



EARTH ENVIRONMENTAL
& GEOTECHNICAL

Phase 1 GeoEnvironmental Desk Study

Moss Lane East

Manchester

September 2021

On behalf of

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**MOSS LANE EAST
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PHASE I GEOENVIRONMENTAL DESK STUDY
FOR
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CONTENTS

1.0	INTRODUCTION.....	1
	Appointment.....	1
	Objective	2
	Scope	2
2.0	SITE LOCATION AND DESCRIPTION	3
	Site Utility Services	4
3.0	ENVIRONMENTAL SETTING	5
	Geology.....	5
	Ground Workings	5
	Mining and Other Underground Workings.....	5
	Radon Potential.....	6
	Hydrogeology and Hydrology.....	6
	Landfill & Waste Management Activity	6
	Industrial Land Use Information	7
	Environmental Permits, Incidents and Registers.....	8
	Environmentally Sensitive Sites	9
	Ecology	9
	Archaeology	9
	Potential Flood Risks	9
	Previous Site Investigations	9
4.0	SITE HISTORY	10
5.0	PRELIMINARY CONTAMINATION RISK ASSESSMENT	16
	Introduction	16
	Potential Sources.....	17
	Potential Receptors.....	17
	Potential Pathways.....	18
6.0	GEOTECHNICAL HAZARDS ASSOCIATED WITH THE DEVELOPMENT	21
7.0	CONCLUSIONS & RECOMMENDATIONS.....	23
	Conclusions.....	23
	Recommendations	23

FIGURES

Figure 1	Proposed Development Plan
Figure 2	Site Location Plan
Figure 3	Site Photograph
Figure 4	OS Map Extract: 1848
Figure 5	OS Map Extract: 1922
Figure 6	OS Map Extract: 1973-1986
Figure 7	Aerial Photograph 2021
Figure 8	Site Features Plan

TABLES

Table 1	Environmental Permits, Incidents and Registers within 500m of the Site
Table 2	Summary of Site History
Table 3	Consequence, Probability and Risk
Table 4	Estimation of Level of Risk by Comparison of Consequence and Probability
Table 5	Preliminary Conceptual Model
Table 6	Summary of Geotechnical Hazards

APPENDICES

Appendix 1	GroundSure Report
Appendix 2	Report Limitations

1.0 INTRODUCTION

Appointment

- 1.1 Earth Environmental & Geotechnical Ltd has been commissioned by MAI Construction Ltd (the client) to undertake a Phase I GeoEnvironmental Desk Study for the proposed development to the south of Moss Lane East, Manchester.
- 1.2 It is understood that the client intends to construct a residential development on the site comprising of terrace dwelling houses. The development will consist of four terrace houses with front and rear gardens, along with four car parking spaces.
- 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 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.
 - Manchester City Council Planning Portal.

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site is in South Manchester approximately 2.5km to the south of Manchester City Centre. The approximate National Grid Reference for the centre of the site is SJ 8418295715 (X: 384182, Y: 395715), with the closest postcode being M14 4PA.
- 2.2 The site is an irregular shaped parcel of land with current access from Moss Lane East to the south and Broadfield Road to the east. The maximum dimensions of the site are 25m north to south and 24m west to east. The site occupies an area of approximately 0.05 hectares.
- 2.3 The site is currently a derelict parcel of land demarcated by residential dwellings to the east and south. Current site access is available via a Moss Lane East and Broadfield Road. A wooden advertisement board intersects the site across the northeast to the south.
- 2.4 The site is located within a suburb of Manchester and is surrounded by residential dwellings. Terraced houses are located along the site boundary to the east and south. A public alleyway is located along the site boundary to east of the site. Further to the north is a road and an area of open space.
- 2.5 A location plan is shown below as Figure 2, together with a recent site photograph as Figure 3 (overleaf).

