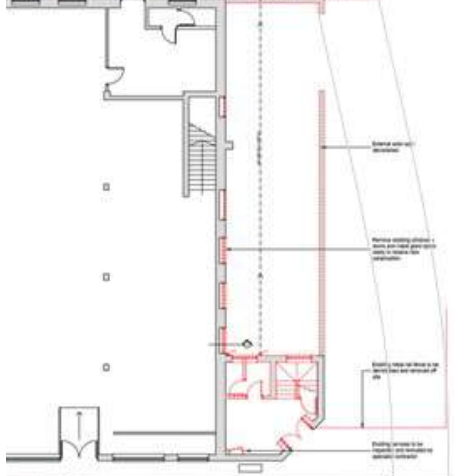




EARTH ENVIRONMENTAL
& GEOTECHNICAL

GeoEnvironmental Desk Study

38 Broughton Street

Manchester

March 2020

On behalf of

RISKY CLOTHING COMPANY
LTD

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Report No. A3434/20

March 2020

Report Title:	38 Broughton Street, Manchester Phase I GeoEnvironmental Desk Study
Report Reference:	A3434/20
Client:	Risky Clothing Company Ltd
Issue Date:	14th March 2020
Drafted By:	D Shanks
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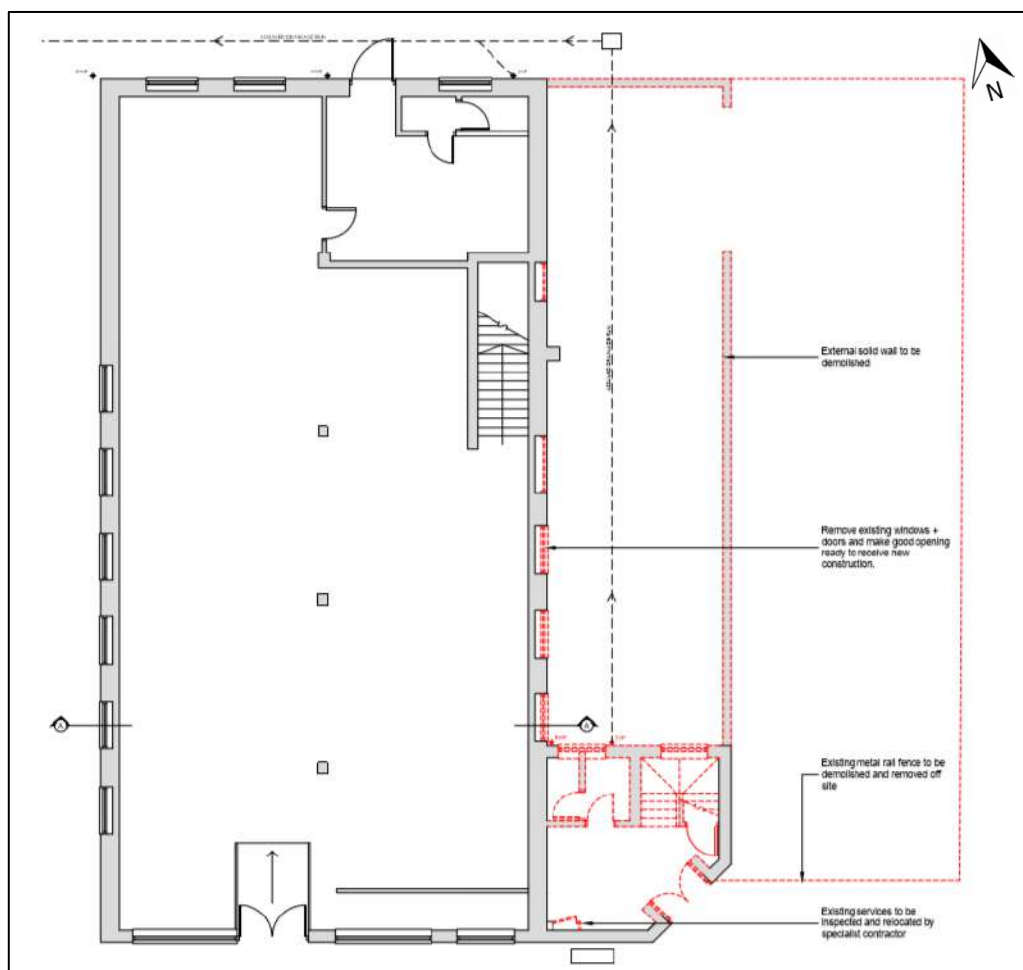
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1.0 INTRODUCTION

