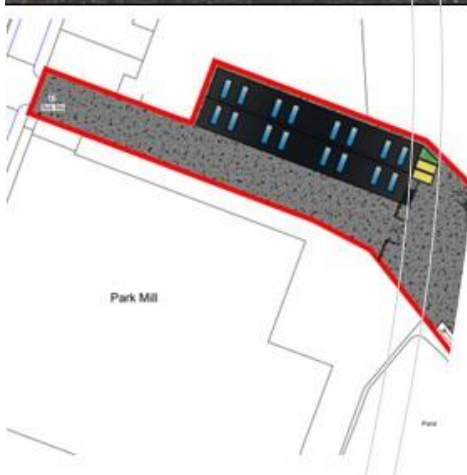




EARTH ENVIRONMENTAL
& GEOTECHNICAL

Phase 1 GeoEnvironmental Desk Study

Buckley Road

Industrial Estate

Rochdale

January 2024

On behalf of

TDM ARCHITECTURAL LTD

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Tel : 01619756088

Email
headoffice@earthenvironmental.co.uk

www.earthenvironmental.co.uk



PHASE I GEOENVIRONMENTAL DESK STUDY

BUCKLEY ROAD

INDUSTRIAL ESTATE

ROCHDALE

FOR

TDM ARCHITECTURAL LTD

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

www.earthenvironmental.co.uk

Tel: 0161 975 6088

Report No. A5784/24/FDS

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Report Title:	PHASE I GEOENVIRONMENTAL DESK STUDY BUCKLEY ROAD INDUSTRIAL ESTATE ROCHDALE
Report Reference:	A5784/24/FDS
Client:	TDM Architectural Ltd
Issue Date:	20th January 2024
Drafted By:	Lewis Waller
Reviewed By:	Adam Czarnecki
Authorised By:	Adam Czarnecki

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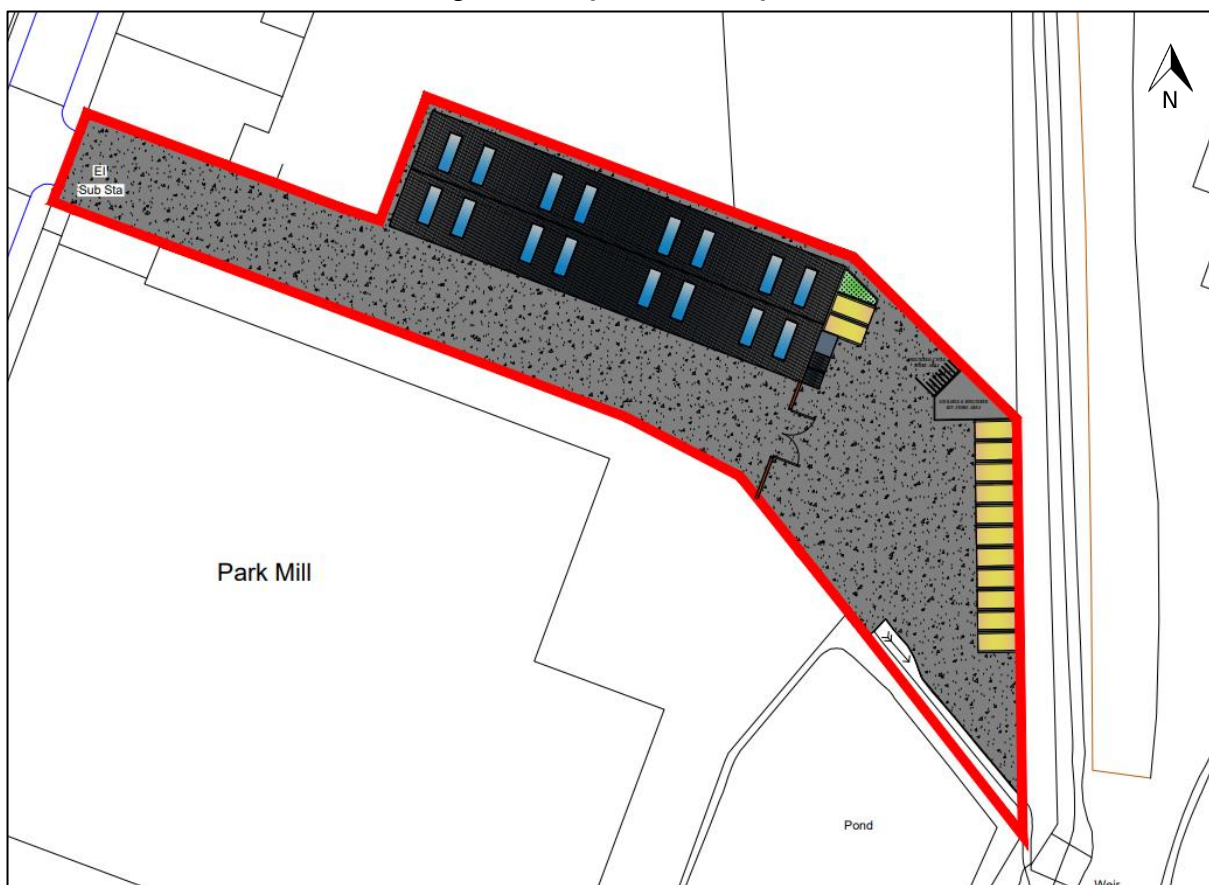
Appendix 1	GroundSure Reports and Historical Maps
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1.0 INTRODUCTION

Appointment

- 1.1 Earth Environmental & Geotechnical Ltd has been commissioned by TDM Architectural Ltd (the Client) to undertake a Phase I GeoEnvironmental Desk Study for land on Buckley Road, Industrial Estate, Rochdale.
- 1.2 It is understood that the Client intends to erect one new commercial/industrial unit on the current unoccupied land.
- 1.3 A proposed development plan is presented in Figure 1, below.

Figure 1: Proposed Development Plan



Objective

- 1.4 The purpose of the Phase 1 GeoEnvironmental 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 site reconnaissance visit and 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.
 - Rochdale Borough Council planning search.

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site is located on land adjacent to Buckley Road, Rochdale (nearest postcode OL12 9DJ) at approximate National Grid Reference for the centre of the site is SD 90686 15055 (X: Easting: 390686 Northing: 415055).
- 2.2 A site walkover was conducted on the 12th January 2024 from which the following descriptions have been taken.
- 2.3 The site is an irregular shaped parcel of land with which comprises of hardstanding (100%) related to a disused former mill and approximately 0.27 hectares in size.
- 2.4 The topography of the site is generally flat having been built up with hardcore and slopes at the eastern and southeastern corner towards the stream and pond located adjacent to the site.
- 2.5 The site is currently unoccupied former industrial land with small stockpiles of demolition rubble and hardcore.
- 2.6 The site is bounded by metal palisade fencing on the east and south sides and by a brick wall and palisade fencing along the northern boundary, the west of the site has a metal gate from which access for a vehicle off Buckley Road is provided.
- 2.7 The immediate vicinity of the site comprises industrial and commercial structures to the north, west and south with Hey Beck to the east.
- 2.8 The general surrounding area comprises of industrial and commercial, residential, and undeveloped land.
- 2.9 A location plan is shown below as Figure 2, together with a recent site photograph as Figure 3.

