20 m and 22 m to the north east of the site.
Faults / Fissures	No faults, fissures or break lines recorded on site.
Opencast Mines	No opencast mines recorded within 500 m of the site boundary.
Coal Authority Managed Tips	None recorded within 500 m of the site boundary.
Remediated Sites	None recorded within 50 m of the site boundary.
Coal Mining Subsidence	None recorded within 50 m of the site boundary.
Mine Gas	None recorded within 500 m of the site boundary.
Mine Water	None recorded within 500 m of the site boundary.
Future Underground Mining	None recorded.
Coal Authority Development Advice	The site is located within an area of historical mining activity and within a Development High Risk Area.
British Geological Survey Mapping	The following BGS Maps have been reviewed: - Country Maps 6" Lancashire 96 NE Solid Edition (1929) - Sheet 85, Manchester 1:50,000 Solid Edition (1974) Excerpts from each map are presented as Figure 4.2 and 4.3 respectively. Both maps record several coal seams cropping within the local region, intercepted by numerous faults. The Black Mine (BkM) is indicated to outcrop immediately north of the site, striking north east – south west and dipping south west (beneath the site) at c. 16 degrees from horizontal. The Black Mine is inferred to represent the Cannel Seam recorded within the Coal Authority Consultants Mining Report. The 6-inch map shows several mine entries to the north, west and south, associated with Tonge Colliery and Boarshaw Pit, indicating a legacy of mining in the wider area. Log annotations for the mapped mine entries on the 6-inch map record drift to 64-65 ft (19.5-20 m) bgl over sandstone, with coal at 79 and 96 ft (22.5 and 29 m).



SOURCES OF INFORMATION	SUMMARY
	In consideration of the historical mining features in proximity to the site and potential for coal close to the surface it is considered possible that coal extraction has occurred, underlying the site at relatively shallow depths; further investigation would be required to determine the extent and depth of any worked seams.
BGS Memoirs	Correlation of shaft records has provided little information about the measures between the Arley and the Black Mines; this is owed to the presence of variations in the thickness of the sandstones in these measures and also the frequency of faulting in the area.
Review of Coal Authority Archive / Abandonment Plans	No CA archives/mine abandonment plans have been obtained for the site. Workings are recorded in the Arley Seam at a depth of 159 m beneath the site, these would not be considered to be within influencing distance of the surface. Unrecorded workings within the Black Mine (alternatively referenced as Cannel) are considered to present a greater risk.
Historical Ordnance Survey Mapping	Historical maps do not appear to show any mining features (collieries, pits, shafts etc) in close proximity of the site or the wider surrounding area.
Historical Site Investigations	E3P has not been provided with any historic site investigation reports.

4.5.1. COAL AUTHORITY PLAN

The Coal Authority plan referenced: MR-LARGE-PLOT-51003309357001-1662388323427 shows a proven coal seam striking north west – south east immediately north of the site.

FIGURE 4.1 COAL AUTHORITY PLAN FOR THE SITE



4.5.2. COAL MINING GEOLOGY

Figure 4.2 is an extract from BGS Sheet 85, Manchester 1:50,000 Solid Edition (1974) and Figure 4.3 is an extract from Country Maps 6" Lancashire 96 NE Solid Edition (1929)

Both maps record several coal seams cropping within the local region, intercepted by numerous faults. The Black Mine (BkM) is indicated to outcrop immediately north of the site, striking north east – south west and dipping south west (beneath the site) at c. 16 degrees from horizontal. (The Black Mine seam is inferred to represent the Cannel Seam recorded within the Coal Authority Consultants Mining Report).

The 6-inch map shows several mine entries to the north, west and south, associated with Tonge Colliery and Boarshaw Pit, indicating a legacy of mining in the wider area.

Log annotations for the mapped mine entries on the 6-inch map record drift to 64-65 ft (19.5-20 m) bgl over sandstone, with coal at 79 and 96 ft (22.5 and 29 m).

