EARTH ENVIRONMENTAL & GEOTECHNICAL

GeoEnvironmental Desk Study

Egmont Street

Mossley

July 2023

On behalf of

Bridgewater
Land & Development Ltd

Earth Environmental & Geotechnical Ltd
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EGMONT STREET

MOSSLEY

PHASE I GEOENVIRONMENTAL DESK STUDY

FOR

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Report No. A5333/23

20th July 2023

Report Title:	**Egmont Street, Mossley** **Phase I GeoEnvironmental Desk Study**
Report Reference:	**A5333/23**
Client:	**Bridgewater Land & Development Ltd**
Issue Date:	**20th July 2023**
Drafted By:	**T Opara**
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Authorised By:	**A Czarnecki**

EARTH ENVIRONMENTAL & GEOTECHNICAL

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1.0 INTRODUCTION

Appointment

1.1 Earth Environmental & Geotechnical Ltd have been commissioned by Mike English on behalf of Bridgewater Land & Development Ltd, the client, to undertake a Phase I Environmental Desk Study for the proposed development at Egmont Street, Mossley.

1.2 It is understood that the Client intends to convert old industrial area into three storey residential dwellings with associated back gardens and access road. Access will be provided via gate at Egmont Street.

1.3 A proposed development plan for the site is shown in Figure 1 below.

Figure 1 Proposed Development Plan

Objective

1.4 The purpose of the Desk Study is to collate available geological and environmental data for the site (and its environment) and provide a preliminary geotechnical and geo-environmental appraisal, with a site-specific conceptual model. This enables a preliminary assessment of geo-environmental risks to be undertaken and, if necessary, provides information for the design of a Phase 2 Ground Investigation.

Scope

1.5 The Phase I Environmental Desk Study comprises of a review of the following information sources, some of which was provided by the client.

- British Geological Survey online maps.
- Google Earth imagery.
- Environment Agency online mapping data.
- Historical Ordnance Survey maps.
- The site and surrounding areas environmental, geological, and mining data presented in the site specific GroundSure Reports (Appendix 1).
- Coal Authority Interactive Viewer.

2.0 SITE LOCATION AND DESCRIPTION

2.1 The site (0.45hectares) is located on Egmont Street, Mossley. The approximate National Grid Reference for the centre of the site is SD 975015 (X: 397505, Y: 401735). The nearest postcode is OL5 9PY.

2.2 The site is irregular shape of approximately 100m long (NW-SE) and approximately 45m wide (W-E), located approximately 5.8km to the south-east of the Oldham Town Centre. The site is generally flat with slightly higher area in the northern part of the site., general area falling to the east towards the River Tame.

2.3 Based on a readily available data and site walkover the site is unoccupied at the moment, formerly being part of a lorry loading station. The site is covered in gravel, rough vegetation, shrubs, and mature trees as well as with gravel in central, southern, and western part of the site.

2.4 A location plan is shown below as Figure 2.

Figure 2 Site Location Plan

3.0 ENVIRONMENTAL SETTING

3.1 The geology of the site is covered by British Geological Survey (BGS) online data and the site specific GroundSure GeoInsight report (Appendix 1).

3.2 Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site specific GroundSure EnviroInsight report (Appendix 1).

Geology

3.3 The BGS states that the site is not underlain by artificial deposits.

3.4 The site is partially underlain by superficial deposits of alluvium, comprising clay, silt, sand, and gravel, in the eastern part of the site.

3.5 The solid geology beneath the site is shown to be the Fletcher Bank Grit, comprising sandstone and by Marsden Formation, comprising of mudstone and siltstone.

3.6 There are five (5) records of linear features within 500m of the site boundary. The closest recorded 198m to the west of the site refers to a fossil horizon (marine band).

3.7 There are two (2) record of landslips within 500m of the site boundary, the nearest located 286m to the west.

3.8 There are eleven (11) borehole records identified within 250m of the site of which only three are non-confidential. The closest non-confidential record refers to a borehole located 65m to the south-west. In summary borehole consists of Made Ground to 5.25m underlain clays and gravels.

3.9 The site is in an area where the hazard rating is moderate with regard to compressible deposits, low risk with regards to running sands and landslides, very low risk regards to collapsible deposits, shrink-swell clays and negligible risk regards to landslides, soluble rocks.

Ground Workings

3.10 There are sixty-three (63) records of historical surface ground working features identified within 250m of the site boundary of which two are located on-site. The record on site refers to refuse heaps, last recorded in 1923.

3.11 According to the BGS, there are five (5) records of a British Pit within 500m of the site. The closest is located 168m to the west refers to ceased sandstone extraction from Swine Ridge.

Mining and Other Underground Workings

3.12 There are a twenty-four (24) records of historical mining areas within 1km of the site boundary. The closest located 330m to the south and refers to the tunnel, last worked in 1992.

3.13 The site is located within the Coal Mining Reporting area, but outside a Development High Risk Area.

3.14 There is one (1) record for non-coal mining areas located within 1km of the site, located on-site and refers to a vein mineral.

3.15 There are no records for non-coal cavities or natural cavities identified within 1km of the site.

Radon Potential

3.16 The property is located in a Radon Affected Area. Between 1% and 3% of properties are above the Action Level. Therefore, radon protection measures are not necessary.

Hydrogeology and Hydrology

3.17 The superficial deposits are classified by the Environment Agency (EA) as a Secondary Undifferentiated. The BGS states the following:

> *For 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.'*

3.18 The Fletcher Bank Grit and Marsden Formation are classified by the Environment Agency (EA) as a Secondary A Aquifer. The BGS states the following:

> *'For Secondary A Aquifer: "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."*

3.19 There are nine (9) records of groundwater abstraction licence records within 2km of the site. The closest is located 599m to the west refers to the historical licence for general use relating to Secondary Category.

3.20 There are two (2) records of surface water abstraction record within 2km of the site, the closest located 789m to the east refers to historical licence for laundry use.

3.21 The site is not located within 500m of a Source Protection Zone or Source Protection Zone within a confined aquifer.

3.22 There are ten (10) water network entries within 250m of the site, one of which are located on-site and refers to inland river not influenced by normal tidal action.

3.23 There are two (2) records of a Water Framework Directive (WDF) surface water body refers to River Tame (Chew Brook to Swineshaw Brook) located 10m to the east. The water body received a failed chemical rating and moderate ecological rating in 2019.

3.24 There is one (1) record of a Water Framework Directive (WDF) groundwater body located on site. The record refers to on-site Manchester and East Cheshire Carboniferous Aquifers. The water body received a poor chemical and overall rating and good quantitative rating in 2019.

Landfill & Waste Management Activity

3.25 There are no records for current Environment Agency landfill records within 1km of the site.

3.26 There are three (3) records of historic Environment Agency landfill sites within 500m of the site. The closest located 97m to the south of the site and refers to inert, commercial, and household landfill. The facility accepted waste from 1986 to 1988.