Figure 2: Site Location Plan



Figure 3: Site Photograph



Site Utility Services

- 2.10 Site service plans have not been provided by the Client. The status of all services should be checked prior to any development (including site investigation) commencing.

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 Enviro+Geo Insight 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 Enviro+Geo Insight report (Appendix 1).

Geology

- 3.3 The BGS states that the site is underlain by artificial deposits classified as made ground in the west of the site, although given the urban setting and site history it is expected to be present across the whole site.
- 3.4 The BGS states that the superficial deposits underlying the site are Alluvium, generally described as unconsolidated detrital material of clay, silt, sand and gravel. Additionally, the site is likely to be underlain by Glacial Till which can generally be described as 'unsorted and unstratified drift, generally over consolidated, consisting of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
- 3.5 The bedrock geology beneath the site is shown to be the Milnrow Sandstone of the Pennine Lower Coal Formation and can generally described as stratified sandstone.
- 3.6 There are 4 records of linear features within 500m of the site boundary. The closest record refers to a buried channel 107 m northeast of the site.
- 3.7 There are no records of landslips within 500m of the site.
- 3.8 There are 3 borehole records identified within 250m of the site. The closest available record (Reference: SE/44570/11061) is located 216m to the southwest of the site, BH1 was advanced to 8.05 m bgl and recorded the following:
- Cohesive Made ground to 2.20 mbgl.
 - Brown slightly clayey sandy GRAVEL and Cobbles presumed Glacial Till to 3.80 mbgl.
 - Firm becoming stiff brown closely fissured silty slightly sandy CLAY with a little coarse sand to medium gravel sized shale fragments, presumed Pennie Lower Coal Measures to 8.05 mbgl.
- 3.9 The following hazards ratings applicate to the site and land with 50 m are presented in the Enviro + Geo Insight Report
- | | |
|--|------------|
| • Shrink / swell clays: | Very Low |
| • Running sands: | Low |
| • Compressible deposits: | Moderate |
| • Collapsible deposits: | Very Low |
| • Landslides: | Low. |
| • Ground dissolution of soluble rocks: | Negligible |

Ground Workings

- 3.10 There are no records of natural cavities or mining cavities within 250m of the site.
- 3.11 There is one record of BritPits Data 155m to the northeast of the site for clay and shale that has ceased operations.
- 3.12 There are 54 records of surface ground working within 250m of the site. A pond is recorded to be located on the site; however, this is adjacent to the proposed site.
- 3.13 The surface ground workings within 50m of the site include, a pond, reservoir, and refuse heap. Between 50m to 250m of the site, includes ponds, mill ponds, reservoir, brickworks, water body unspecified pit, unspecified ground works, water bodies and old clay pit.
- 3.14 There are no underground workings within 250m of the site.
- 3.15 There are no records of non-coal Mining within 250m of the site.

Mining and Other Underground Workings

- 3.16 The site is located within an identified coal mining area as defined by the Coal Authority, but not within a Development High Risk Area.
- 3.17 There are no records of non-coal mining areas located within 500m of the site.
- 3.18 There are no records of brine areas, gypsum extraction, tin mining, or clay mining on the site.
- 3.19 There are no records of natural cavities within 500m of the site.
- 3.20 There are no records for mining cavities identified within 500m of the site.
- 3.21 There are no records for JPB mining areas on the site.
- 3.22 There is one record of historical underground workings of colliery of 713m north and described as Colliery dated 1908.
- 3.23 There are no records of historical mineral planning areas within 500m of the site.

Radon Potential

- 3.24 The study site is not located within a Radon Affected Area, as less than 1% of properties are above the Radon Action Level. No radon protection measures are required.

Hydrogeology and Hydrology

- 3.25 The superficial deposits of Alluvium have been designated by the Environment Agency (EA) as a Secondary A aquifer. The maximum and minimum permeability are recorded as high to very low with intergranular flow type and high to very low permeability.

3.26 The Milnrow Sandstone underlying the site has been designated as a Secondary A aquifer. The maximum and minimum permeability are recorded as moderate to high with fractured flow type.

3.27 The BGS states the following:

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.'*

3.28 The groundwater vulnerability of the site has been classified as low vulnerability for the superficial and bedrock aquifers. The soil leaching potential of the site classified as low. The BGS states low vulnerability as

Low – *'Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability'*.

3.29 There are 5 licensed groundwater abstractions within 2km of the site, with the nearest 1.8km southeast of the site.

3.30 There are 16 surface water abstractions within 2km of the site, with the nearest 60m northwest of the site.

3.31 There are no potable water abstractions within 500m of the site.

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

3.33 There are 21 water network entries within 250m of the site. On site is the Syke Brook Dyke, the second closest is pond 3m to the southeast and Buckley Brook (also referred to as Hey Brook) 4m to the east, the furthest is 248m to the north is the inland river.

3.34 There are 5 surface water features identified within 250m of the site.

3.35 There is 1 record of Water Framework Directive (WFD) surface water bodies located on the site. This refers to a Dyke within the Syke Book of the Roch a source to the Spodden within the Roch Irk Medlock operational catchment and Irwell Management catchment.

3.36 There is 1 record of a Water Framework Directive (WFD) groundwater body located on-site. The record refers to the Roch which received a fail chemical rating in 2019.

Landfill & Waste Management Activity

3.37 There are no records for current Environment Agency landfill records within 500m of the site.

3.38 There is 1 recorded historic Environment Agency landfill site recorded at 253m to the southwest of the site. This accepted industrial waste from 1939 to 1991.