Figure 2 Site Location Plan

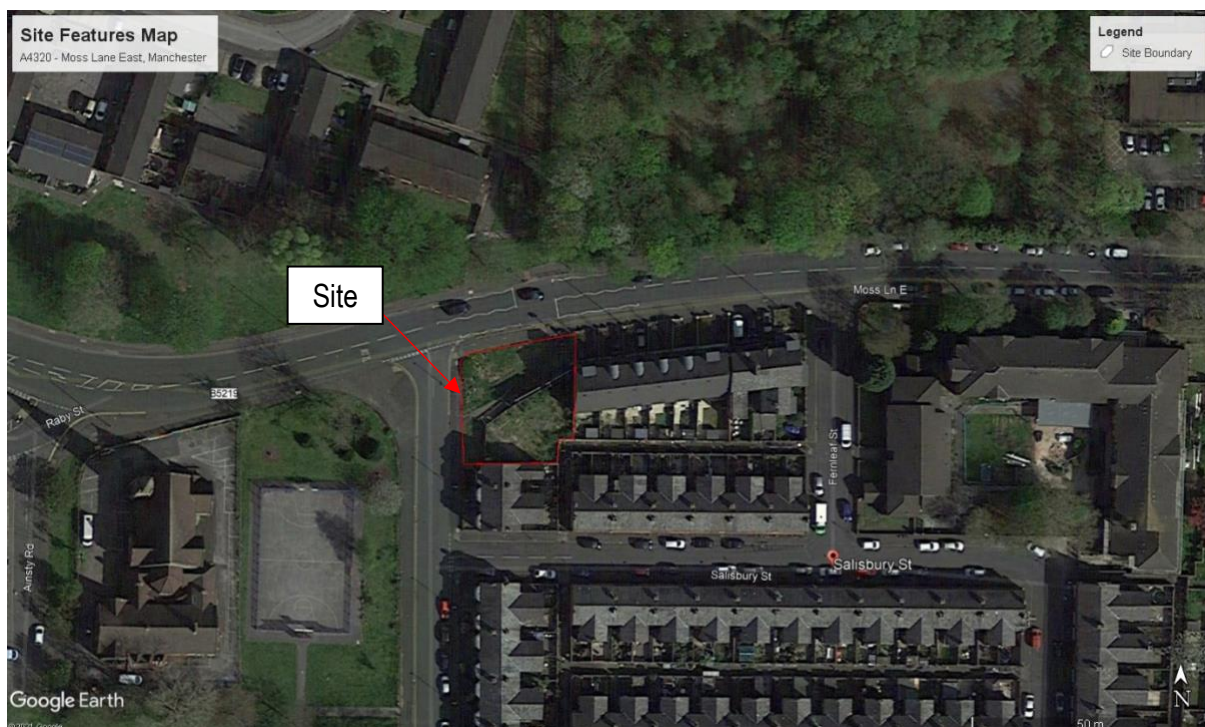


Figure 3 Site Photograph



Site Utility Services

- 2.6 Site service plans have not been obtained for the site on behalf of 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 has 9 records of artificial land within 500m of the site. The closest record refers to an artificial deposit of landscaped ground located 44m southwest of the site.
- 3.4 The site is underlain by superficial deposits of Till Deposits comprising Devensian Diamicton, commonly known as Boulder Clay.
- 3.5 The solid geology beneath the site is shown to be the Chester Pebble Beds Formation comprising sandstone.
- 3.6 There are no records of linear features within 500m of the site boundary.
- 3.7 There are no records of landslips within 500m of the site boundary.
- 3.8 There are no BGS borehole records identified within 250m of the site.
- 3.9 The site is in an area where the hazard rating is negligible with regard to compressible deposits and soluble rocks. The hazard rating is very low with regard to shrink well clays, running sands, collapsible deposits and landslides.

Ground Workings

- 3.10 There are 4 records of historical surface ground working features identified within 250m of the site boundary. 1 of these records is onsite and refers to a pond, dated 1851. The closest off site record also refers to a pond, located 110m northeast, dated 1851.
- 3.11 According to the BGS, there are no records of a British Pit within 500m of the site.

Mining and Other Underground Workings

- 3.12 The site is located within the specified search distance (1km) of an identified coal mining area. However, reference to the Coal Authority Interactive viewer shows the site is not located within a Development High Risk Area.
- 3.13 There are no records for non-coal mining areas located within 1km of the site.
- 3.14 There are no areas of brine extraction, gypsum extraction, tin mining or clay mining within 1km of the site.
- 3.15 There are no records for non-coal cavities or natural cavities identified within 1km of the site.

- 3.16 There are no records for historical underground working features identified within 1km of the site.

Radon Potential

- 3.17 The property is not located in a Radon Affected Area, less than 1% of the properties are above the Action Level. Therefore, radon protection measures are not required.