Appointment

- 1.1 Earth Environmental & Geotechnical Ltd have been commissioned by P4BA Ltd on behalf of Risky Clothing Company Ltd (the client) to undertake a Phase I Environmental Desk Study for the proposed development at 38 Broughton Street, Manchester.
- 1.2 It is understood that the Client intends to construct an extension to the existing commercial building. Access will be provided via Broughton Street.
- 1.3 A proposed development plan for the site is shown in Figure 1 below.

Figure 1 Proposed Development Plan



Objective

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

Scope

- 1.5 The Phase I Environmental Desk Study comprises of a 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 Planning Portal.

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site is located 2km north of Manchester city centre. The approximate National Grid Reference for the centre of the site is SJ 84021 99997 (X: 384022, Y: 399995) with the closest postcode being M8 8NN.
- 2.2 The site is a square shaped parcel of land with access via Broughton Street to the southwest. The maximum dimensions of the site are 31m northwest to southeast and 31m northeast to southwest. The site occupies an area of approximately 0.05Ha.
- 2.3 The site is currently occupied by a singular commercial building located on the western side of the property. The remainder of the site is completely covered by concrete. The eastern boundary and part of the north and south boundaries are bordered by palisade fencing. The western border is contained withing the current building walls.
- 2.4 The immediate surrounding area is commercial. There is a garage 100m to the southeast and 160m to the northeast.
- 2.5 A location plan is shown below as Figure 2 together with a 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 GeoInsight report (Appendix 1).
- 3.2 Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site specific GroundSure EnviroInsight report (Appendix 1).

Geology

- 3.3 The BGS states that the site is underlain by artificial deposits of infilled ground.
- 3.4 The site is underlain by superficial deposits of Devensian till, comprising of Diamicton.
- 3.5 The solid geology beneath the site is shown to be the Chester Pebble Beds Formation comprising of sandstone.
- 3.6 There are 2 records of linear features within 500m of the site boundary. The closest record refers to a geological fault located 215m to the southwest of the site.
- 3.7 There is 1 record of landslips within 500m of the site boundary.
- 3.8 There are 10 borehole records identified within 250m of the site. The closest record (SJ89NW42) is located 99m to the west of the site. The borehole record describes Made Ground comprising of 0.61m of ash, underneath which is clay to 5.49m, sand to 8.23m and hard clay beneath that to 12.5m.
- 3.9 The site is in an area where the hazard rating is moderate with regard to compressible deposits, very low with regards to shrink-swell clays, landslides, collapsible deposits and running sands. The hazard rating is negligible with regards to soluble rocks.

Ground Workings

- 3.10 There are 55 records of historical surface ground working features identified within 250m of the site boundary, including brick works recorded on-site, dated 1894 – 1956 and unspecified ground workings recorded on site, dated 1906 – 1938. The closest record refers to unspecified ground workings located 30m to the south of the site. Other records in the vicinity refer to unspecified pits, ponds, unspecified heaps, clay pits, more brick works, refuse heaps, brick fields and a mortuary.
- 3.11 According to the BGS, there are 3 records of British Pits within 500m of the site. The closest record refers to Broughton Street Brickworks located 147m to the northeast of the site. Production is noted to have ceased.

Mining and Other Underground Workings

- 3.12 There are 2 records of historical mineral planning areas within 500m of the site boundary. The closest record is on site for surface mineral working, clay.

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

Radon Potential

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

Hydrogeology and Hydrology

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

'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.'

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

'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.'

- 3.21 The groundwater vulnerability and soil leaching potential of the soils at the site has been classified as low vulnerability 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.

- 3.22 There are 32 groundwater abstraction licence records within 2km of the site. The closest record refers to a historical license for drinking, cooking, sanitary and washing at Lancashire Dairies Ltd at a site located 217m to the southwest of the site.

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

- 3.24 There are 10 potable water abstraction licence records within 2km of the site. The closest record refers to a historical license for drinking, cooking, sanitary and washing at Lancashire Dairies Ltd at a site located 217m to the southwest of the site.
- 3.25 The site is not located within 500m of a Source Protection Zone or Source Protection Zone within a confined aquifer.
- 3.26 There are no water network entries within 500m of the site.
- 3.27 There are no surface water features identified within 250m of the site.