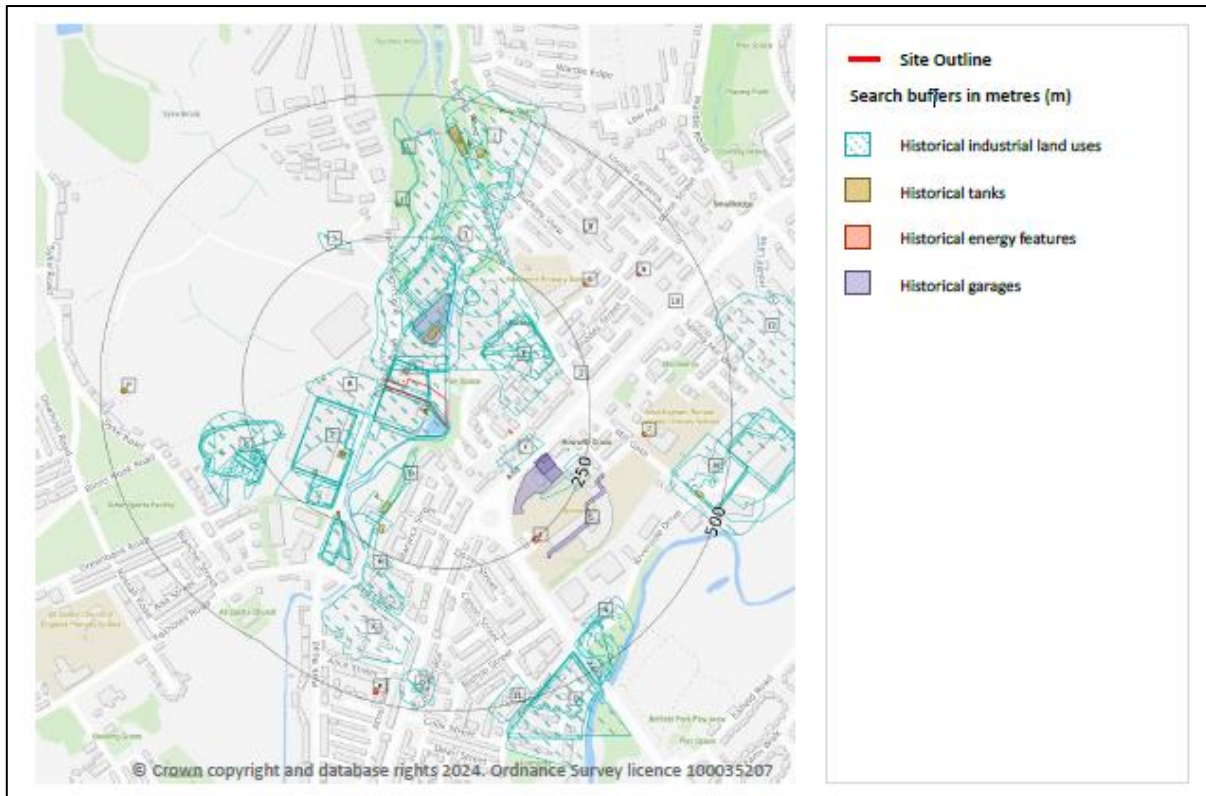
3.39 There are no records of BGS/DoE non-operational landfill sites within 500m of the site.

- 3.40 There are no records of a historical landfill from the Local Authority and Historical Mapping records within 500m of the site.
- 3.41 There are no records of historical waste sites within 500m of the site.
- 3.42 There are 3 records of current Environment Agency licensed waste sites within 500m of the site. The closest site is 41m northwest of the site for vehicle depollution.
- 3.43 There are 27 waste exemptions within 500m of the site. Waste exemptions are made available for certain specific activities considered to pose a low risk to the environment and allowable waste types and quantities are limited. The closest is 202m southeast of the site for a pharmacy with treating waste exemption for sorting and de-naturing of controlled drugs for disposal.

Industrial Land Use Information

- 3.44 There are 156 records of potentially contaminative historical land uses identified within 500m of the site, including 12 records located directly on site. The on-site record refers to Unspecified Commercial/Industrial dated 1967, Woollen mill dated 1908 and 10 entries for an unspecified Mill data from 1890 to 1976.
- 3.45 Other records within the vicinity include a cotton mill, chimney, refuse heap, industrial estate, unspecified mill, mill pond, woollen mill, unspecified ground works, unspecified tank, unspecified shaft, unspecified tank, unspecified pit, engineering works, pump, nursery, and survey within 250m of the site.
- 3.46 There are 28 records of recent land uses identified within 250m of the site, including 1 record located on the site. The on-site record refers to an electricity substation.
- 3.47 There are 74 records of unspecified tanks within 500m of the site. The closest is 5m northwest of the site dated 1890.
- 3.48 There are 36 records of historical energy features identified within 500m of the site. The closest record refers to an electricity substation located on site, dated 1959-1996.
- 3.49 The other records in the vicinity refer to electrical substations, the closest is 108m east. The substation predates the 1981 ban on PCBs and there is a potential source of contamination.
- 3.50 There are no recorded historical petrol or fuel stations within 500m of the site.
- 3.51 There are 10 historical garages within 500m of the site, the closest is 67m north of the site dated 1970.
- 3.52 There are no records recorded historical military land usage within 500m of the site.

Figure 4: Historical Industrial Land Uses



- 3.53 There are 28 recorded recent historical industrial land uses within 250m of the site. There is one onsite record of an electrical substation. The closest offsite record is 14m northwest for a recycling centre and the furthest is 249m southwest of the site for generic tank.
- 3.54 There are no records of current or recent petrol stations within 500m of the site.
- 3.55 There are no National Grid high voltage underground electricity transmission cables within 500m of the site.
- 3.56 There are no National Grid high-pressure gas transmission pipelines within 500m of the site.
- 3.57 There are two recorded historical railway and tunnel features identified within 250m of the site. Both records are for railway sidings located 61 and 67m northwest of the site and dated 1958.
- 3.58 There are 2 historical railway lines identified within 250m of the site, with the nearest 61m west of the site.
- 3.59 There are no current active railway line records identified within 250m of the site.
- 3.60 There are no underground railway lines or tunnels identified within 250m of the site.
- 3.61 The site is not within 500m of the route of the High Speed 2 rail project.
- 3.62 The site is not within 500m of the route of the Crossrail 1 rail project.

Environmental Permits, Incidents and Registers

- 3.63 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
Historical Licensed Industrial Activities (IPC)	28
Regulated Explosive Sites	0
Planning Hazardous substances consents	0
Records of Historic IPC Licensed Activities	0
Part A (1) Licensed Activities	0
Part A (2) and Part B Activities and Enforcements	4
Records of Radioactive Substance Authorisations	0
Licensed Discharge Consents	7
Pollutant Release to Surface Waters (Red List)	0
List 1 Dangerous Substances Inventory Sites	0
List 2 Dangerous Substances Inventory Sites	0
Dangerous or Hazardous (COMAH and NIHHS) Sites	1
Pollutant Release to Public Sewer	0
Substantiated Pollution Incidents (Category 1 to 4)	16
Pollution Inventory Substances, Wastes and Radioactive Wastes	0

- 3.64 There is 1 record of a Control of Major Accident Hazards (COMAH) sites located 74m northwest of the site. This is Makin Metal Powders.
- 3.65 There are 4 records of Part A(2) and Part B installations under the Environmental Permitting Regulations 2016 located within 500m of the site. The closest is 107m southeast of the site for a historical permit.
- 3.66 There are 7n records of Licensed Discharges to controlled waters within 500m of the site. The closest is 375m southwest of the site.
- 3.67 There are 16 records of records of Substantiated Pollution Incidents (Category 1 to 4) within 500m of the site. There are 4 records for onsite, all dated 20/05/2002 for a pollutant of specific waste materials and inert materials, with no impact on water or air and minor impact on the land.
- 3.68 There are no further records of Environmental Permits, Incidents and Registers within 500m of the site.