Hydrogeology and Hydrology

- 3.18 The superficial deposits of Till Deposits are classified by the Environment Agency (EA) as a Secondary Undifferentiated Aquifer with a mixed flow type and a low to high permeability. The BGS states the following:

Secondary Undifferentiated Aquifer *'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.'*

- 3.19 The Chester Pebble Beds Formation are classified by the Environment Agency (EA) as a Principal Aquifer with a mixed flow type and a moderate to high permeability. The BGS states the following:

Principal Aquifer *'Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers'*

- 3.20 The groundwater vulnerability and soil leaching potential of the site has been classified as low with a low leaching potential. The BGS states:

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'*

- 3.21 There are 17 groundwater abstraction licence records within 2km of the site. The closest active licence refers to general cooling at Heineken UK Ltd, located 368m to the northwest of the site.

- 3.22 There are no surface water abstraction licence records within 2km of the site.

- 3.23 There are no potable abstraction licence records within 2km of the site.

- 3.24 The site is located within 500m of a Groundwater Source Protection Zone.

- 3.25 There are no records of water network entries within 250m of the site.

- 3.26 There are no surface water features identified within 250m of the site.

Landfill & Waste Management Activity

- 3.27 There are no current Environment Agency/Natural Resource Wales landfill records within 500m of the site.

- 3.28 There are no records of historic Environment Agency/Natural Resource Wales landfill sites within 500m of the site.
- 3.29 There are no records of BGS/DoE non-operational landfill sites within 500m of the study site.
- 3.30 There are no records of a historical landfill site from the Local Authority and Historical Mapping Records within 500m of the site.
- 3.31 There are no records of a historical waste site from the Local Authority and Historical Mapping Records within 500m of the site.
- 3.32 There are 4 records of a waste treatment, transfer or disposal site within 500m of the study site. The closest record refers to a treating waste exemption located 159m to the northeast of the site.
- 3.33 There are no records of current Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site.

Industrial Land Use Information

- 3.34 There are 24 records of potentially contaminative historical land uses identified within 500m of the site. The closest record refers to a brewery located 283m to the northwest of the site, dated 1994. Other records in the vicinity refer to a police station, electricity station, fire station and infirmary.
- 3.35 There are 6 records of current potentially contaminative land uses identified within 250m of the site. The closest record refers to an electricity substation located 31m to the northwest of the site. Other records in the vicinity refer to Greenheys MOT Station, A & Co Shutters and farming silos.
- 3.36 There are 23 records of historical tanks identified within 500m of the site. The closest record refers to tanks located 278m northwest of the site, dated 1995.
- 3.37 There are 12 records of historical energy features identified within 500m of the site. The closest record refers to an electricity substation located 30m to the north of the site, dated 1992.
- 3.38 There is 1 record for current petrol or fuel sites within 500m of the site. The record refers to a station located 292m to the southwest of the site with an obsolete status.
- 3.39 There are no records of historical petrol or fuel sites within 500m of the site.
- 3.40 There are 3 historical garage and motor vehicle repair site records identified within 500m of the site. The closest record refers to a garage located 427m to the east of the site, dated 1982.
- 3.41 There are no National Grid high voltage underground electricity transmission cables within 500m of the site.
- 3.42 There are no National Grid high-pressure gas transmission pipelines within 500m of the site.
- 3.43 There are no historical railway and tunnel features identified within 250m of the site.
- 3.44 There are no historical railway lines identified within 250m of the site.

- 3.45 There are no current active railway line records identified within 250m of the site.
- 3.46 There are no underground railway lines or tunnels identified within 250m of the site.
- 3.47 The site is not within 5km of the route of the High Speed 2 rail project.
- 3.48 The site is not within 500m of the route of the Crossrail 1 rail project.

Environmental Permits, Incidents and Registers

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

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

Permit/Incident/Register	Number
Historical Licensed Industrial Activities (IPC)	0
Part A (1) and IPPC Authorised Activities	28
Pollutant Release to Surface Waters (Red List)	0
List 1 Dangerous Substances Inventory Sites	0
List 2 Dangerous Substances Inventory Sites	0
Part A (2) and Part B Activities and Enforcements	1
Category 3 or 4 Radioactive Substance Authorisations	6
Licensed Discharge Consents	0
Planning Hazardous Substance Consents and Enforcements	0
Dangerous or Hazardous (COMAH and NIHHS) Sites	0
Sites Determined as Contaminated Land under Part 2A EPA 1990	0
Regulated Explosive Sites	0
Pollutant Release to Public Sewer	0
Substantiated Pollution Incidents (Category 1 and 2)	0
Pollution Inventory Substances, Wastes and Radioactive Wastes	7