3.27 There are no records of a BGS/DoE non-operational landfill sites within 1.5km of the study site.

3.28 There are two (2) records of landfills from the Local Authority and Historical Mapping Records. The closest is located 312m to the north of the site and refers to a refuse tip, mapped in 1966.

3.29 There are nineteen (19) records of waste treatment, transfer, or disposal sites within 500m of the study site. The closest records refer to burning waste in the open located 92m to the north-east of the site.

3.30 There are no records of Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site.

Industrial Land Use Information

3.31 There are three hundreds thirty-two (332) records of potentially contaminative historical land uses identified within 500m of the site of which twelve records are on site. These refer to unspecified mills, cotton mills, unspecified tanks and refuse heaps last operated in 1923.

3.32 There are twenty-four (24) records of potentially contaminative current land uses identified within 250m of the site. The closest record refers to rubber, silicones, and plastics industrial products, located 30m to the west of the site.

3.33 There are seventy-six (76) records of historical tanks identified within 500m of the site of which eight are recorded on-site. All records on site refers to unspecified tank, recorded in 1892 - 1933.

3.34 There are fifty-one (51) eleven records of historical energy features identified within 500m of the site. The closest is located 58m to the east of the site and refers to a gasometer recorded in 1922.

3.35 There are no records for current petrol or fuel site 435m to the north of the site.

3.36 There are one (1) record of ahistorical petrol or fuel sites within 500m of the site.

3.37 There are twenty-one (21) historical garage and motor vehicle repair site records identified within 500m of the site, of which four are recorded on site, recorded 1975 - 1992.

3.38 There are no National Grid high voltage underground electricity transmission cables within 500m of the site.

3.39 There are no National Grid high-pressure gas transmission pipelines within 500m of the site.

3.40 There are thirty-one (31) historical railway and tunnel features identified within 250m of the site. Closest located 50m to the west refers to railway sidings, recorded in 1894.

3.41 There are five (5) current active railway lines identified within 250m of the site. The closest located 59m to the west refers to unnamed multi-track line.

3.42 There are no underground railway lines or tunnels identified within 250m of the site.

3.43 The site is not within 5km of the route of the High Speed 2 rail project.

3.44 The site is not within 500m of the route of the Crossrail 1 rail project.

Environmental Permits, Incidents and Registers

3.45 The Groundsure Report includes records of environmental permits, incidents, and registers within 500m of the site, which are summarised in Table 1 below.

Table 1: Environmental Permits, Incidents and Registers within 500m of the Site

Permit/Incident/Register	Number
Sites Determined as Contaminated Land under Part 2A EPA 1990	0
Dangerous or Hazardous (COMAH and NIHHS) Sites	0
Regulated Explosive Sites	0
Planning Hazardous Substance Consents and Enforcements	0
Historical Licensed Industrial Activities (IPC)	0
Part A (1) and IPPC Authorised Activities	0
Part A (2) and Part B Activities and Enforcements	7
Category 3 or 4 Radioactive Substance Authorisations	0
Licensed Discharge Consents	8
Pollutant Release to Surface Waters (Red List)	0
Pollutant Release to Public Sewer	0
List 1 Dangerous Substances Inventory Sites	0
List 2 Dangerous Substances Inventory Sites	0
Substantiated Pollution Incidents (Category 1 and 2)	8

3.46 There are seven (7) Part A (2) and Part B Activities and Enforcements records within 500m of the study site. The closest is located 31m to the north-west off the site and refers to a historical licence for coating processes.

3.47 There are eight (8) records for Licensed Discharge Consent within 500m of the study site. The closest is located 92m to the south-west from site and refers to sewer storm discharge, recorded in 2010.

3.48 There are eight (8) records for Substantiated Pollution Incidents (Category 1 and 2) within 500m of the study site. The closest is located 54m to the north of site and refers to crude sewage, and refers to Category 3 (Minor), recorded in 2001.

Environmentally Sensitive Sites

3.49 There is one (1) record of a Site of Special Scientific Interest (SSSI) within 2km of the study site which refers to the Huddersfield Narrow Canal located 103m the east.

Ecology

3.50 An ecological assessment of the site falls outside the brief of this report. Where considered necessary, advice should be sought from an ecological specialist in this respect.

Archaeology

3.51 An archaeological assessment falls outside the brief of this report. Where considered necessary, advice should be sought from an archaeological specialist in this respect.

Potential Flood Risks

3.52 Detailed assessment of flood risks is outside the scope of this report.

3.53 However, the site lies within a Zone 2 & Zone 3 Flood Risk area.

3.54 The highest risk of surface water flooding occurring on-site is 1 in 30 years, is 0.1m - 0.3m.

3.55 The highest risk of groundwater flooding occurring on-site is low.

4.0 SITE HISTORY WALKOVER SURVEY

4.1 A walkover survey was completed on 10th July 2023. The photographs and notes from this survey are appended to this report as Appendix 2 and Appendix 3, respectively.

4.2 The site is accessed via Egmont Street. It should be noted that for a time of site walkover, the gate was blocked by stone boulders.

4.3 The site is generally flat with a slightly higher area in northern part of the site. It is covered in gravel, rough vegetation, shrubs, and mature trees.

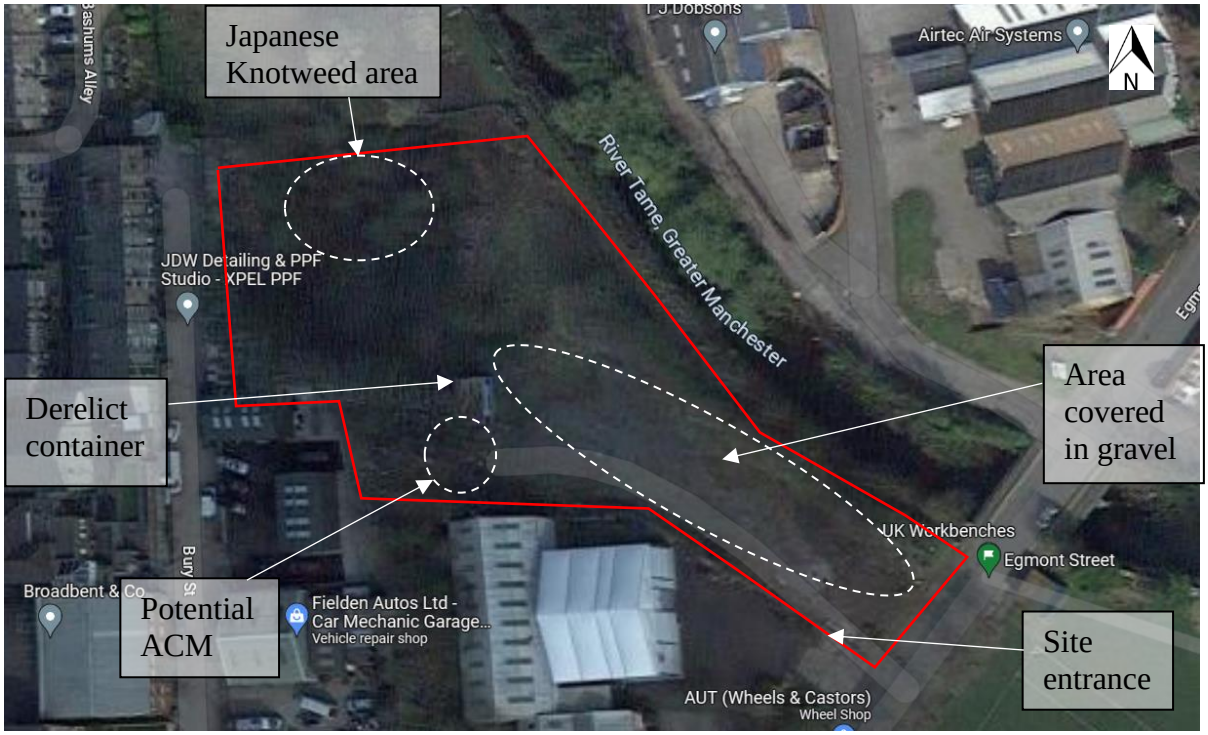
4.4 The site is generally bordered by the metal fence and Heras fencing panels between site and footpath to the north.