Environmentally Sensitive Sites

- 3.69 There are no records of a Site of Specific Scientific Interest (SSSI) located within 500m of the site.
- 3.70 There are no records of Special Areas of Conservation (SAC) within 500m of the site.
- 3.71 There are 2 records of Designated Ancient Woodlands within 500m of the site. Both records refer to Buckley Wood which is classified as Ancient and Semi-Natural woodland and Ancient Replanted Woodland.
- 3.72 There is one record of a green belt land within 500m of the site. The closest record is 111m to the west and refers to Merseyside and Greater Manchester within the Rochdale local authority.
- 3.73 There are no records of a nitrate vulnerable zone within 2km of the site.

Ecology

- 3.74 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.
- 3.75 There is one mosaic habitat 96m southwest of the site.
- 3.76 However, the site is classified as Grade 4 poor quality agricultural land.

Archaeology

- 3.77 An archaeological assessment falls outside the brief of this report. Where considered necessary, advice should be sought from an archaeological specialist in this respect.
- 3.78 There are no records of visual and cultural designations within 500m of the site.

Potential Flood Risks

- 3.79 Detailed assessment of flood risks is outside the scope of this report. However, the site is designated a medium risk and lies within an Environment Agency Zone 2 floodplain and within 3m of a Zone 3 floodplain.
- 3.80 There are 6 records of risk of flooding from rivers and sea (RoFRaS) within 50m of the site.
- 3.81 There are 7 records of a historical flood event within 250m of the site. An onsite event occurred on 280/01/1995 caused by channel capacity exceedance (no raised defences).
- 3.82 There are 7 records of flood defences, within 250m of the site. The closest is 43m south of the site.
- 3.83 The highest risk of surface water flooding occurring on-site for a 1 in 30-year event is 0.1m – 0.3m.
- 3.84 The highest risk of groundwater flooding occurring on-site is low.

Previous Site Investigations

- 3.85 Earth Environmental & Geotechnical Ltd are not aware of any previous site investigations carried out at the site.

4.0 SITE HISTORY

- 4.1 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 1851.
- 4.2 The site history is summarised in Table 2, below, followed by selected extracts from maps, Table 3 Summaries the aerial photographs.

Table 2: Summary of Site History

Date	Scale	On-Site History	Surrounding Land Use History
1851	1:10,560	Surface water course runs across the site from north to south. A road runs north south across the western end of the site.	Buckley Brook is to the immediate south of the site. Buckley Mill is ~200 m north of the site. The Buckley Lower Mill is ~200 m south of the site. Residential housing is ~200 m east of the site.
1851	1:1,056	Surface water course runs across the site from north to south. A road runs north south across the western end of the site.	The immediate surrounding area is undeveloped.
1890-1891	1:10,560	A building has been constructed on part of the site as part of the Buckley Brook Woollen Mill.	Buckley Brook Mill has been constructed to the immediate north the site and Park Mill to the immediate south of the site. A reservoir has been construed to the immediate south the site. Hafley Mill, Hamer Vale Mills and a Mill have been constructed 200-250m to the south of the site. Residential development has occurred 100 m and more to the east of the site. There is an old shaft and old colliery ~ 200m north of the site.
1890	1: 2,500	No significant change compared to previous map.	No significant change compared to previous map.
1892	1:500	No significant change compared to previous map.	No significant change compared to previous map.
1908	1:10,560	No significant change compared to previous map.	Eclipse Mill has been constructed ~ 150m southwest of the site. Further residential development has occurred west of the site.
1910	1: 2,500	No significant change compared to previous map.	Filter tanks have been constructed ~ 80m north of the site.
1928-1938	1:2,500 1:10,560	No significant change compared to previous map.	No significant change compared to previous map.

Date	Scale	On-Site History	Surrounding Land Use History
1949-1954	1:10,560	No significant change compared to previous map.	No significant change compared to previous map.
1958-1959	1:1,250	No significant change compared to previous map.	No significant change compared to previous map.
1967-1968	1:10,560	No significant change compared to previous map.	No significant change compared to previous map.
1975-1979	1:10,000	The buildings on site have been removed.	Buckley Mill ~100m north of the site has been removed and replaced by a single small building.
1976	1:1,1250	The original budling on site has been replaced with two smaller units. An electrical substation has been built partially within western edges of the site.	No significant change compared to previous map.
1981-1985	1:1,250	No significant change compared to previous map.	Industrial units have been constructed ~50m north of the site and residential properties ~ 50m to the east. A works has been constructed ~ 100m northwest of the site.
1989	1:1,250	No significant change compared to previous map.	No significant change compared to previous map.
1992-1995	1:1,250	No significant change compared to previous map.	No significant change compared to previous map.
2001	1:10,000	No significant change compared to previous map.	No significant change compared to previous map.
2003	1:1,250	No significant change compared to previous map.	A warehouse has been constructed ~60m to the southwest of the site.
2010	1:10,000	No significant change compared to previous map.	No significant change compared to previous map.
2024	1:10,000	No significant change compared to previous map.	The former mill to the north has been demolished.

Table 3: Summary of Site History from Aerial Photographs

Date	On-Site History	Surrounding Land Use History
2000	The site is disused with trees and scrubs growing in the eastern half of the site.	The former mill to the immediate North of the site is now disused. A warehouse is being constructed to the southwest of the site.
2012	There is no significant change compared to the previous photograph	The warehouse to the southwest of the site has been constructed.
2018	There is no significant change compared to the previous photograph	There is no significant change compared to the previous photograph
2019	There is no significant change compared to the previous photograph	There is no significant change compared to the previous photograph