FIGURE 4.2 EXCEPT OF BGS SHEET 85, MANCHESTER 1:50,000 SOLID EDITION (1974)

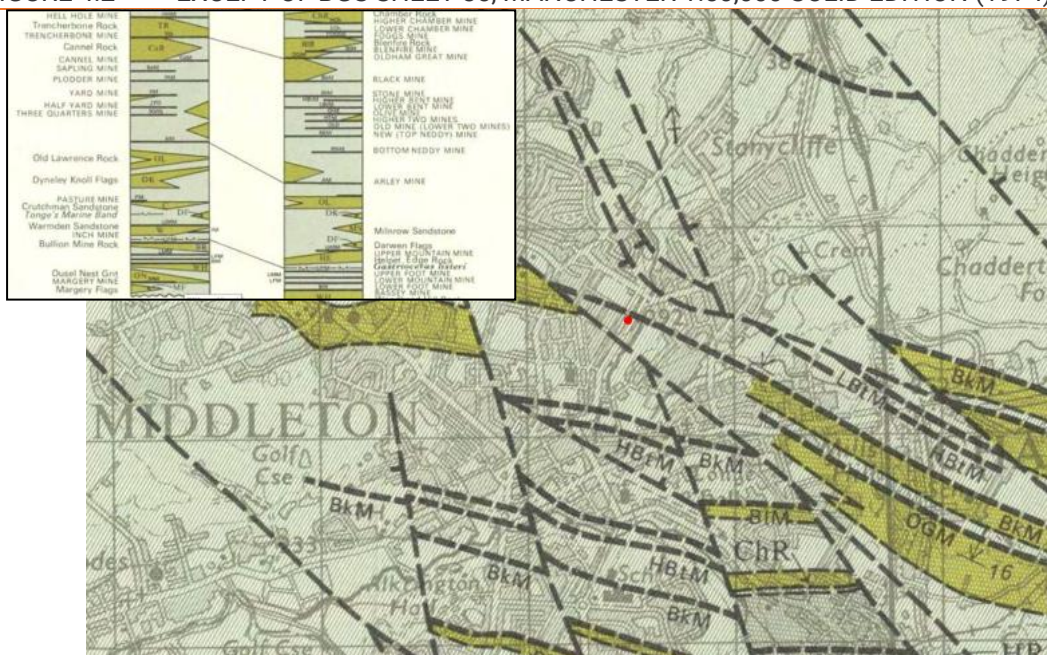


FIGURE 4.3 EXCEPT OF COUNTRY MAPS 6" LANCASHIRE 96 NE SOLID EDITION (1929)





4.6. PRELIMINARY MINE GAS ASSESSMENT

If coal mining is present below the site, then this may be a potential source of ground gas that could pose a risk to site end users. A preliminary mine gas assessment is provided in Table 4.6.

TABLE 4.6 PRELIMINARY MINE GAS ASSESSMENT

SCENARIO	DISCUSSION	RATING
Are there known coal seams beneath the site?	Yes – Cannel (Black Mine) at shallow depth <30 m. Arley at c. 159 m bgl.	Moderate
Are there coal seams within 150m of the top of bedrock?	Yes – Cannel (Black Mine) at shallow depth <30 m.	Moderate
Are there any known workings below the site?	Yes – there are known workings at 159 m bgl	Low
Are the underlying drift deposits impermeable?	No – The underlying drift in surrounding areas are noted to be moderate permeability granular deposits.	Moderate
Are there any mine entrances within the site boundary or within 50m of the site?	No – there are no recorded mine entrances within 50m of the site boundary.	Low
Are there any faults below the site or in close proximity?	No – The nearest recorded fault is circa 91m South West.	Low
Is there any records of mine gas emission on or within 50m of the site	No.	Low
Is there any record of historical mine stabilisation works?	No.	Low



SCENARIO	DISCUSSION	RATING
Evidence of rising groundwater in flooded mine workings?	Not known.	Low
OVERALL MINE GAS RISK (IF MODERATE/ HIGH THEN FURTHER ASSESSMENT IS REQUIRED)		Moderate
Conclusions:		
Source: The site is underlain by known coal workings at depth. Unrecorded workings in shallower seams may also be present, both of which are potential sources of ground gas. Pathway: The site is underlain by permeable granular deposits, increasing the risk of migration. Recommendations: Further assessment is required to assess the potential for mine gas to be migrating to the ground surface.		