4.5 The immediate surrounding areas to the north, south and is industrial/commercial area and River Tame to the east. General the topography is slightly falling towards the River Tame to the east of the site.

4.6 Japanese Knotweed and Himalayan Balsam (both invasive plants) have been identified in northern part of the site, in the area of the rough vegetation.

4.7 A site features plan is presented as Figure 3 overleaf.

Figure 3 Site Features Plan



5.0 SITE HISTORY

5.1 The historical development of the site has been determined by reference historical plans and Google Earth imagery. The reviewed historical plans comprise only readily available records and may be limited; however, the information available to date indicates that additional searches are unlikely to add to our understanding of the site. The earliest available historical mapping covering the site dates back to 1863.

5.2 The site history is summarised in Table 2, below, followed by selected extracts from maps and aerial photographs.

Table 2: Summary of Site History

Date	On-Site History	Surrounding Land Use History
1863 Partial 1:2500 and 1:10560	The site is part of the Albert Mill (Cotton), with two buildings recorded on site.	Series of cotton mills recorded to the north along Tame River, located 400m, 350m, 250m, 200m, 150m and to the north. Coal depot recorded 150m to the south-west. Railway recorded 50m running north south. Quarry recorded 150m to the west.
1872 Partial 1:2500	Additional building recorded in southern part of the site.	Series of mills recorded between 300 and 50m to the east and north-east from site. Gasometer recorded 120m to the north.
1894, 1898 1:2500	Some ground works in middle parts and additional building in western part of the site.	New gasometer recorded 80m to the east. Iron Foundry recorded 150m to the east. Railway recorded 150m to the east running north-south with coal depot.
1904-1906,1907, 1909, 1928 1:2500 and 1:10560	Two tanks recorded on site one in northern part of the site and south-eastern part of the site.	Gasometer to the north no longer recorded.
1922, 1923, 1933 1:2500 and 1:10560	No significant change.	No significant change.
1938 1:10560	Buildings on site no longer recorded.	No significant change.
1954, 1955, 1956 1:2500 and 1:10560	No significant change.	No significant change.
1970, 1975-1977	No significant change.	Railway to the east no longer recorded.

Date	On-Site History	Surrounding Land Use History
1:2500 and 1:10000		
1982, 1990-1992, 2001, 2003, 2010, 2023 1:2500, 1:10000	No significant change.	No significant change.
2000, 2005, 2009, 2016, 2017, 2018, 2019 Satellite images	Site turned into lorry depot.	No significant change.
2020 Satellite images	Site disused.	No significant change.