Figure 5: OS Map Extract 1851



Figure 6: OS Map Extract 1910

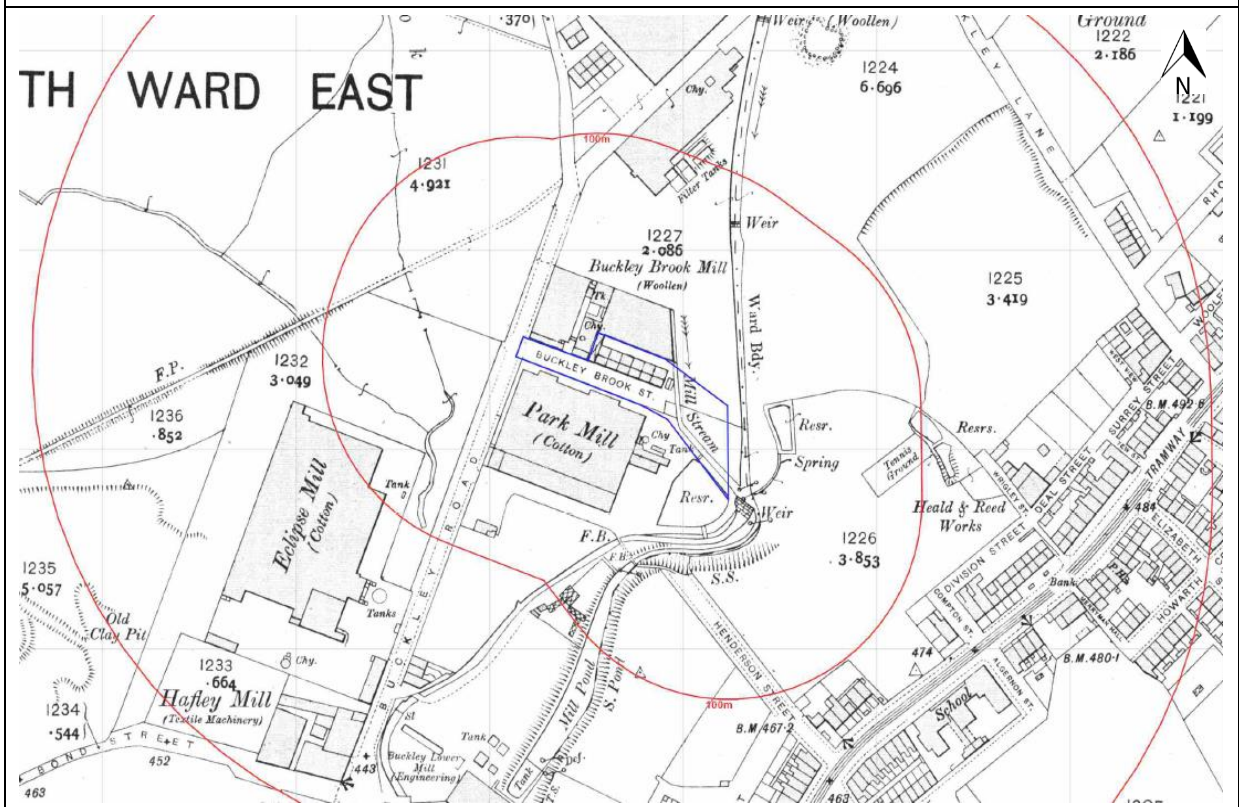


Figure 7: OS Map Extract 1981-1985

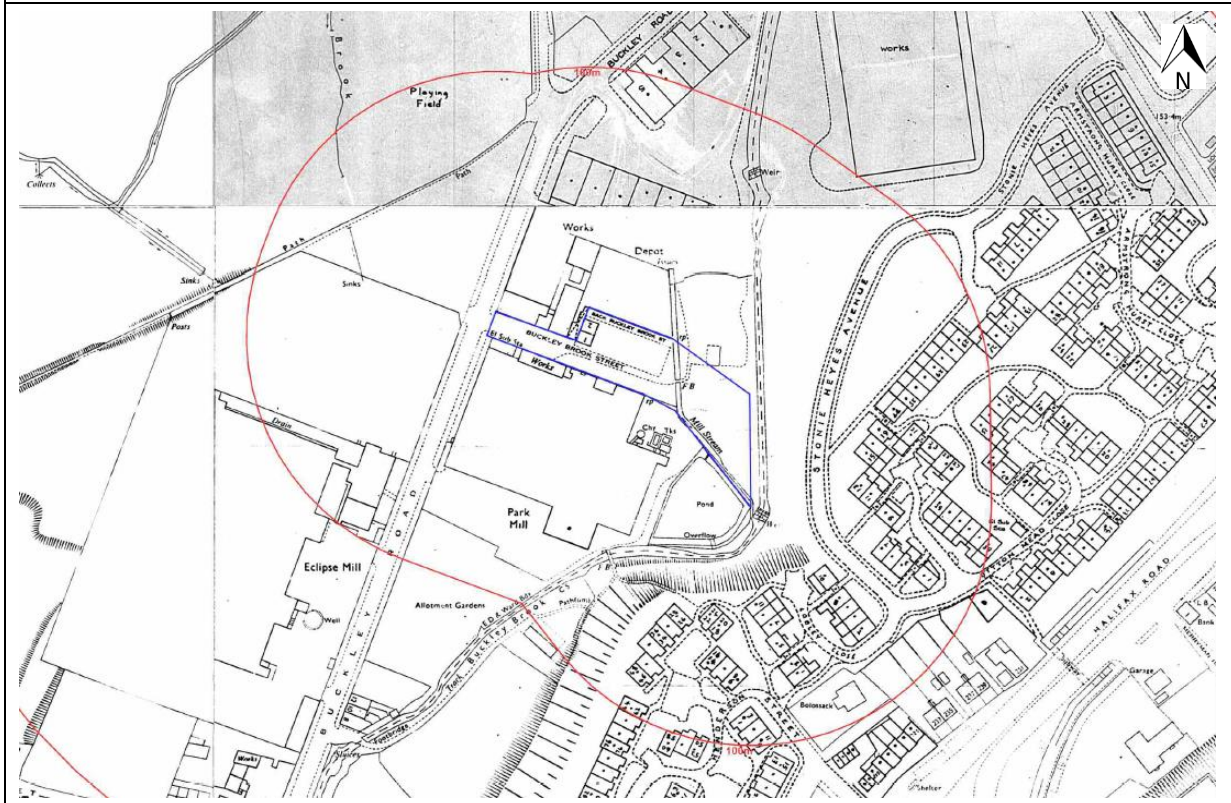
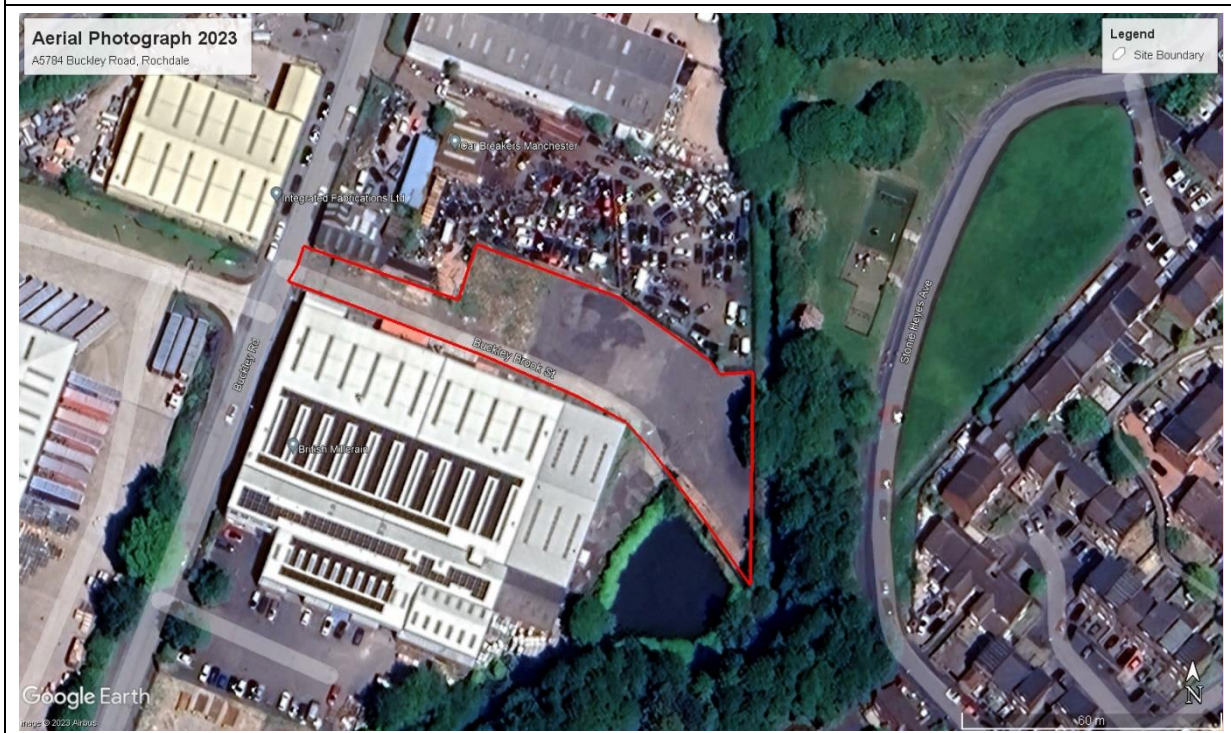