4.7. COAL MINING RISK ASSESSMENT

This risk assessment comprises a desk-based review of all available information on coal mining issues relevant to the application site located within a high-risk area. This includes:

- Interpretation of information to identify and assess the risks to the proposed development of coal mining legacy, including the cumulative impact of issues;
- Setting out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrating how coal mining issues have influenced the proposed development; and
- Demonstrating to the local planning authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

The coal mining risk assessment is summarised in Table 4.7

TABLE 4.7 SUMMARY OF COAL MINING RISK ASSESSMENT

COAL MINING RISK ASSESSMENT	YES/NO	RISK ASSESSMENT
Recorded Underground Coal Mining at Shallow Depth (< 30 m)	No	Low
Recorded Underground Coal Mining at Shallow Depth (> 30 m)	Yes	Moderate
Evidence of Unrecorded Surface Extraction of Coal Outcrop	No	Low
Unrecorded Underground Coal Mining at Shallow Depth (< 30 m)	Yes	High
Mine Entries (Shaft/Adits)	No	Low
Coal Mining Geology – Fractures/Fissures	No	Low
Recorded Gas Emissions	No	Low



COAL MINING RISK ASSESSMENT	YES/NO	RISK ASSESSMENT
Recorded Mining Surface Hazard	No	Low
Surface Mining (Opencast)	No	Very Low/Low

Based on the above, a high risk of unrecorded coal mining at shallow depth has been identified within the Cannel coal seam (Black Mine). The CA, as a statutory consultee, will require a series of rotary open holes across the site to determine the presence of any coal on-site and to understand the nature of any coal workings. Furthermore, the CA will require a probing exercise to be undertaken in the locality of the mine shaft in the northern sector of the site.

4.8. BRINE WORKINGS

The site is not situated within a brine working area.

4.9. RADON RISK POTENTIAL

The Envirocheck report indicates the site is situated in an area where less than 1% of homes are above the "Action Level" and that the BGS reports that full radon protective measures are not necessary for the construction of new dwellings or extensions.

4.10. PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the desk-study information, the following geotechnical assessment has been made:

- Given the previously developed nature of the site, it is likely there will be Made Ground fill deposits and obstructions present. Furthermore, relict foundations from previous structures will require grubbing out prior to the construction of the proposed development.

The site is very uniform in topography with a uniform flat terrain across the site.

4.11. HYDROLOGY

Surface water features within 250 m of the subject site are summarised in Table 4.8.