Landfill & Waste Management Activity

- 3.28 There are no records for current Environment Agency or National Resources Wales landfill records within 500m of the site.
- 3.29 There are 3 records of historic Environment Agency or National Resources Wales landfill sites within 500m of the site. The closest record refers to a landfill on Elizabeth Street located 8m to the east of the site. There are no details available regarding the waste site.
- 3.30 There are no records of a BGS/DoE non-operational landfill sites within 500m of the study site.
- 3.31 There are no records of landfills from the Local Authority and Historical Mapping Records within 500m of the site.
- 3.32 There are 2 records of waste treatment, transfer or disposal sites within 500m of the study site. The closest record refers to a waste storage exemption located 296m to the east of the site.
- 3.33 There is 1 record of Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site. The closest record refers to a material recycling treatment facility located 330m to the west of the site.

Industrial Land Use Information

- 3.34 There are 146 records of potentially contaminative historical land uses identified within 500m of the site, including a brick works dated 1894-1956, an unspecified ground workings dated 1906-1938, an unspecified works dated 1968 and an unspecified heap dated 1894, all recorded on site. The closest record refers to unspecified commercial/ industrial located 14m to the south of the site. Other records in the vicinity refer to tramway and railway sidings, unspecified pits, unspecified ground workings, unspecified warehouses, unspecified heaps, police stations, sawmills, art metal works, ice works, clay pits, unspecified depots, refuse heaps, printing works, brick works, hospitals, unspecified tanks, brick fields, a mortuary, cabinet works, electricity substations, and garages.
- 3.35 There are 56 records of potentially contaminative current land uses identified within 500m of the site. The closest record refers to an unspecified factory located 9m to the west of the site. Other records in the vicinity refer to warehouses, various clothing and footwear shops, electricity substations, telecommunications features, generic tanks, vehicle repair and recovery services, recording studios, packaging facilities, catering facilities, textiles machinery facilities and car breakers yards.

- 3.36 There are 21 records of historical tanks identified within 500m of the site. The closest record refers to an unspecified tank dated 1949 located 38m to the north of the site.
- 3.37 There are 22 records of historical energy features identified within 500m of the site. The closest record refers to an electricity substation dated 1968 - 1993 located 48m to the south of the site.
- 3.38 There are 3 records for current petrol or fuel sites within 500m of the site. The closest record refers to an obsolete unbranded petrol station located 298m to the east of the site.
- 3.39 There are no records of historical petrol or fuel sites within 500m of the site.
- 3.40 There are 48 historical garage and motor vehicle repair site records identified within 500m of the site. The closest record refers to a car breakers yard dated 1975 located 137m to the northeast of the site.
- 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 40 historical railway and tunnel features identified within 250m of the site. All of which are tramway and railway sidings.
- 3.44 There are no historical railway lines identified within 250m of the site.
- 3.45 There are no current active railway lines 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 500m 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 below.

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

Permit/Incident/Register	Number
Historical licensed industrial activities (IPC)	0
Licensed industrial activities (Part A (1))	0
Hazardous substance storage/usage	0
List 1 Dangerous Substances	0
List 2 Dangerous Substances	0
Licensed pollutant release (Part A (2)/B)	0
Radioactive Substance Authorisations	0

Permit/Incident/Register	Number
Licensed Discharge Consents to controlled waters	0
Pollutant release to surface water (Red List)	0
Pollutant release to public sewer	0
Pollution Incidents (EA/NRW)	6
Pollution Inventory Substances	0
Pollution Inventory waste transfers	0
Pollution inventory radioactive waste	0
Control of Major Accident Hazards (COMAH)	0
Regulated explosive sites	0
Sites Determined as Contaminated Land under Part 2A EPA1990	0

- 3.50 There are 6 Pollution incidents (EA/NRW) within 500m of the study site. The nearest record refers to an incident involving household waste at a site located 89m to the west of the site. It had no impact on water and air, with a minor impact on land.