Figure 4 OS Map Extract 1894

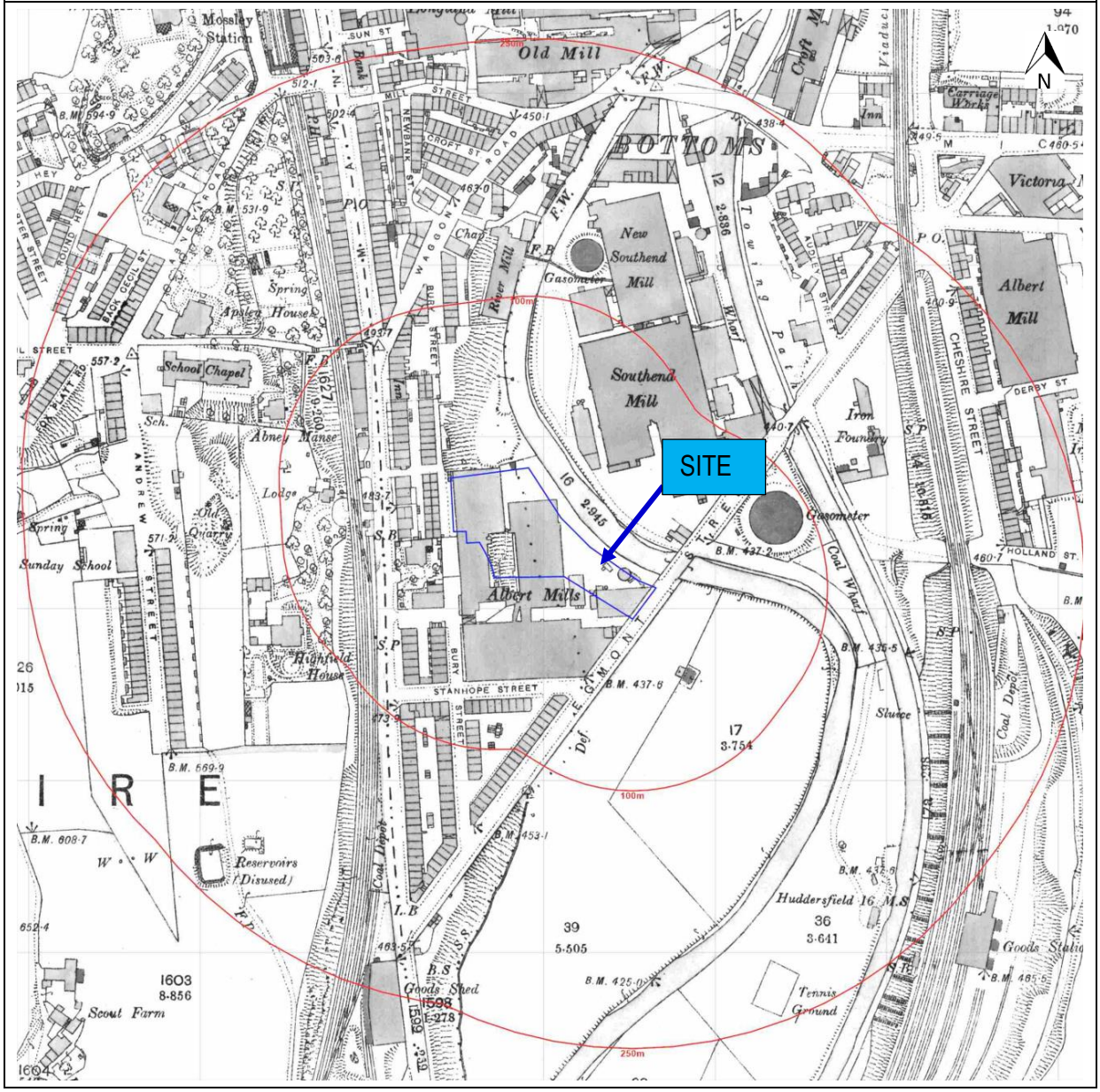


Figure 5 OS Map Extract 1922

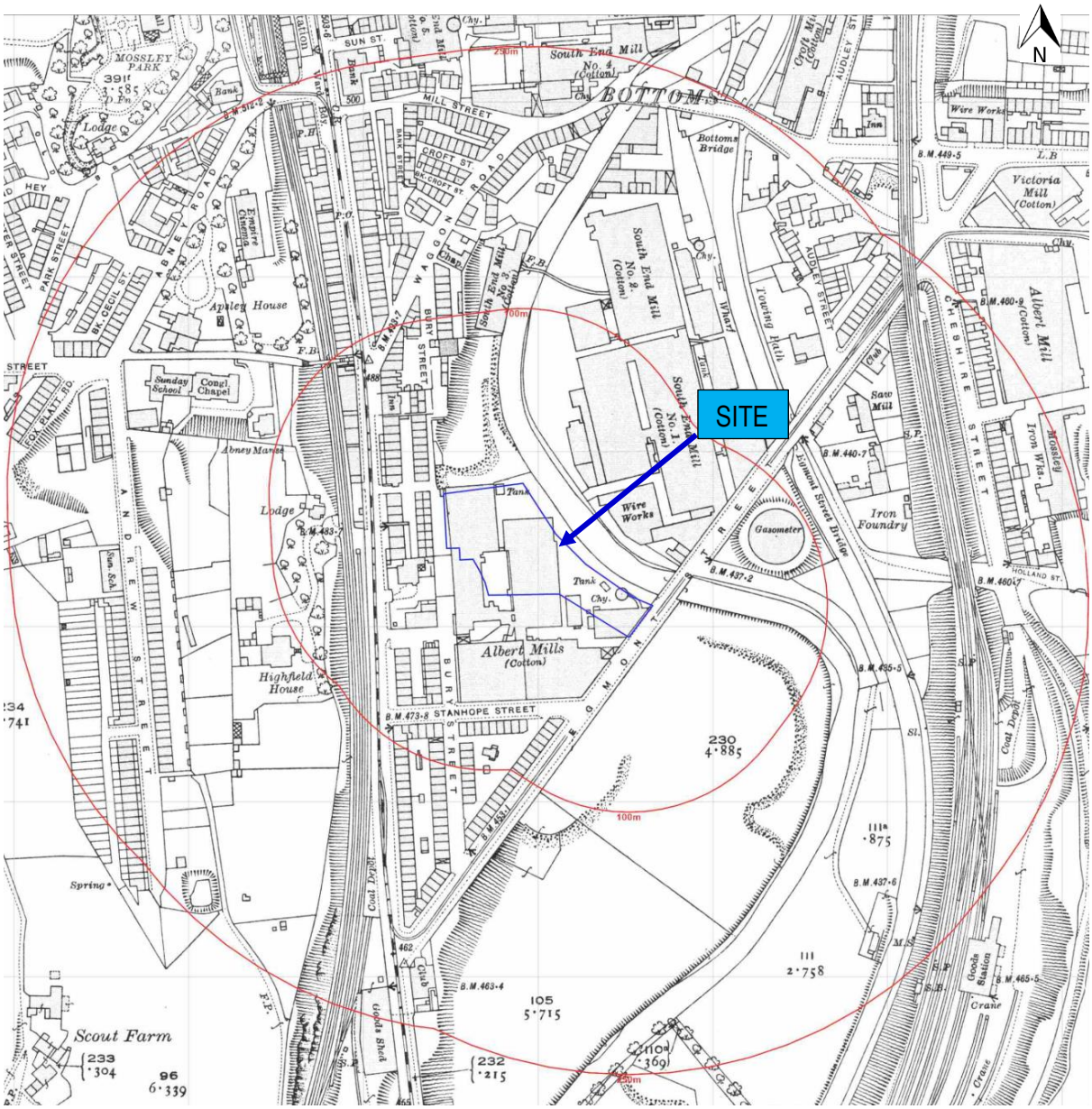


Figure 6 OS Map Extract 1975-1977

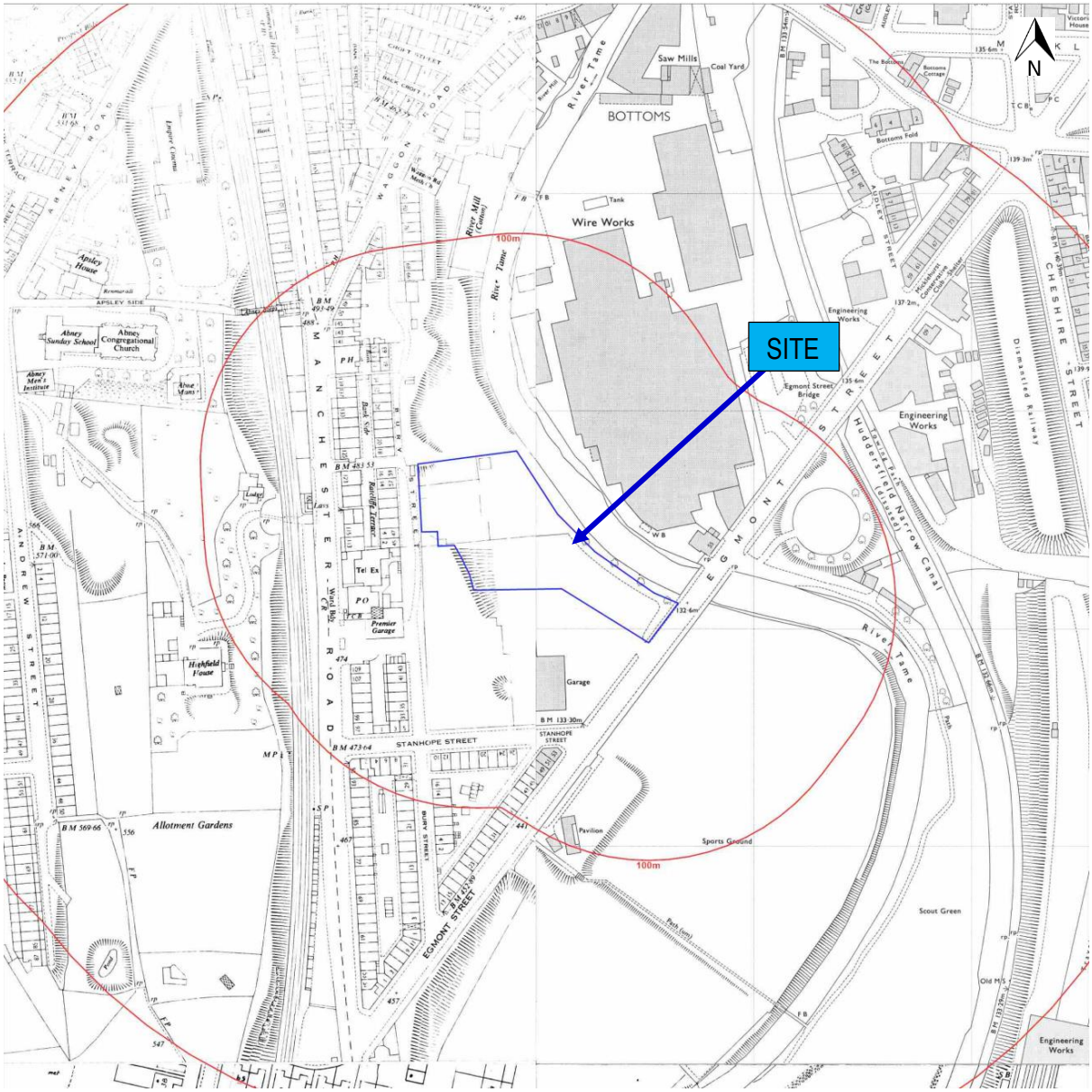
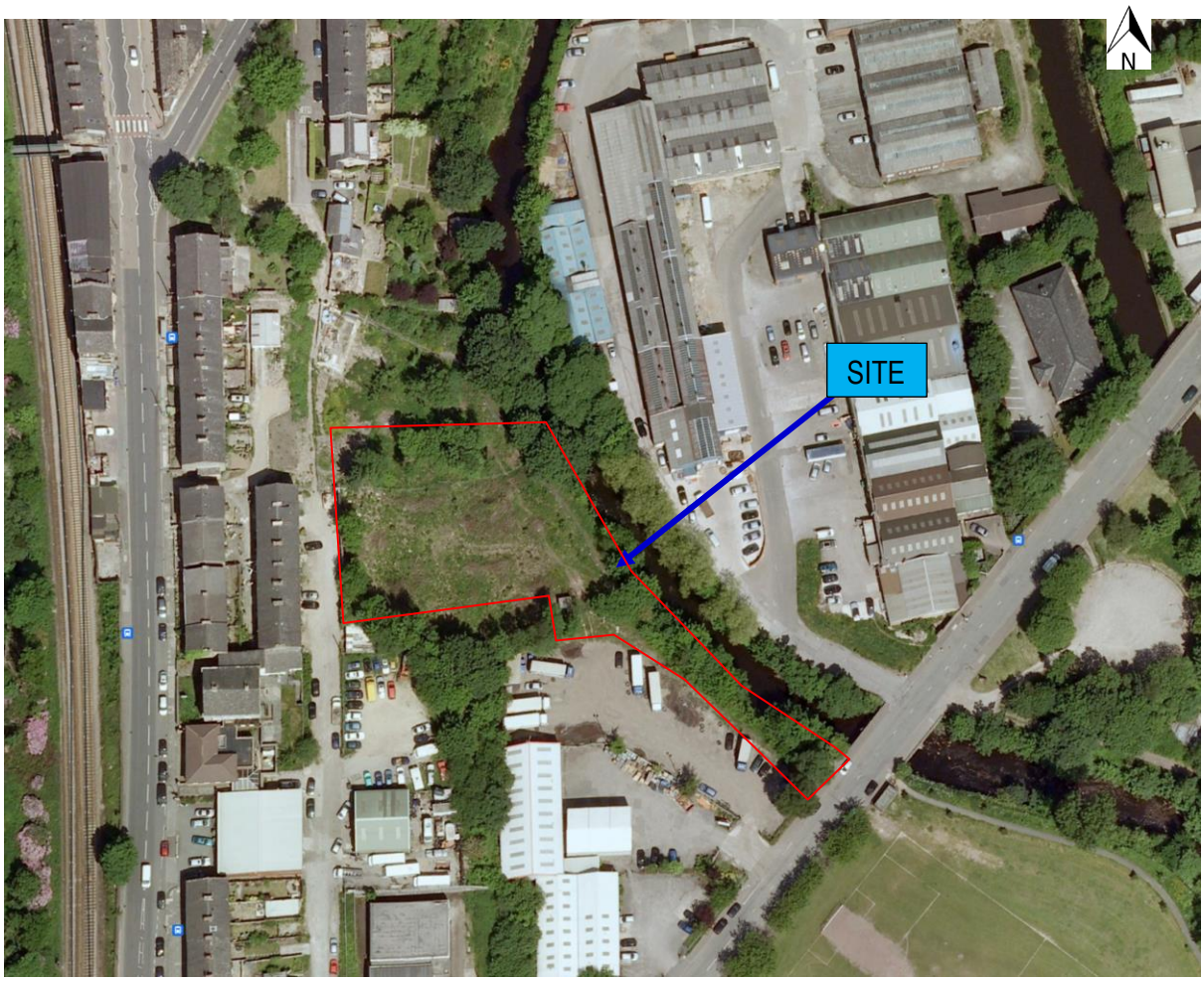


Figure 7 Google Earth Aerial Photograph 2018



6.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

Introduction

6.1 The following paragraphs outline a Preliminary Risk Assessment (PRA) for the site based on the above desk study information as defined by DEFRA and the EA Model Procedures for the Management of Land Contamination, CLR11(2004).

6.2 Table 5 provides a Preliminary Conceptual Model (PCM) which considers the source-pathway-receptor linkages present alongside the likelihood, severity and risk level as defined within Table 3 and Table 4 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and CLR11.