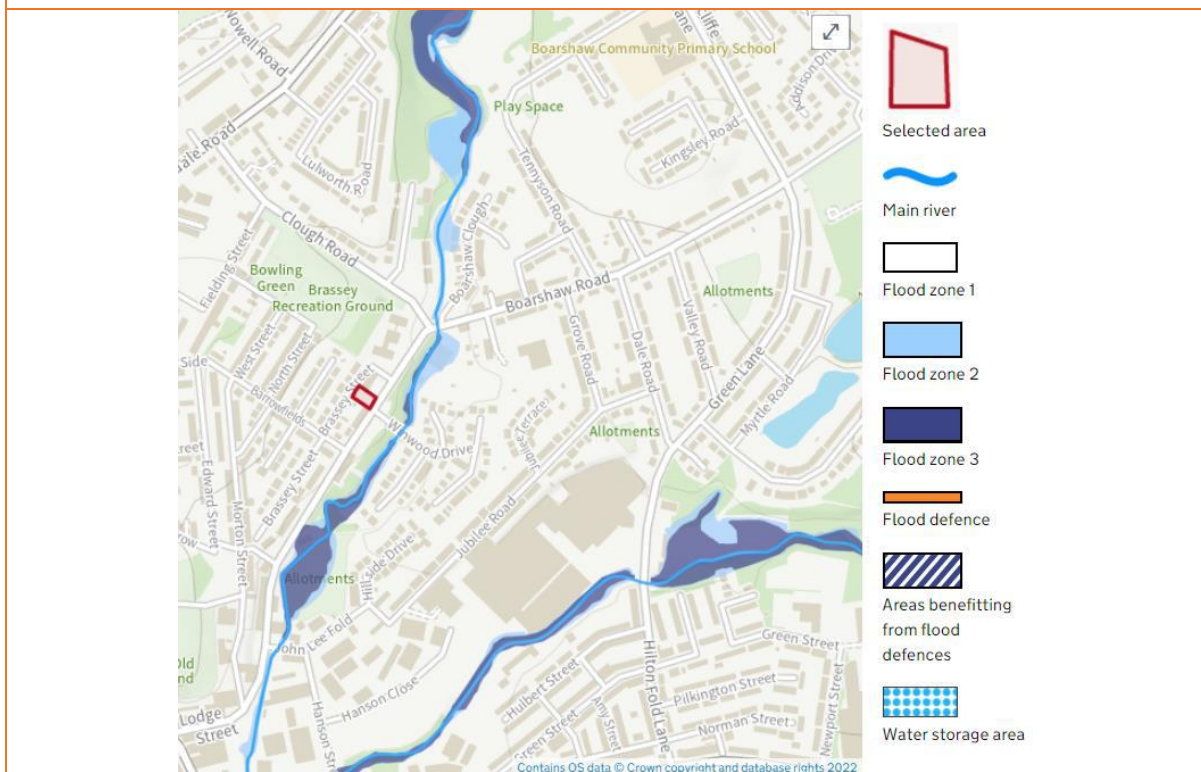
TABLE 4.8 SURFACE WATER FEATURES

SURFACE WATER FEATURE	QUALITY	DISTANCE (m)	DIRECTION
Whit Brook	Moderate	43 m	South East

The site is predominantly located within a currently defined "Flood Risk Zone 1"; defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (< 0.1%), and as such, is considered to be unaffected by river flooding. However, the Groundsure report states there is a moderate potential for groundwater flooding to occur at the site. The Environment Agency (EA) Flood Risk Map for the site is presented in Figure 4.3.



FIGURE 4.3 EA FLOOD RISK MAP



Source - <https://flood-map-for-planning.service.gov.uk/>

4.12. INDUSTRIAL LAND USES

The site is located within a predominantly agricultural and residential area, therefore there are limited entries within the trade directory noted below.

- ✧ Electricity Sub Station (52m S, 127m NE, 145m NE)
- ✧ Telecommunication Mast (162m NE)
- ✧ United Flags Ltd (212m E)
- ✧ Unspecified Works (231m E)

4.13. SENSITIVE LAND USES

The closest residential properties are located adjacent to the western, northern and eastern boundaries of the site. No other environmentally sensitive land uses have been identified within close proximity to the site.

4.14. SITE SENSITIVITY ASSESSMENT

The site is assessed to be located within a “Moderate” sensitivity setting as discussed within Table 4.10.



TABLE 4.10 SITE SENSITIVITY ASSESSMENT

SENSITIVITY PROFILE	DISCUSSION	RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within 2 km of a Groundwater Source Protection Zone or Drinking Water Safeguard Zone.	Low
Distance to the Closest Groundwater Abstraction Point	There are no active groundwater abstraction points recorded within 2 km of the site boundary.	Low
Aquifer Classification in Superficial Drift Deposits	Secondary A superficial aquifer is recorded beneath the site.	Moderate
Aquifer Classification in Bedrock	Secondary A Bedrock aquifer is recorded beneath the site.	Low/Moderate
Is the Site Underlain by Low-Permeability Drift to Depths in Excess of 10 m?	The underlying superficial deposits are likely to comprise gravelly sands interbedded with low-permeability clay soils to depths of c. 20 m.	Low/Moderate
Is the Site Located Within 50 m of a Surface Watercourse?	Whit Brook is located 43 m east of the site boundary.	High
Sensitive Land Uses	The site is situated within a densely populated residential area.	High
OVERALL SITE ENVIRONMENTAL SENSITIVITY		Moderate



5. REGULATORY DATA

5.1. LANDFILL SITES AND WASTE TREATMENT SITES

There are no recorded active or historical landfills located within 250 m of the site location.

Areas of artificial deposits and infilled ground are recorded within 250 m of the site, which may be potential sources of migrating hazardous gas.

5.2. REGULATORY DATABASE

The information summarised in Table 5.1 has been obtained from a commercially available environmental database. The summary table only includes records from within 250 m of the subject site and not otherwise detailed in the report.