Environmentally Sensitive Sites

- 3.51 There are no Sites of Special Scientific Interest (SSSI) within 2km of the study site.
- 3.52 There are no Special Areas of Conservation (SAC) within 2km of the study site.
- 3.53 There are no Special Protection Areas within 2km of the study site.
- 3.54 There are no records of Designated Ancient Woodland within 2km of the study site.
- 3.55 There are 2 records of Local Nature Reserves (LNR) within 2km of the study site. The closest is the Cliff/ Kersal Dale located 1.9km to the northwest of the site.
- 3.56 There site is located within a Nitrate Vulnerable Zone. However, given the non-agricultural proposed end-use of the site, this is not considered to be a concern.
- 3.57 There are no records of Forest Parks within 2km of the study site.
- 3.58 There are no records of Greenbelt land within 2km of the study site.
- 3.59 There are no other records for Designated Environmentally Sensitive Sites within 2km of the study site.

Ecology

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

Archaeology

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

Potential Flood Risks

- 3.62 Detailed assessment of flood risks is outside the scope of this report.
- 3.63 However, the site does not lie within 50m of an Environment Agency Zone 2 or Zone 3 floodplain.
- 3.64 There are no records of flood defences, areas benefitting from flood defences or areas used for flood storage within 250m of the site.
- 3.65 The highest risk of surface water flooding is negligible.
- 3.66 The highest risk of groundwater flooding is moderate.

Previous Site Investigations

- 3.67 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 - 1850 1:1056 1:10560	The site is unoccupied and likely forms part of an agricultural plot.	Residential district 150m to the west and 200m to the east. Stream 90m to the east and 50m to the south, originating from a spring 150m to the northeast.
1891 – 1894 1:2500 1:10560	The site is now part of a brick works, with an old clay pit located on the southern side of the site.	Broughton Street constructed along the south boundary of the site. Brick works and kilns located 50m to the north. Clay pits located 50m to the south, 100m to the northeast and directly east of the site. Tramway from brickworks 100m to the north. Residential district to the west replaced by further brick works and clay pits. Residential expansion 500m to the south and southeast of the site. Stream no longer present fully on the map. Likely infilled to create clay pits. Cheetham park developed 250m to the north of the site.
1906 – 1908 1:2500 1:10560	No significant change.	Large clay pit to the south of the site filled. Stream no longer present on the map. Further residential and industrial development to south of site. Electricity substation constructed 300m to the south west of the site. Hospital constructed 350m to the north of the site.
1922 - 1923 1:2500 1:10560	No significant change.	Development of brickworks 250m to the southwest. Large clay pit 250m to the north of the site extended with north western side turned into a gravel pit/ refuse heap.

Date	On-Site History	Surrounding Land Use History
1931 – 1933 1:2500 1:10560	Clay pit developed further north within the site.	Brick works further developed 10m north of the site. Industrial/ commercial development 100m to 200m to the southwest of the site, including chemical works, printing works and waterproofing works.
1938 1:10560	No significant change.	Industrial development 600m to the west.
1949 – 1951 1:1250	Clay pits filled. Workshop/ commercial building constructed.	Clay pits slightly developed 170m to the northeast and 150m to the north. Both have ponds. Large refuse heap 190m to the northeast of the site. Rough grassland 100m to the east. Sawmill constructed 130m to the southeast. North western Electricity Board HQ and Manchester Regional Hospital Board HQ constructed 150m to the northwest. Clay pits filled and industrial buildings constructed 260m to the southwest.
1975 – 1978 1:1250	Current commercial building constructed.	Small factory on western site boundary. Surrounding clay pits filled, replaced by warehouses and various works. Car breakers yard developed 200m to the northeast.
1980 – 1985 1:10000	No significant change.	Works 200m to the north replaced by offices.
1988 – 1992 1:1250	No significant change.	Carpark developed 110m northwest.
2001 1:10000	No significant change.	Residential development 600m to the northwest.
2003 1:1250	No significant change.	No significant change.
2010 – 2020 1:10000	No significant change.	Manchester Fort constructed 500m to the northeast of the site.
Google Earth Aerial Imagery 2009		Warehouse 90m to the northeast demolished, rebuilt 2013.

Date	On-Site History	Surrounding Land Use History
Google Earth Aerial Imagery 2018		Carpark 150m to the east of the site demolished and replaced with a warehouse in 2019.