- 3.50 There are 28 records of Part A (1) and IPCC Authorised Activities within 500m of the site. The closest record refers to Heineken UK Ltd located 334m northwest of the site.
- 3.51 There is 1 record of Part A (2) and Part B Activities and Enforcements within 500m of the study site. The closest record refers to a historical Part B permit for petrol vapour recovery located 334m southwest.
- 3.52 There are 6 records of Radioactive Substance Authorisations within 500m of the site. The closest record refers to the keeping and use of radioactive materials from Medeval Ltd, located 433m northeast of the site.
- 3.53 There are 7 records of Pollution Inventory Substances, Wastes and Radioactive Wastes. The closest record of pollution inventory substance refers to Heineken UK Ltd treatment and

processing located 334m northwest of the site. The closest record of pollution inventory waste refers to Heineken UK Ltd treatment and processing located 334m northwest of the site.

Environmentally Sensitive Sites

- 3.54 There are no records of a Local Nature Reserve (LNR) within 2km of the study site.
- 3.55 There are no records of Greenbelt land within 2km of the study site.

Ecology

- 3.56 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.
- 3.57 However, the site is classified as Urban Land.

Archaeology

- 3.58 An archaeological assessment falls outside the brief of this report. Where considered necessary, advice should be sought from an archaeological specialist in this respect.
- 3.59 There are no records of World Heritage Sites, Scheduled Ancient Monuments and Listed Buildings within 250m of the site.

Potential Flood Risks

- 3.60 Detailed assessment of flood risks is outside the scope of this report. However, the site does not lie within 50m of an Environment Agency Flood Zone 2 and 3.
- 3.61 There are no records of flooding from rivers and sea (RoFRaS) within 50m of the site.
- 3.62 There are no records of flood defences or areas benefitting from flood defences within 250m of the site.
- 3.63 There are no records of areas used for flood storage within 250m of the site.
- 3.64 The highest risk of surface water flooding occurring on-site is 0.1m to 0.3m for a 1 in 1000-year return period.
- 3.65 The highest risk of groundwater flooding occurring on-site is moderate to high.

Previous Site Investigations

- 3.66 Earth Environmental & Geotechnical Ltd are not aware of any previous site investigations carried out for 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 1848.
- 4.2 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
1848 1:10,560 1850 1:1,056	The site is an undeveloped parcel of land.	A cottage is situated on the southern boundary of the site. A road is located on the northern boundary of the site. Residential dwellings are located approximately 200m east of the site. Pepper Hill cottage is located 300m southwest of the site.
1891 1:5,000 1893 1:2,500 1894-1896 1:10,560	No significant change.	A school is located on the western boundary of the site. A large residential dwelling, with relevant roads, is constructed located approximately 80m north of the site. A residential dwelling is located approximately 80m east of the site. A bowling green is created, located approximately 150m southwest of the site.
1908 1:2,500 1908 – 1909 1:10,560	No significant change.	A chapel is constructed on the western boundary of the site. The residential development has expanded, now located approximately 80m northeast of the site. A billiard hall building is created located approximately 150m west of the site. A recreational ground has been developed, located approximately 200m from the site.
1922 1:2,500 1923-1938 1:10,560	A building has been constructed in the northeast corner of the site. A fence structure and concrete path has been constructed from east to west on the site.	A tennis court has been constructed on the western boundary of the site. A tramway is constructed across Moss Lane East, located across the northern boundary of the site. A picture theatre is developed located approximately 150m west of the site.

Date	On-Site History	Surrounding Land Use History
1950 1:2,500 1951 1:2,500 1951-1977 1:2,500	The onsite building is demolished.	The tennis court has been demolished and converted into recreational grounds. The tramway on the northern boundary is converted to a road (Moss Lane East.)
1976 1:2,500 1980 -1987 1:10,000	No significant change.	The residential development located approximately 50m north of the site has been demolished and converted into a school with associated playing fields and tennis courts. A spiritualist church is constructed approximately 150m west of the site. A health clinic is constructed located approximately 200m northeast of the site.
2021 Google Earth Imagery	No significant change.	Land located approximately 50m north of the site is now vegetated with trees. Recreational ground located on the western boundary is now lain with concrete playing courts.