TABLE 5.1 SUMMARY OF ENVIRONMENTAL DATA

RECORD	ENTRIES WITHIN 250 m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified
Authorised Industrial Processes (IPC/IPPC/LAPPC)	0	None Identified
Fuel Stations Entries	0	None Identified
Licensed Radioactive Substances	0	None Identified
Enforcements, Prohibitions or Prosecutions	0	None Identified
Discharge Consents	4	✱ Boarshaw Road, 70m S – Sewage Discharges to Whit Brook (Status: Revoked 2019). ✱ Boarshaw Road, 129m NE – Sewage Discharges to Whit Brook (Status: Revoked 2016) ✱ Boarshaw Road, 137m NE – Sewage Discharges to Whit Brook (Status: Active) ✱ Boarshaw Road, 139m S – Sewage Discharges to Whit Brook (Status: Active).



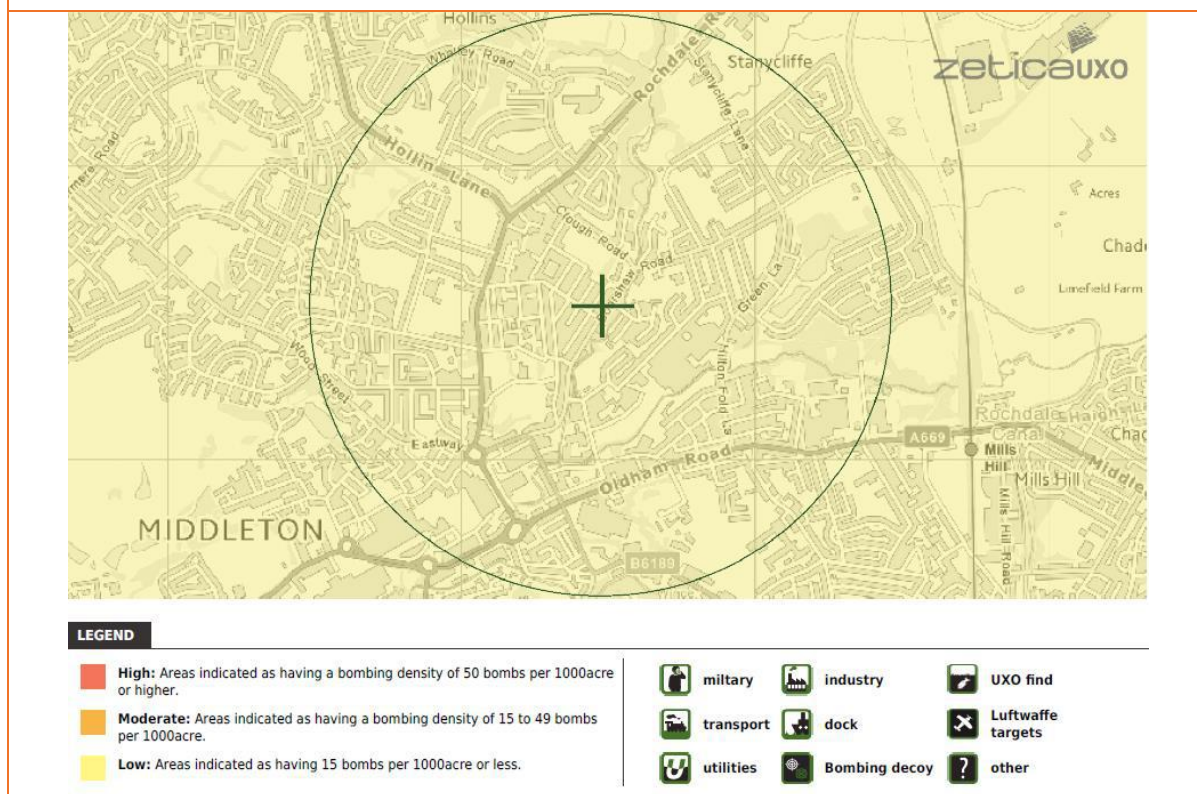
RECORD	ENTRIES WITHIN 250 m	DETAILS
Pollution Incidents	13	- Specific Waste Materials, 2001 (117 m N E) – Minor land Impact. - Specific Waste Materials, 2001 (142m NE) – Minor land and air impact. - Atmospheric Pollutants and Effects, Inert Construction and Demolition Materials and Wastes, Fumes, 2002 (161m E) – Minor land and air impact. - Specific Waste Materials, Household wastes, inert materials, 2001 (181 m E) – Minor land impact. - Atmospheric Pollutants and Effects, smokes and demolition materials and wastes 2002 (188m E) – Minor land and air impact. - Unidentified Pollutant (218m NE) – Minor land impact. - General Biodegradable Materials and Wastes, 2001 (281 m NE) – Minor land and air impact.
Consents Issued Under the Planning (Hazardous Substances) Act 1990	0	None Identified
Control of Major Accident Hazard (COMAH) Sites	0	None Identified