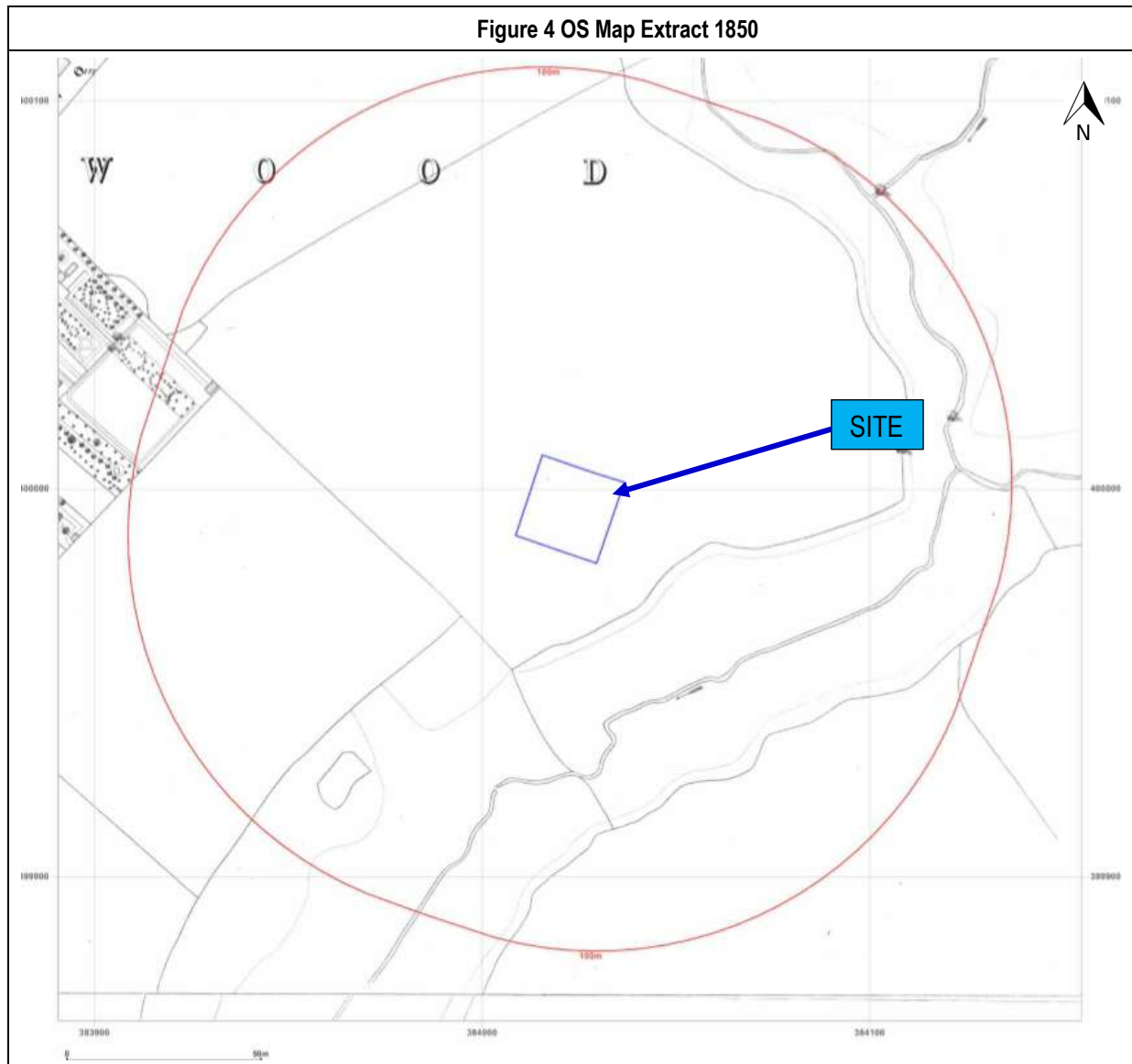


Figure 5 OS Map Extract 1933

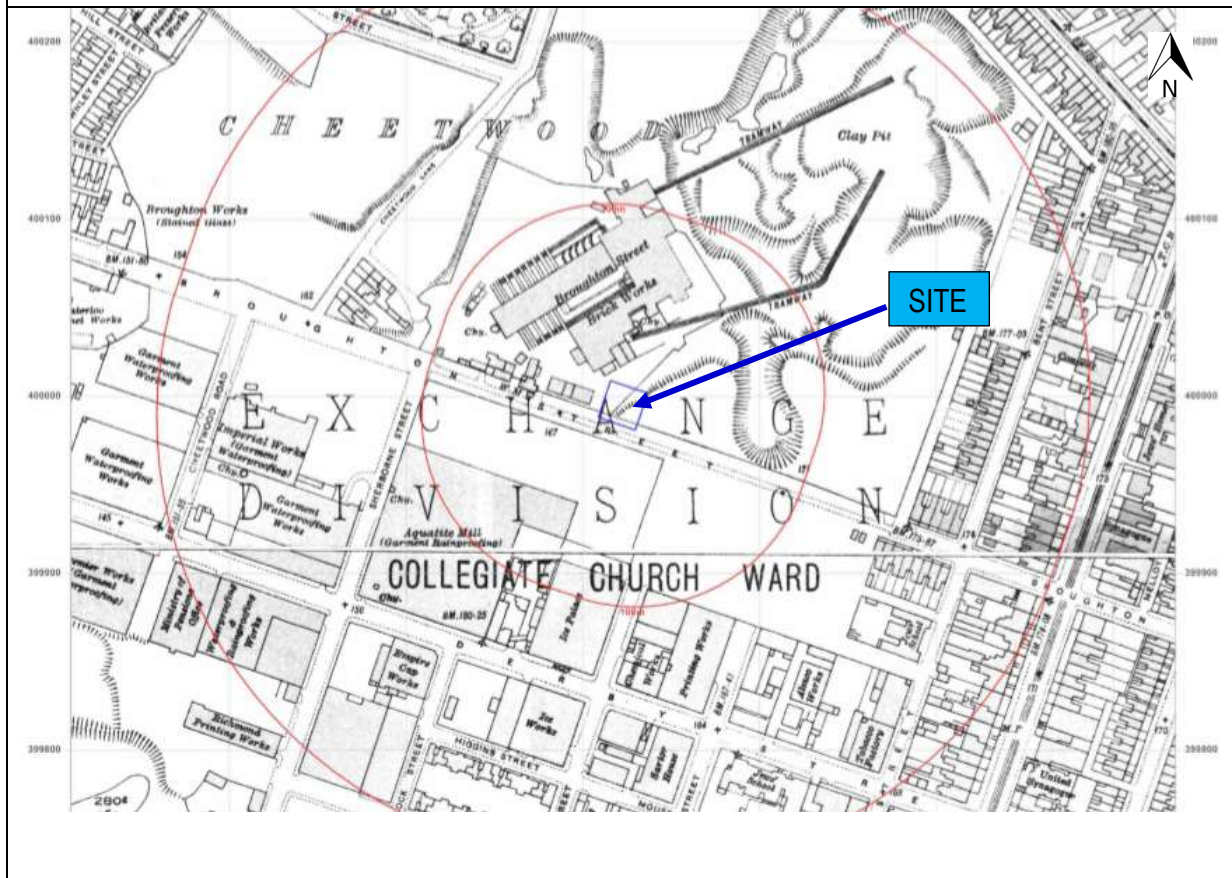


Figure 6 OS Map Extract 1988-92

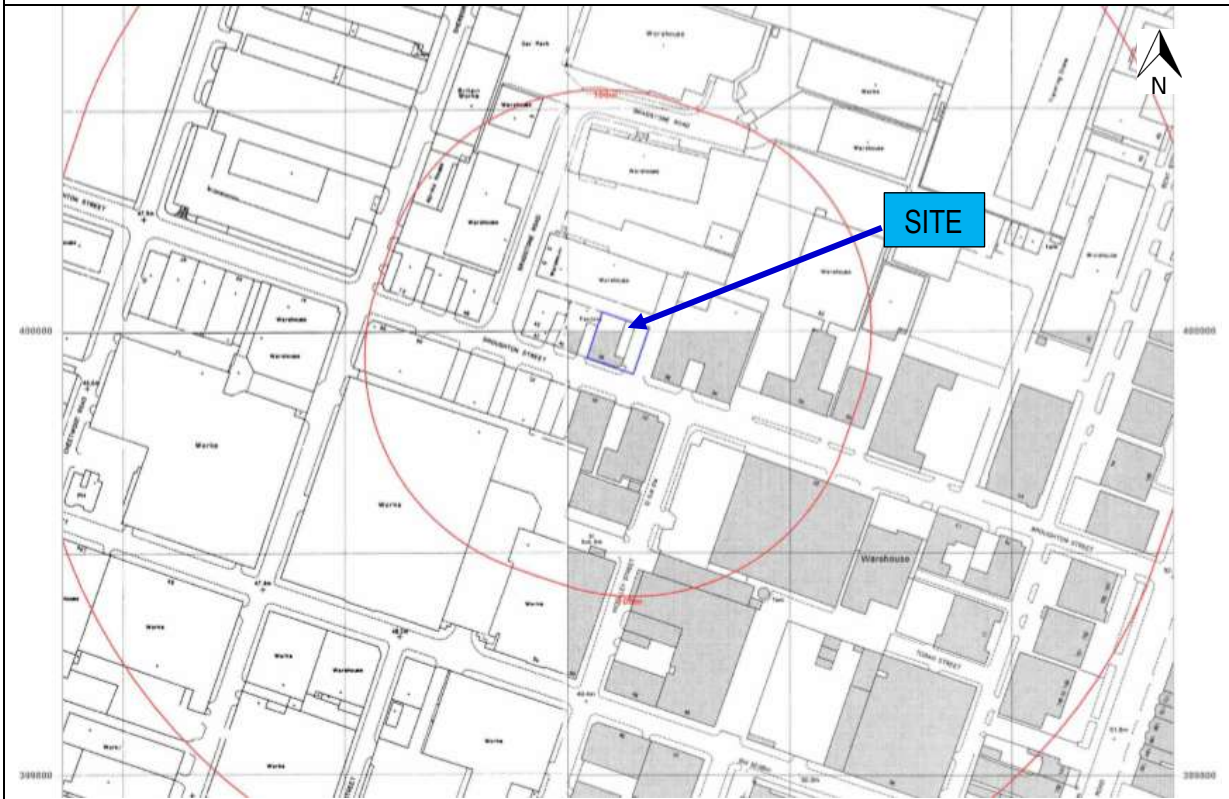


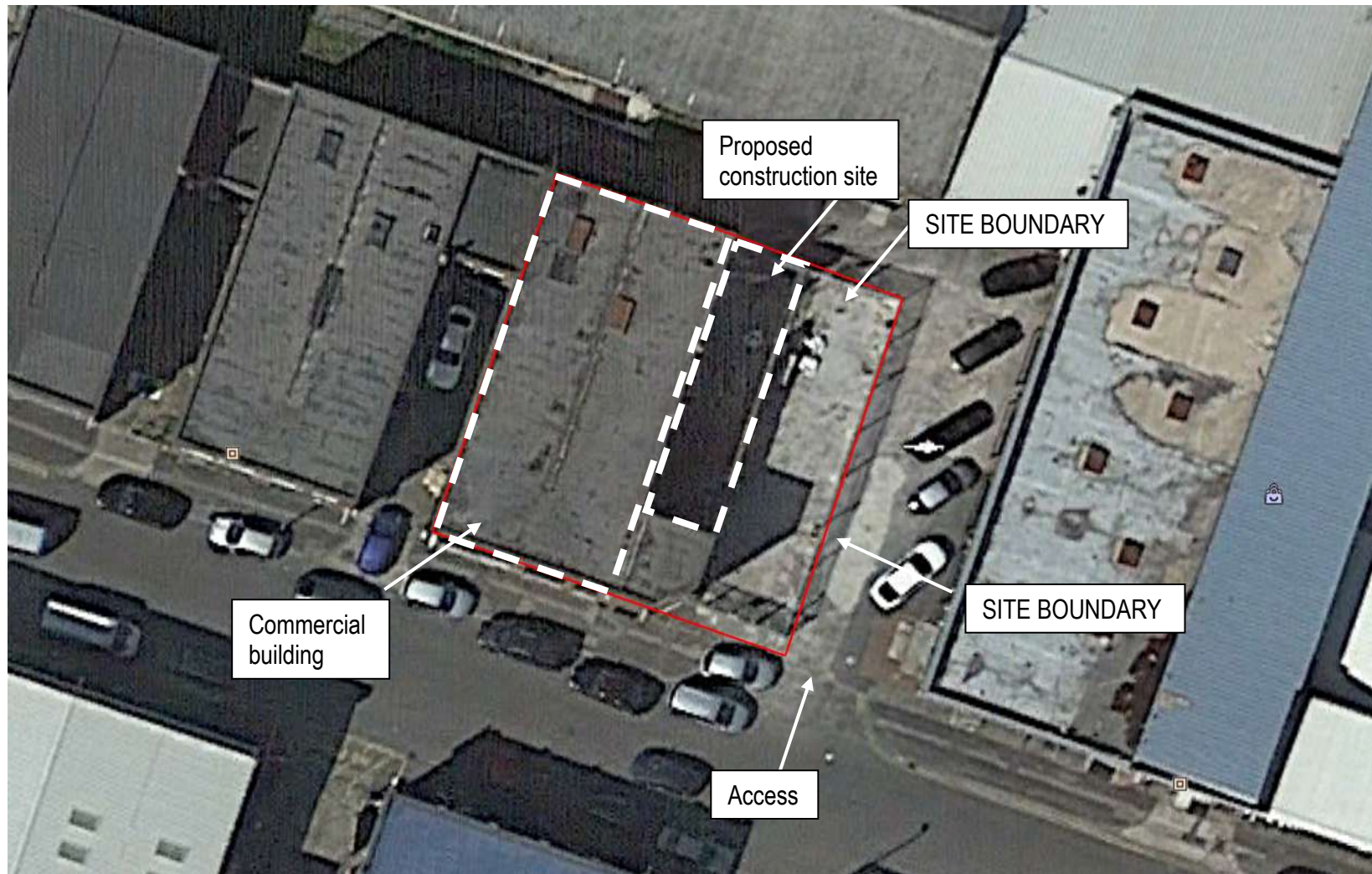
Figure 7 Aerial Photograph 2009



5.0 SITE HISTORY WALKOVER SURVEY

- 5.1 A walkover survey was completed on 11th March 2020. 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 via Broughton Street and currently comprises the current commercial use building on the western side and an open area on the eastern side. The open area is mostly concreted over and surrounded by palisade fencing. Part of the concreted area has been recently broken and work has begun with the placing of ground reinforcement.
- 5.3 The site is understood to be occupied and currently used as a commercial property.