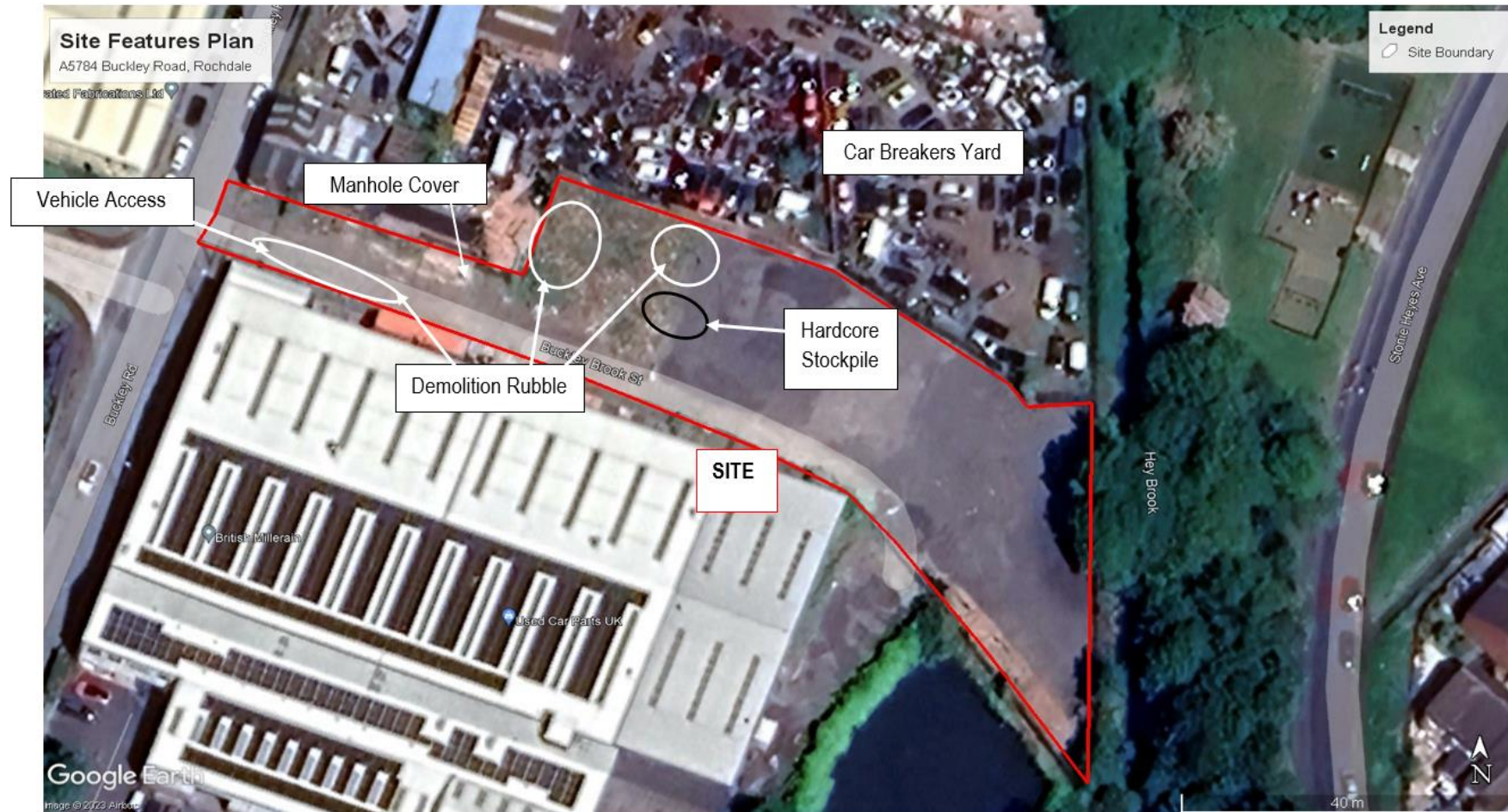
Figure 8: Aerial Photograph 2021



5.0 WALKOVER SURVEY

- 5.1 A walkover survey was completed on Friday 12th January 2024. The photographs and notes from this survey are appended to this report as Appendix 2 and Appendix 3 respectively.
- 5.2 The site is accessed by foot and vehicle off Buckley Road to the west.
- 5.3 The site is an irregular shaped parcel of land with which comprises of disused yard of hardstanding (95%) and small dyke (5%) approximately 0.27 hectares in size.
- 5.4 The site bounded by metal palisade fencing on the east and south sides and by a brick wall and palisade fencing along the northern boundary, the west of the site has a metal gate from which access for a vehicle off Buckley Road is provided.
- 5.5 The immediate vicinity of the site comprises industrial and commercial structures to the north, west and south with Hey Beck to the east.
- 5.6 The general surrounding area comprises of industrial and commercial, residential, and undeveloped land.
- 5.7 The site contains stockpiles of demolition rubble.
- 5.8 The site contains stockpiles of building material used for levelling the site.
- 5.9 The site has one obvious manhole for potential drainage.
- 5.10 A site features plan is presented as Figure 9 overleaf.