5.3. UNEXPLODED ORDNANCE

The regional unexploded bomb risk map from Zetica (2014) indicates that the site is in an area at low risk from possible unexploded ordnance (UXO) resulting from the Second World War. The Zetica UXO Risk Map is presented in Figure 5.1.



FIGURE 5.1 ZETICA UXO RISK MAP



Source - <https://zeticauxo.com/downloads-and-resources/risk-maps/>

5.4. INITIAL CONCEPTUAL SITE MODEL

- ✦ In accordance with EA LCRM (2019) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P has developed an initial conceptual site model (CSM) to identify potential contamination sources, migration pathways and receptors within the study area. This is summarised within Table 5.1. On-Site Sources of Contamination
- ✦ The following potential on-site sources of contamination have been identified: Made Ground – Heavy Metals, Speciated Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), asbestos and ground gas (CO₂ and CH₄)
- ✦ Mine Gas – CO₂ and CH₄

OFF-SITE SOURCES OF CONTAMINATION

The following potential off-site source of contamination have been identified:

- ✦ Boarshaw Bleach, Dye and Print Works and infilled reservoirs – 80 m north east
- ✦ Boarshaw Cotton Mill – 225 m



5.5. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 5.1 has been prepared for the site.

TABLE 5.1 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Likely	Low	LOW
Discussion: Made Ground may underlie the site, associated with historical development within the site boundary, which may contain contaminants such as heavy metals and non-volatile PAH. Given the proposed development will comprise apartments with limited soft landscaping, the potential for direct contact is therefore reduced. The risk to future residential end users is considered low. Recommendation: A site investigation is recommended to assess the presence of soil contamination. Cover system to garden and landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						
PL3	ACM (Made Ground / historical developments)	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Likely	Moderate	LOW
Assessment: Due to the age of the historically developed buildings, it is possible that ACM will be present within localised areas of Made Ground present on site. The risk to construction workers during the groundworks phase is considered moderate, with the risk to future end users reduced. Recommendation: Site investigation recommended. Cover system to garden and landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile contaminants hydrocarbons (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: Historically the site was occupied by residential properties, therefore, no significant sources of volatile contamination have been identified. The overall risk to construction workers and residential end users is considered low. Recommendation: Site investigation recommended.						
PL4	Methane, carbon dioxide (Coal Measures, Made Ground, Infilled Features)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Likely	Moderate	LOW
Assessment: Made Ground, potential unrecorded shallow mine workings and infilled reservoirs (80 m north east) are all potential sources of ground gas to the site. The underlying natural drift is likely to comprise moderate permeability granular strata, thus providing a viable migration pathway. The risk from ground gas is considered moderate. Recommendation: Either gas monitoring or precautionary CS2 measures are required.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground, Historical Mining, Bleach and Dye Works)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (secondary A aquifer). Surface water (Whit Brook).	Low Likelihood	Low	LOW
Assessment: Significant sources of mobile contamination have not been identified on the site that may present a direct risk to controlled waters. The overall risk to controlled waters from the site is considered low. Given the anticipated presence of granular strata, there is a theoretical risk of mobile contamination migrating from the former Bleach and Dye works to the site within groundwater. However, the likelihood of this is reduced because the migration pathway would be interrupted by the Whit Brook which runs between the site and the former works. Recommendation: Sampling of groundwater and surface water recommended.						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate/Low	LOW
Assessment: Made Ground with ashy constituents is a potential source of Sulphate, which presents issues with sulphate attack on concrete if present at elevated levels. Recommendation: Site investigation recommended.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL7	Organic contaminants such as hydrocarbons, solvents (Made Ground, Historical Bleach and Dye works).	Ingestion of tainted water supply.	Future site users. Water pipes.	Low Likelihood	Moderate	LOW
Assessment: Significant organic contamination is not anticipated at pipeline depth (0.75–1.35 m). Recommendation: Intrusive investigation required. If present, barrier pipes may be required.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low	LOW
Assessment: Likely probability as contamination sources on site are considered possible, which may be taken up by flora in soft landscaping/gardens. Recommendation: Investigation work as part of PL1.						