Figure 4 OS Map Extract 1848

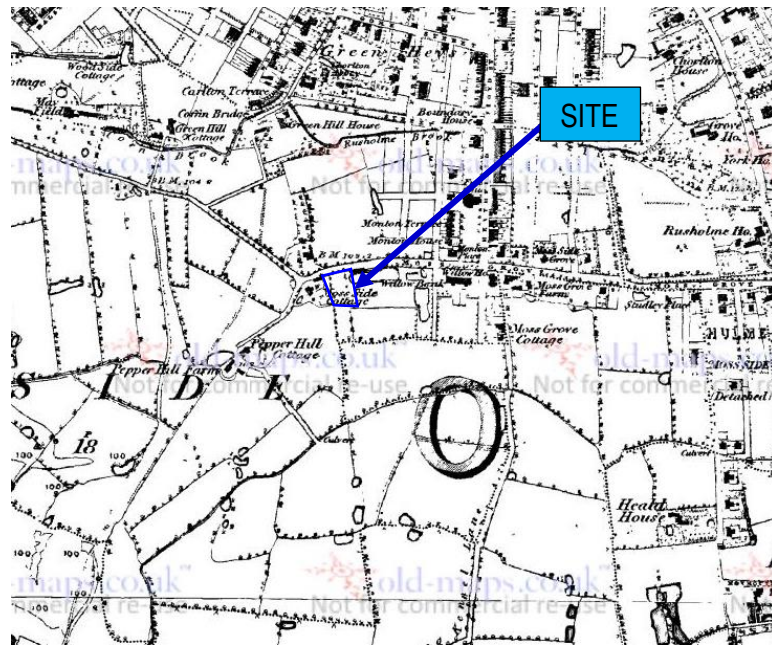


Figure 5 OS Map Extract 1922



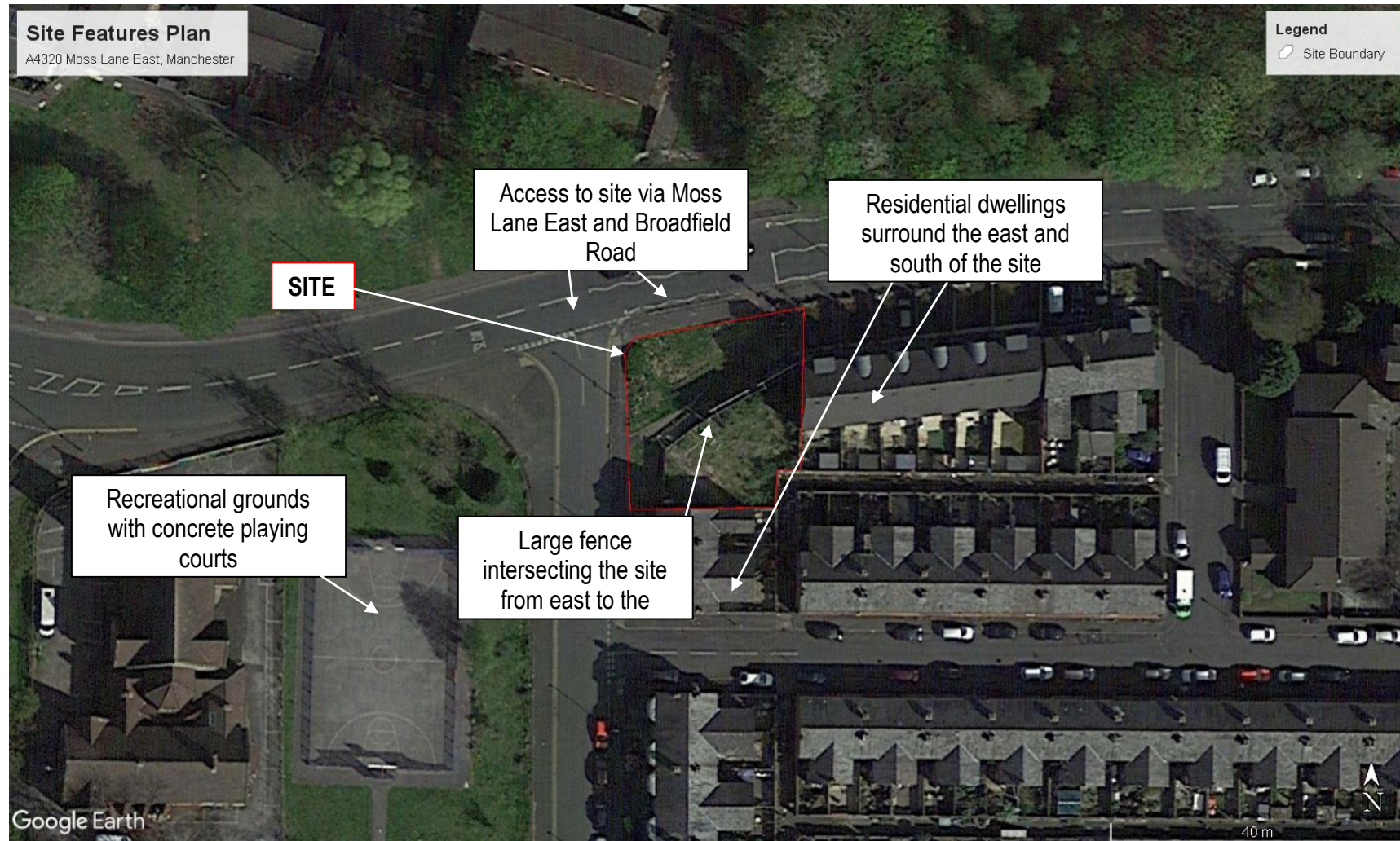
Figure 6 OS Map Extract 1973-1986



Figure 7 Aerial Photograph 2021



Figure 8 Site Features Plan



5.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

Introduction

- 5.1 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⁾.
- 5.2 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.
- 5.3 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.
- 5.4 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 are 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

- 5.5 The site is currently a vacant parcel of land. Potential onsite contamination may be present following the construction and demolition of a small building in the northeast corner of the site.

Potential Receptors

- 5.6 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

Potential Pathways

5.7 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
Potential ground contamination E.g., Ground gases, heavy metals, TPH, PAH.	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Low	The site is currently derelict, however litter and waste from adjoining properties are located onsite. Made Ground is anticipated beneath the soft landscaped areas associated with the development of concrete walkways and construction/demolition of an onsite building. Usual dust control measures should be implemented as part of good site working practices during construction to reduce dust generation. Therefore, the risk is considered to be LOW .
		Adjacent land users	Unlikely	Moderate	Low	Terraced houses are located adjacent the site to the east and recreational grounds are located approximately 10m west of the site. Made Ground is anticipated beneath the soft landscaped areas associated with the concrete walkways and demolition of the onsite building. Usual dust control measures should be implemented as part of good site working practices during construction to reduce dust generation. Therefore, the risk is considered LOW .
		Future land users	Low Likelihood	Moderate	Low	The site is a proposed residential development. The site was previously vacant. Fly tipped materials appear to be present on site. The risk to future site users via direct exposure is LOW .