Figure 9: Site Features



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 Land Contamination Risk Management Environmental Agency, July 2023.
- 6.2 Table 6 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 4 and Table 5 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and Land Contamination Risk Management Environmental Agency, July 2023.
- 6.3 Table 6 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 commercial/industrial end use.

Table 4: 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 5: 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 The following possible on-site sources have been identified from the historical study and the Enviro + Geo Insight Data:

- Historical Made Ground.
- Electrical sub-station.
- Historical site-use and demolition.

- Alluvium geology.

6.6 The following contaminants are potentially associated with the on-site sources:

- Heavy Metals and Metalloids.
- Inorganic.
- PAH.
- TPH.
- PCBs.
- Asbestos
- Hazardous Ground Gas.

6.7 The following possible off-site sources have been identified from the historical study and the Enviro + Geo Insight Data:

- Historical Made Ground.
- Historical site uses and demolition.

Potential Receptors

6.8 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.
- Surface water and Groundwater within the underlying aquifer.

Potential Pathways

6.9 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 surface waters and shallow groundwater.
- Vertical or lateral migration of ground gas.

Table 6: Preliminary Conceptual Model

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Contamination associated with the made ground E.g., Heavy Metals, PAH, TPH, BTEX, ground gases.	Dermal contact, ingestion, and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Low	The site currently comprised of an unoccupied previously industrial site with the site covered by hardcore. There is therefore limited potential for direct contact between contaminated soils and receptors. The risk is therefore considered to be LOW .
		Adjacent land users	Unlikely	Moderate	Low	Industrial and commercial buildings border the site to the north, west and east. The risk is considered LOW . However, usual dust control measures should be implemented as part of good site working practices during construction to reduce dust generation.
		Future land users	Unlikely	Moderate	Low	The site will be used by a commercial/industrial end user with no areas of soft landscape and the site will be covered with hardstanding. The risk to future site users via direct exposure is considered LOW due to a lack of pollutant linkage.
		Construction Workers	Likely	Moderate	Moderate	Construction workers may 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 MODERATE to LOW risk to construction workers is anticipated.
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Low Likelihood	Moderate	Moderate to low	Leachable contaminants may be present beneath the site associated with the former usage. The presence of Secondary (A) aquifer in the superficial alluvium and sandstone bedrock deposits. However, the groundwater vulnerability of the site low. Therefore, the risk to groundwater is considered MODERATE to LOW .
	Lateral migration in surface waters	Surface water	Low Likelihood	Moderate	Moderate to low	Leachable contaminants may be present beneath the site associated with the former usage. There is a surface water feature 4m east of the site. Therefore, the perceived risk to surface water is MODERATE to LOW .
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Low	Very Low	There is potential for made ground soils beneath the site associated with former buildings. However, there are no buildings on site for which the ground gas can accumulate. The risk to current site users from ground gas is therefore considered VERY LOW .
		Adjacent land users	Unlikely	Moderate	Low	Industrial/Commercial properties are located in close proximity to the site boundary. There is potential for made

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
						ground soils beneath the site associated with former buildings. The risk to adjacent site users from ground gas is therefore considered LOW .
		Future land users	Likely	Moderate	Moderate	There is potential for made ground soils beneath the site associated with former buildings and geology but absence of other potential sources. Therefore, the risk to future site users from ground gas is therefore considered MODERATE . Use of appropriate ground gas protection measures can mitigate against this risk.
		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	Unlikely	Moderate	Low	Asbestos may be present in the made ground soils beneath the site and within the existing building. However, no asbestos was observed on the site walkover. Asbestos is only harmful when disturbed. The risk to current site users is considered to be LOW .
		Adjacent land users	Unlikely	Moderate	Low	Commercial/Industrial properties are located in close proximity to the site boundary. Asbestos may be present in the made ground soils beneath the site and within the existing building which will demolished. However, no asbestos was observed on the site walkover. Demolition and disturbance of soil during the construction phase may allow fibres to become airborne. The risk is therefore considered LOW . Dust control measures (dampening down) should be implemented as part of good site working practices in order to reduce the risk.
		Future land users	Unlikely	Moderate	Low	The new industrial unit and hardstanding across the site make exposure to ACM soils unlikely due to absence of pollutant pathway. Therefore, a LOW -risk rating has been assigned.
		Construction Workers	Low Likelihood	High	Moderate	Construction workers may be exposed to potential asbestos in made ground soils and the existing building during demolition. The risk is considered MODERATE . A contamination assessment of the 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 (2012) 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 7.

Table 7: Summary of Geotechnical Hazards

Geohazards:	
Highly Compressible Ground	Moderate
Collapsible Soils	Very Low
Swelling Clay	Very low risk
Running Sand	Low
Ground Dissolution	Negligible risk
Landslip	Low risk
Mining & Quarrying	The site is located within an identified coal mining area but not within a development high risk area. The risk from mining and quarrying is generally considered low.

Geotechnical Design Considerations	
Site Clearance	The site is largely unoccupied with only a few small stockpiles of demolition rubble which can be removed offsite.
Trees	There are no large trees located on or near the site.
Existing Buildings/Obstructions	The site is not currently occupied by any existing structures, however previous structures associated are likely to result in relic foundations beneath the site. At the time of the walkover the foundations of the previous structure were not visible.
Foundations	The suitability of the proposed foundations would depend on the ground conditions present on site. The site is recorded to have made ground, alluvium superficial deposits and Milnrow Sandstone bedrock. Therefore, shallow foundation may be suitable for the proposed industrial development bearing into suitably competent clay or sandstone bedrock. However, due to previously demolished buildings on site, deep Made Ground fill may also be present, and foundations may need to be deeper. An intrusive ground investigation will be carried out prior to any construction works taking place to discover the most suitable foundation options for the site.
Floor Slabs	An intrusive geotechnical investigation is recommended prior to any construction works to identify the most suitable slab design for the on-site ground conditions.

Geotechnical Design Considerations	
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 a Secondary A superficial and bedrock aquifer. The highest risk of groundwater flooding on site is considered low.
Earthworks	Extensive earthworks are unlikely to be required for the proposed development as the proposed development is located within land that is relatively flat. However, it is likely that relic foundations will need to be removed.
Slopes	The site has small slopes at the rear down to the stream and pond.
Retaining Walls	There are no retaining walls onsite.
Concrete Foundations	There is a low potential for chemically aggressive ground conditions on site. However, an intrusive geotechnical investigation would be necessary to confirm this.