6.3 Table 5 considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.

6.4 The PCM/PRA is based on a proposed residential end use.

Table 3: Consequence, Probability and Risk

Probability	Consequence,	Risk
High Likelihood- There is a pollution linkage and an event either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution	Very High – acute risk to the human health likely to result in significant harm. Risk of severe or irreversible effect on ground/surface water quality. Catastrophic damage to buildings / property.	Very High – there is a high potential that the source-pathway-receptor scenarios may give rise to harm to human health, or the environment and remedial action is likely to be required.
Likely – there is a pollution linkage, and all the elements are present, which means that it is probable an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	High – Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependant environmental receptors.	High – it is likely that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, which may require remediation and/or control measures to mitigate risks
Low likelihood– there is a pollutant linkage and circumstances are possible for an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term	Moderate – Long term or short-term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time. Reduced reliability of a supply at a groundwater or surface water abstraction source	Moderate – it is possible that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, however it is either relatively unlikely that such would be severe, or if any harm were to occur it is more likely that harm would be mild.
Unlikely – there is a pollution linkage, but circumstances are such that it is doubtful that an event would occur even in the very long term.	Low – Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Slight effect on ground/surface water quality, reversible with time. Marginal reduced reliability of a supply at a groundwater or surface water abstraction source.	Low – it is possible that harm could arise at the source, however it is likely that this would at worst be mild.
		Very Low – it is unlikely that the source-pathway-receptor scenarios will give rise to an impact on human health or the environment.

Table 4: Estimation of Level of Risk by Comparison of Consequence and Probability

		Consequence			
		High	**Moderate**	**Low**	**Very low**
Probability	**High Likelihood**	Very High	High risk	Moderate risk	Moderate to low risk
	Likely	High risk	Moderate risk	Moderate to low risk	Low risk
	Low Likelihood	Moderate risk	Moderate to low risk	Low risk	Very low risk
	Unlikely	Moderate to low risk	Low risk	Very low risk	Very low risk

Potential Sources

6.5 Historically site was part of a cotton mills, with tanks, and recently being used as lorry depot.

6.6 There is potential for the presence of contamination associated with the following:

- Made Ground from various phases of on-site development and groundworks.
- Asbestos containing materials (ACM) from former structures and local warehouse fragile ACM cladding.
- Ground gas associated with potential deep made ground

Potential Receptors

6.7 The following receptors have been considered for the construction and operational stages of the proposed redevelopment.

- Current site users;
- Adjacent land users;
- Future land users;
- Construction workers during site development works;
- Groundwater within the underlying aquifer and nearby surface water course.

Potential Pathways

6.8 The following pathways have been considered for the construction and operational stages of the proposed redevelopment.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils;
- Downward vertical migration of leachate to shallow groundwater;
- Vertical or lateral migration of ground gas.

Table 5: Preliminary Conceptual Model

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Made Ground across site from various stages of site development and site use (Heavy Metals, PAH & TPH)	Dermal contact, ingestion, and inhalation of soils dust	Current Site Users	Low Likelihood	Moderate	Moderate to Low	Current site is not in use, Therefore the risk to current site users via direct exposure is considered to be **LOW**. This assessment is based on the sensitivity of the receptor and the potential for contamination to be present beneath the proposed garden area.
		Adjacent land users	Low Likelihood	Moderate	Moderate to Low	Residential properties partially surround the site. The risk is considered **MODERATE to LOW** and usual dust control measures should be implemented as part of good site working practices during construction to reduce dust generation.
		Future land users	Low Likelihood	Moderate	Moderate	The proposed development will include residential properties with private gardens. The risk to future site users via direct exposure is considered to be **MODERATE**. This assessment is based on the sensitivity of the receptor and the potential for contamination to be present beneath the proposed garden area.
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers are likely to be exposed to potentially contaminated Made Ground materials during construction works, however exposure duration will be short-term only. Assuming appropriate health and safety measures are adopted (in line with CDM and other relevant health and safety guidance) a **LOW** risk to construction workers is anticipated.
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer & Nearby Watercourse	Low likelihood	Moderate	Moderate	Shallow groundwater may be present beneath the site and there are nine nearby abstraction licenses, and the underlying superficial soils are anticipated to be cohesive with generally low permeability. The risk to groundwater is therefore considered **MODERATE**.
	Vertical or lateral migration of ground gas	Current Site Users	Low Likelihood	Moderate	Moderate	There is potential for Made Ground soils beneath the site. The risk to current site users from ground gas is therefore considered **MODERATE**.
		Adjacent land users	Unlikely	Moderate	Low	Considering the age of the potential Made Ground materials present and the cohesive nature of the underlying superficial deposits there is low potential for ground gas migration. The risk to adjacent site users from ground gas is therefore considered **LOW**.
		Future land users	Low Likelihood	Moderate	Moderate	There is potential for Made Ground from former structures and potentially organic soils beneath the site. The risk to future site users from ground gas is therefore considered **MODERATE**.

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers may be exposed to ground gas/depleted oxygen conditions in confined spaces and excavations; however, the duration will be short term. The risk to construction workers from ground gas is considered **MODERATE to LOW**.
Asbestos Containing Material (ACM)		Current Site Users	Low Likelihood	Moderate	Moderate to Low	Asbestos may be present in the Made Ground soils beneath the site. Disturbance of potential ACM by future resident may allow fibres to become airborne. The risk is therefore considered **MODERATE**. A contamination assessment of the existing on-site soils and appropriate remediation, if required, will reduce the risk to LOW.
		Adjacent land users	Low Likelihood	Moderate	Moderate to Low	Asbestos may be present in the Made Ground soils beneath the site. Disturbance of soil during the construction phase may allow fibres to become airborne. The risk is therefore considered **MODERATE**. Dust control measures (dampening down) should be implemented as part of good site working practices in order to reduce the risk to **LOW**.
		Future land users	Low Likelihood	Moderate	Moderate to Low	The proposed residential development includes private gardens. Disturbance of potential ACM by future resident may allow fibres to become airborne. The risk is therefore considered **MODERATE**. A contamination assessment of the existing on-site soils and appropriate remediation, if required, will reduce the risk to **LOW**.
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers will be exposed to potential asbestos in soils during the construction phase. The risk is considered **MODERATE**. A contamination assessment of the existing on-site soils would be required to determine the level of risk and necessary mitigation measures.

7.0 GEOTECHNICAL HAZARDS ASSOCIATED WITH THE DEVELOPMENT

7.1 In addition to the environmental hazards there are also geotechnical hazards associated with the stability of the ground including load bearing capacity, slope stability and effects of ground mining activities. Local Authorities follow NPPF (2021) which requires that a site be suitable for its new use taking into account of ground conditions and land instability, including from natural hazards to former activities such as mining. A summary of the geotechnical considerations is provided below in Table 6.

Table 6: Summary of Geotechnical Hazards

Geohazards	
Highly Compressible Ground	Moderate - Compressibility and uneven settlement hazards are probably present associated with alluvium. Land use should consider specifically the compressibility and variability of the site.
Collapsible Soils	Very low risk.
Swelling Clay	Very low risk.
Running Sand	Low risk.
Ground Dissolution	Negligible risk.
Landslip	Low risk.
Mining & Quarrying	There are no recorded historical coal mining activities nearby. Site is located in Coal Mining Reporting area, but outside a Development High Risk Area.
Geotechnical Design Considerations	
Site Clearance	Site is currently unoccupied covered with rough vegetation trees and gravel.
Trees	Number of mature trees are present across the site.
Existing Buildings/Obstructions	No building currently on site. There are two derelict containers in the western and southern part of the site.
Foundations	The depth and type of proposed foundations would depend on the ground conditions present on site. Unknown depth of Made Ground deposits is expected to underlie the site. An intrusive geotechnical investigation is recommended prior to any construction works.