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers may be exposed to potentially contaminated soils during construction works, however exposure duration will be short-term only. The risk to construction workers is considered MODERATE to LOW . Appropriate health and safety measures (in line with CDM and other relevant health and safety guidance) will reduce the risk to LOW .

	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Unlikely	Low	Very low	The soil leaching potential and groundwater vulnerability are classified as low. There are 6 active groundwater abstraction licences, although the closest record is located 368m northwest is not likely to impact the site. There are no obvious sources of leachable contaminants. The risk to groundwater is therefore considered VERY LOW .
	Lateral migration in surface waters	Surface water	Unlikely	Low	Very low	There are no surface water features located within 250m of the site and the site is not located in a Flood Zone. There are no obvious sources of leachable contaminants. Therefore, the perceived risk to surface waters is considered to be VERY LOW .
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Moderate	Low	The site is currently derelict, however fly tipped materials and litter are located on site. Given the existing land use, the risk to current site users from ground gas is considered LOW .
		Adjacent land users	Unlikely	Moderate	Low	Terraced houses are located adjacent the site to the west and south of the site. Ground gas may be present within the Made Ground associated with the concrete walkways and demolition of onsite building. However, it is likely any ground gas will have dissipated. The risk to current site users from ground gas is therefore considered LOW .
		Future land users	Unlikely	Moderate	Low	The site is a proposed residential development. Ground gas may be present associated with the Made Ground across the site. However, any void spaces will be backfilled. Modern construction practices will provide a barrier and ventilation. Therefore, the risk is considered LOW .
		Construction Workers	Low Likelihood	Moderate	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 LOW .
	Asbestos Containing Material (ACM)	Current Site Users	Unlikely	Moderate	Low	The site is currently derelict, however an advertisement board/fence and fly tipped materials are located on site. Asbestos may be present within the Made Ground on site associated with the demolished building. Asbestos may be present in fly tipped materials. However, asbestos is only harmful when disturbed. The risk to current site users is considered to be LOW .