8.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

- 8.1 It is understood that the Client intends to erect a new industrial unit new on the current unoccupied land.
- 8.2 There is potential for the presence of contamination on site associated with the made ground and historical site usage as part of a mill.
- 8.3 The geology beneath the site is shown to be the Alluvium and Milnrow Sandstone, both of which are classified as a Secondary A Aquifer.
- 8.4 The site is located within the specified search distance of an identified coal mining area, however, not within a Development High Risk Area.
- 8.5 The property is not located in a Radon Affected Area, as less between 1% of the properties are above the Action Level. Therefore, no radon protective measures are required.
- 8.6 Given the previous historical buildings on site the overall risk from soil contamination to industrial end users and construction workers is **MODERATE to LOW**.
- 8.7 The overall risk to controlled waters is concluded to be **MODERATE to LOW** based on the anticipated geology and nearby surface water features.
- 8.8 The risk from ground gas to end users and construction workers is **MODERATE** based on potential made ground and alluvial superficial deposits.
- 8.9 An Environment Agency Flood Zone 2 and 3 are located on the boundary of the site. However, the highest risk of groundwater flooding is **LOW**.

Recommendations

- 8.10 Based on the information obtained for the formation of this report it is recommended that suitable combined Phase II environmental and geotechnical site investigation is carried out at the site to establish the presence of any soil and groundwater contamination at the site and identify the ground conditions and provide details of their engineering properties in order to facilitate foundation design for the proposed development.
- 8.11 As part of the Phase II investigation, it is recommended that monitoring wells be installed to facilitate the measurement of ground gas concentrations (and flow rates).
- 8.12 The intrusive investigation may reveal on-site sources of contamination that were not established by the Phase I Desk Study, thus requiring modification of the CSM.
- 8.13 A Flood Risk Assessment is required for the site.

APPENDIX 1

GROUNDSURE REPORTS

APPENDIX 2

SITE PHOTOGRAPHS

Earth Environmental & Geotechnical Ltd Tel: 0161 975 6088 Email: info@earthenvironmental.co.uk Web: www.earthenvironmental.co.uk	SITE PHOTOGRAPHS 
Job No.: A5787-24	Site: Buckley Road Industrial Estate, Rochdale
Plate 1 Viewing entrance to the site and adjacent substation	Plate 2 View of northwestern boundary of previous mill wall
	
Date: 12th January 2024	Date: 12th January 2024
Plate 3 View facing north of boundary wall of previous mill and rubble stockpile.	Plate 4 Viewing north showing green palisade fence of northern boundary and adjacent car breakers yard.
	
Date: 12th January 2024	Date: 12th January 2024

Earth Environmental & Geotechnical Ltd Tel: 0161 975 6088 Email: info@earthenvironmental.co.uk Web: www.earthenvironmental.co.uk	SITE PHOTOGRAPHS 
Job No.: A5787-24	Site: Buckley Road Industrial Estate, Rochdale
Plate 5 Looking east showing palisade fencing and Hey Brook at rear of the site.	Plate 6 Looking at the southeastern corner of the site and offsite pond with down from built up hardcore.
	
Date: 12th January 2024	Date: 12th January 2024
Plate 7 Viewing West showing majority of the site covered with hardcore and stockpiles of hardcore.	Plate 8 Viewing southwest showing stockpile of hardcore.
	
Date: 12th January 2024	Date: 12th January 2024

Figure 10: Site Walkover Photo Locations



APPENDIX 3

SITE WALKOVER NOTES

WALK OVER SURVEY REPORT

Site: Buckley Road Industrial Estate, Rochdale

Date: 12th January 2024

Job No: A5784/24/FDS

Undertaken By: Lewis Waller

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)		Town Industrial Unoccupied form mill ground.
Evidence of Past Activities	Are there: Any relevant street names in area? Features or relics which indicate past history?	No Yes	Walls of previous mill
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		The site part of an industrial area.
Ground Conditions	Is there any evidence of: Mining, Mine entries Subsidence Landslip/slope erosion Former investigation works	No No No No	N/A N/A

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 Yes	There overall topography slopes slightly to the stream at the rear of the site (eastward) but has been built up with hardcore.
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 bounded by metal palisade fencing on the east and south sides and by a brick wall and palisade fencing along the northern boundary, the west of the site has a metal gate.
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 No	There is small amount of weeds and shrubs along the boundary of the site and small trees over the rear boundary fence around Hey Brook.
Ground Surface	Are there areas of hardstanding and estimate the split between hard and soft cover? (If yes describe locations, types, and conditions). Is there any evidence of any spillages or staining?	Yes No	The site was covered entirely with hardcore.

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)	Yes	There is one manhole cover on the site.
	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)	No	No evidence of the Mill stream or drainage running across the site.
	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 evidence of water quality variation in the adjacent stream at the east of the site.
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	An electrical substation is adjacent to the site and in use.
Buildings	Is there any evidence of asbestos construction materials e.g., roofing, insulation materials.	No	No evidence of asbestos was observed on the site walkover. None of the occupants were aware of any asbestos. However, given the age of the building ACM may be present.
	Do any buildings have basements?	Yes/No	There was no evidence of any exiting basement, but these may have been infilled.
	Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?	Yes/No	Unknown.

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)?	No	N/A.
Process Air Emissions	Point Source: Are there any stacks / vents / cooling towers / abatement equipment?	No	N/A.
	Fugitive Source: is there any stockpiled material / windblown dust / vapour process?	No	N/A
Storage of fuels & Chemicals	Are there any drums / containers (if yes, describe quantity, full /empty, stored on hard standing / soft landscaping, bunding)?	No	N/A
	Are there any above ground fuel tanks (if yes, describe locations, volumes, how many, bunding, used / disused, condition?)	No	N/A.
	Is there any evidence of underground fuel tanks (fuel pumps, covers, vent pipes, how many and how large, fill point, used / disused, and condition)?	No	N/A.
Accidents	In the event of a large spillage would runoff affect any vulnerable watercourse/culverts?	No	N/A.
	Are emergency procedures / equipment in place?	No	N/A.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Waste	Are there any waste skips present on site?	No	N/A
	Are waste storage facilities adequate?	No	N/A
	Is there any litter/fly tipped material?	Yes	There small stockpile of demolition rubble at the site from the former mill building.
Atmospheric	Are there any fumes, odours originating from site or affecting site from neighbouring sites?	No	N/A.
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.		The site is open and easily accessible by a vehicle. On the hardstanding at the rear of the site? No obvious onsite water supply.
Site Environs	Are there any local features that could have a harmful influence e.g., landfill, industrial processes, railway land?	Yes/No	N/A.
	Are there any sensitive water features/courses near to the site?	Yes/No	N/A.
Local Knowledge / Anecdotal Evidence			N/A
Site Dimensions	Describe shape of Site in plan and measure dimensions.		The site is an approximately rectangular shape of 0.27 He.

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 2024 and should be read considering 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.