Geotechnical Design Considerations	
Floor Slabs	Again, an intrusive geotechnical investigation is recommended prior to any construction works to discover the most suitable floor slab design for the on-site ground conditions.
Groundwater	Exact groundwater conditions are not known at this stage. For more detailed knowledge of the groundwater regime, an intrusive geotechnical investigation would be needed. However, it is recorded that the site is underlain by Secondary Undifferentiated and Secondary A Aquifer. The highest risk of groundwater flooding on site is recorded as low.
Earthworks	It is unlikely that any major earthworks will be required on the site.
Slopes	The site is generally flat.
Retaining Walls	It is unlikely retaining walls will be required due to the flat lying nature of the site.
Chemically aggressive ground conditions	Chemically aggressive ground conditions are likely based on historical calling activities. Intrusive geotechnical investigation would be necessary to confirm this.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

8.1 Currently the site is unoccupied, covered by rough vegetation trees and gravel.

8.2 Historically site been part of a former cotton mill and more recently used as a lorry depot.

8.3 The proposed development of the site includes construction of residential dwellings.

8.4 The site is underlain by superficial deposits of alluvium in the eastern sector of the site. The rest of the site is not underlain by superficial deposits. The solid geology of Fletcher Bank Grit and Marsden Formation.

8.5 The overall risk from soil contamination to residential end users and construction workers is concluded to be **MODERATE.**

8.6 The risk to controlled waters is concluded to be **MODERATE** based on the underlying cohesive geology and presence of a nearby abstraction.

8.7 Given the anticipated extent and age of made ground, the risk from ground gas to end users is considered to be **MODERATE.**

8.8 The site is located within a flood risk zone, however the flood risk from Groundwater is considered **LOW**.

8.9 During the site walkover asbestos fragments were found across areas of the site.

8.10 Invasive plant species have been noted on the site, including Japanese Knotweed and Himalayan Balsam.

Recommendations

8.11 An intrusive investigation should be undertaken to establish geotechnical parameters for the design of foundations, floor slabs and pavement construction for the proposed new structures and surrounding area.

8.12 As part of the geotechnical investigation, it is recommended that samples of soil are recovered for contamination testing and to confirm whether there are any potential risks.

8.13 Ground gas and groundwater monitoring standpipes should be also installed to facilitate future monitoring of the ground gas regime and to allow sampling of groundwater for contamination testing.

8.14 Invasive plant species have been found on the site. These will be need to managed or removed offsite as part of the development of the site.

8.15 A Flood Risk Assessment is required for the site.

APPENDIX 1

GROUNDSURE REPORTS

APPENDIX 2

SITE PHOTOGRAPHS

<table>
<tr><td>Earth Environmental & Geotechnical Ltd

Tel: 0161 975 6088
Email: info@earthenvironmental.co.uk
Web: www.earthenvironmental.co.uk</td><td>SITE PHOTOGRAPHS

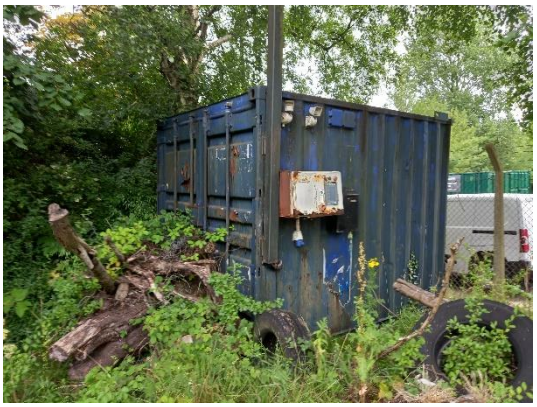
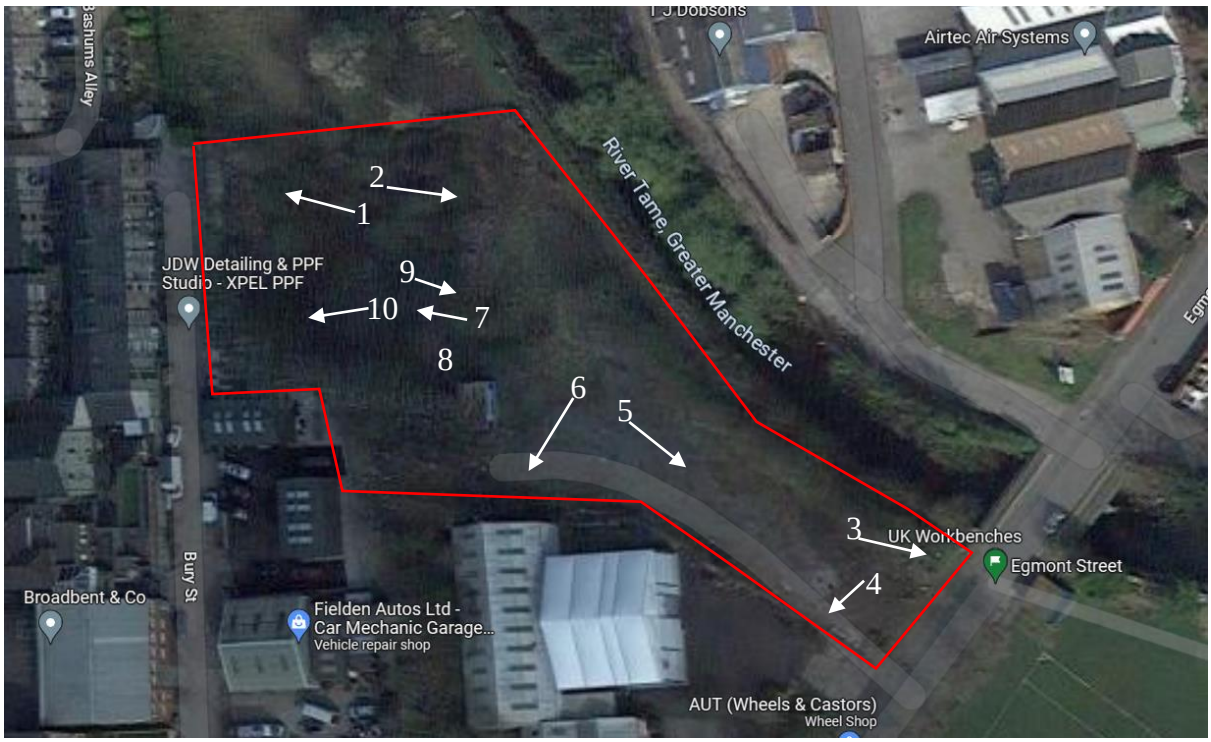
EARTH ENVIRONMENTAL & GEOTECHNICAL</td></tr>
<tr><td>Job No.: A5333/23</td><td>Site: Egmont Street, Mossley</td></tr>
<tr><td>Plate 1 View for a vegetation to the north of the site, looking NW</td><td>Plate 2 View across the northern part of the site with vegetation, looking S</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 10th July 2023</td><td>Date: 10th July 2023</td></tr>
<tr><td>Plate 3 View to the container with electric connection, south corner, looking SE</td><td>Plate 4 View for the main access gate (not in use), looking W</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 10th July 2023</td><td>Date: 10th July 2023</td></tr>
</table>