		Adjacent land users	Unlikely	Moderate	Low	Terraced houses are located adjacent the site to the east and south of the site. Asbestos may be present within the Made Ground on site associated with the demolished building. Asbestos may be present in fly tipped materials. 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 risk	The site is a proposed residential development. Asbestos may be present within the Made Ground on site associated with the demolished building. Asbestos may be present littered materials. Disturbance may cause fibres to become airborne. The risk is therefore considered MODERATE to LOW .
		Construction Workers	Low Likelihood	Moderate	Moderate to Low risk	Construction workers may be exposed to potential asbestos in the Made Ground on site associated with the litter, construction and demolition of onsite building, and construction of concrete walkways. Therefore, the risk is considered MODERATE to LOW . A contamination assessment of the existing on-site soils will determine the level of risk and necessary mitigation measures.

6.0 GEOTECHNICAL HAZARDS ASSOCIATED WITH THE DEVELOPMENT

6.1 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 is 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	Negligible risk
Collapsible Soils	Very low risk
Swelling Clay	Very low risk
Running Sand	Very low risk
Ground Dissolution	Negligible risk
Landslip	Very low risk
Mining & Quarrying	No mining or quarrying is recorded as taking place on site. The site is located within 1km of a Coal Mining Reporting Area but not located within a Development High Risk Area. Therefore, the mining risk is considered low.
Geotechnical Design Considerations	
Site Clearance	The site is currently derelict, however there is litter and a large fence/advertisement board which will need to be removed. Large overgrown vegetation is also present in the southeast corner of the site which will need to be removed.
Trees	Large overgrown vegetation is also present in the southeast corner of the site which will influence ground conditions.
Existing Buildings/Obstructions	No buildings are present on site; however, a large fence intersects the site along with concrete footpaths, therefore Made Ground may be present on the site. Made ground may also be present following the construction and demolition of a small building onsite.
Foundations	The depth and type of proposed foundations would depend on the ground conditions present on site. The site is underlain by Till Deposits comprising Diamicton. An intrusive ground investigation is recommended prior to any construction works taking place to discover the most suitable foundation options for the site and to make sure the ground conditions are the same across the entire site.

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 a Principal aquifer. The highest risk of groundwater flooding on site is recorded as moderate-high.
Earthworks	Due to the relatively even topography of the site, it is not expected that extensive earthworks will be necessary for the proposed development plan.
Slopes	No steeply dipping slopes were observed on site.
Retaining Walls	No retaining walls were observed on site.
Chemically aggressive ground conditions	Chemically aggressive ground conditions are not expected at this site. However, an intrusive geotechnical investigation would be necessary to confirm this.

7.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

- 7.1 Historically was historically vacant land. By 1922 a small building was constructed onsite, although it was demolished by 1973.
- 7.2 It is understood that the client intends to construct a residential development on the site comprising of four terraced houses.
- 7.3 The site is underlain by superficial deposits of Till Deposits comprising Devensian diamicton (Secondary Undifferentiated Aquifer) and the solid geology beneath the site is shown to be the Chester Pebble Beds Formation comprising sandstone (Principal Aquifer).
- 7.4 The site is not located within a Coal Authority Development High Risk Area.
- 7.5 The overall risk from soil contamination and asbestos to end users and construction workers is concluded to be **LOW**.
- 7.6 The risk to controlled waters is concluded to be **VERY LOW** due to the absence of leachable contaminants, low soil leaching potential and low groundwater vulnerability.
- 7.7 The overall risk from ground gas to end users and construction workers is **LOW**.
- 7.8 The site is not located within a Flood Zone 2 and a Flood Zone 3. However, the risk of groundwater flooding is **MODERATE TO HIGH**.

Recommendations

- 7.9 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.
- 7.10 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.

APPENDIX 1

GROUNDSURE REPORT

APPENDIX 2

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 2021 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.