Notes:

Main exposure pathways: PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants;



6. CONCLUSIONS AND RECOMMENDATIONS

6.1. SITE SUMMARY

Current Site Use	The subject site is a rectangular-shaped parcel of land located adjacent to 135 brassey street, approximately 1 km to the north east of Middleton town centre. The site currently comprises an openly accessible parcel of maintained open green space associated with the neighbouring Boarshaw working men's club. Mature trees are present in the north east corner and at the western boundary.
Historical Site Use	Earliest mapping showed the site to comprise several fields separated by field boundaries. Terraced residential properties were constructed pre 1893 and were later demolish pre 1975, after which point the site remained vacant.
Site Sensitivity	The site is situated within a residential development area, with dwellings adjacent to the northern and eastern site boundary.

6.2. CONTAMINATED LAND ASSESSMENT

Human Health	Made Ground may underly the site, associated with historical development within the site boundary, which may contain contaminants such as heavy metals, non-volatile PAH and asbestos. Given the proposed development will comprise apartments with limited soft landscaping, the potential for direct contact is therefore reduced. The risk to future residential end users is considered low/moderate
Controlled Waters	Controlled waters receptors are identified as the underlying Secondary A drift and bedrock aquifers, together with the off-site Whit Brook. Significant sources of mobile contamination have not been identified on the site that may present a direct risk to controlled waters. The overall risk to controlled waters from the site is considered low.
Ground Gas	Made Ground, potential unrecorded shallow mine workings and infilled reservoirs (80 m north east) are all potential sources of ground gas to the site. The underlying natural drift is likely to comprise moderate permeability granular strata, thus providing a viable migration pathway. The risk from ground gas is considered moderate.
Potable Water	An UKWIR risk assessment is required to determine whether barrier pipes will be required. .



6.3. COAL MINING

Coal Mining	The site is located within a Coal Authority defined development high-risk area and workings are recorded in the Arley Seam beneath the site at a depth of 159 m. Unrecorded shallow workings are also considered probable, associated with the Cannel Coal seam that is recorded to outcrop to the north of the site. Geological maps indicate the Black Mine (BkM) to outcrop immediately north of the site, dipping beneath the site. (The Black Mine seam is inferred to represent the Cannel Seam recorded by the Coal Authority. Several mine entries are also recorded to the north, west and south of the site, associated with Tonge Colliery and Boarshaw Pit, indicating a legacy of mining in the wider area. Log annotations for the mapped mine entries on the 6 inch map record drift to 64-65 ft (19.5-20 m) bgl over sandstone, with coal at 79 and 96 ft (22.5 and 29 m). Based on the above, there is considered to be a moderate risk from shallow coal mining beneath the site (<30 m bgl).
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6.4. GEOTECHNICAL ASSESSMENT

Geological	The site is anticipated to be underlain by c. 20 m of granular drift, with coal seams in the bedrock at depths c. 25-30 m bgl.
Civil and Structural	Relict substructures and obstructions may be present associated with the historic developments on-site.
Abnormal Foundations	It is likely that shallow strip / trench foundations will be suitable for the proposed structure, subject to the depth of Made Ground. Piled foundations would be precluded by the presence of coal mine workings.

END OF REPORT



APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II

GLOSSARY

TERMS

ACM	Asbestos-containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above-ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
CA	Coal Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate-phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi-volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro-concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro-replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation
MCV	Moisture condition value	WRAP	Waste and Resources Action Programme



Brassey Street, Middleton

Phase I Geoenvironmental Site Assessment
September 2022

MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection



APPENDIX III

DRAWINGS

DRAWING 16-124-001 – SITE LOCATION PLAN