Plate 5 View across the site, looking S	Plate 6 View for the warehouse with ACM cladding, looking NW
	
Date: 10th July 2023	Date: 10th July 2023
Plate 7 View to the derelict container, looking NE	**Plate 8 View for the potential ACM debris on site**
	
Date: 10th July 2023	Date: 10th July 2023
Plate 9 View across the site, looking S	**Plate 10 View for the fly tip adjacent to the north.**
	
Date: 10th July 2023	Date: 10th July 2023

Figure 9 Site Walkover Photo Locations



APPENDIX 3

SITE WALKOVER NOTES

EARTH ENVIRONMENTAL & GEOTECHNICAL

WALK OVER SURVEY REPORT

Site: Bent Farm, Packmoor **Date:** 12th July 2023

Job No: A5456/23 **Undertaken By:** Tomasz Opara

Purpose of Site Walkover:
1) Provide further information for the Desk Study Report;
2) Identify potential contamination sources, pathways, and receptors;
3) Identify geotechnical features and potential geohazards;
4) Determine locations for exploratory boreholes.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Setting	Description required for: Town/Country/Suburb Setting Industrial/Residential/Retail Usage Current Site use (if undertaking security and access to the site)		Site located in Mossley, approximately 558m to the south-east from the Oldham Town Centre, as part of the wider industrial area. Site is undeveloped with former lorry depot.
Evidence of Past Activities	Are there: Any relevant street names in area? Features or relics which indicate past history?	 ~~Yes~~/No Yes/~~No~~	Site is flat covered with broken tarmac, gravel and rough vegetation. Number of old tyres recorded on site as well as ship container indication past history of HGV depot.
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		
Ground Conditions	Is there any evidence of: Mining, Mine entries Subsidence Landslip/slope erosion Former investigation works	 ~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	Slope located adjacent to the north, Retaining wall to the east towards the river

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Topography	Description required for: Are there apparent differences between site and surrounding area? (If yes describe the presence of retaining walls, and slopes). Is there evidence of Made Ground / Fill on site?	~~Yes~~/No ~~Yes~~/No	As above slope to the north and towards eastern boundary to the river. Based on the anecdotal evidence site been filled with reworked material, especially in northern and north-eastern part of the site.
Site Boundaries and Neighbours	Description required for: Type of boundary demarcation (if any) on each side of site, usage of adjacent land and name of industrial/commercial occupiers. Note any adjacent features such as water course and other potentially environmentally sensitive uses (residential, school, infirmary, SSSI etc)		The site is generally bordered with metal fence, metal wire fence and herras fencing in places. River Tame present adjacent to the east
Vegetation	Are there any vegetation/trees on or close to site (if yes describe locations, type, maturity, etc) Is there any evidence of poor health / distress?	Yes/~~No~~ ~~Yes~~/No	Mature trees located along northern and eastern boundary. Dense shrubs present on site.
Ground Surface	Are there areas of hardstanding and estimate the split between hard and soft cover? (If yes describe locations, types, and conditions). Is the any evidence of any spillages or staining?	Yes/~~No~~ ~~Yes~~/No	Grass and rough vegetation with some shrubs in in northern part of the site.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Drainage	Are there any drain covers / soakaways (if yes describe locations) Are there any outfalls/water courses on site (note the condition of water courses in open water courses. discolouration, odour, eutrophication, oily sheen, gas bubbling water, clear or cloudy) Where a watercourse runs alongside or crosses a site are there any differences in visible water quality upstream and downstream of the site?	~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	
Electrical Equipment	Are there any electricity sub stations on or adjacent to the site? Are there any electrical transformers, capacitors, pylons etc on site?	~~Yes~~/No	Container present in the eastern corner of the site, with electricity connection.
Buildings	Is there any evidence of asbestos construction materials e.g., roofing, insulation materials. Do any buildings have basements? Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?	~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	Asbestos present on site, falling from the warehouse wall at the north-western corner and nearby.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Landfilling	Is there any evidence of gas protection measures (gas membrane, gravel-filled trenches, venting pipes, etc)?	~~Yes~~/No	
Process Air Emissions	Point Source: Are there any stacks / vents / cooling towers / abatement equipment? Fugitive Source: is there any stockpiled material / windblown dust / vapour process?	~~Yes~~/No ~~Yes~~/No	
Storage of fuels & Chemicals	Are there any drums / containers (if yes, describe quantity, full /empty, stored on hard standing / soft landscaping, bunding)? Are there any above ground fuel tanks (if yes, describe locations, volumes, how many, bunding, used / disused, condition?) Is there any evidence of underground fuel tanks (fuel pumps, covers, vent pipes, how many and how large, fill point, used / disused, and condition)?	~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	Anectodical evidence, of fuel tank on site in northern part of the site, no signs on site.
Accidents	In the event of a large spillage would runoff affect any vulnerable watercourse/culverts? Are emergency procedures / equipment in place?	~~Yes~~/No ~~Yes~~/No	

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Waste	Are there any waste skips present on site? Are waste storage facilities adequate? Is there any litter/fly tipped material?	~~Yes~~/No Yes/No ~~Yes~~/No	Old ship container present in northern part of the site.
Atmospheric	Are there any fumes, odours originating from site or affecting site from neighbouring sites?	~~Yes~~/No	
Access / Further Investigations	If a Phase 2 Investigation is likely to be required, describe any access problems including headroom where relevant, services, overhead cables, restricted access areas, confined spaces, trafficked areas, etc that are likely to affect investigation scope/techniques. Identify possible site office and storage locations. Identify possible water supply		No vehicular access for the time of the walkover Japanese Knotweed. No water supply on site.
Site Environs	Are there any local features that could have a harmful influence e.g., landfill, industrial processes, railway land? Are there any sensitive water features/courses near to the site?	~~Yes~~/No ~~Yes~~/No	Fly tipping adjacent to the northern boundary.
Local Knowledge / Anecdotal Evidence			
Site Dimensions	Describe shape of Site in plan and measure dimensions.		

APPENDIX 4

REPORT LIMITATIONS

LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget, and staff resources allocated to the project.

Other than that, expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2023 and should be read in light of any subsequent changes in legislation, statutory requirements, and industry best practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.