- 5.4 The site is covered by concrete cover on the eastern side, partly broken due to construction. The western side is covered by the currently occupied brick building.
- 5.5 There is a small fly tipped material in the north eastern corner of the site.
- 5.6 The site is generally bordered by palisade fencing on the eastern boundary and part of the north and south boundaries. The western border is comprised of the retail building on site.
- 5.7 The immediate surrounding areas comprise various retail establishments, mostly clothing shops. There are a few restaurants and warehouses within 150m, as well as a garage.
- 5.8 A site features plan is presented as Figure 8 overleaf.

Figure 8 Site Features Plan



6.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

Introduction

- 6.1 The following paragraphs outline a Preliminary Risk Assessment (PRA) for the site based on the above desk study information as defined by DEFRA and the EA Model Procedures for the Management of Land Contamination, CLR11⁽²⁰⁰⁴⁾.
- 6.2 Table 5 provides a Preliminary Conceptual Model (PCM) which considers the source-pathway-receptor linkages present alongside the likelihood, severity and risk level as defined within Table 3 and Table 4 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and CLR11.
- 6.3 Table 5 considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.
- 6.4 The PCM/PRA is based on a current commercial 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

- 6.5 Originally, the site was located on a plot of undeveloped land. In the early 1890's, the site was developed into a clay pit for use by the nearby brick works. The site remained as part of a clay pit until the late 1940's, where the pit was filled, and a small workshop/ factory was constructed as part of the local brick works. In the late 1960's, the current commercial building was constructed on site. No further significant development has been undertaken on site since.
- 6.6 There is potential for the presence of contamination associated with the following:
- Made Ground from various phases of on-site development and infilled features.
 - Asbestos containing materials (ACM) from former structures and made ground.
 - Ground gas associated with infilled claypits, although the risk is low due to the age of the tipped material.
 - Proximity to an adjacent landfill site.

Potential Receptors

- 6.7 The following receptors have been considered for the construction and operational stages of the proposed redevelopment.
- Current site users;
 - Adjacent land users;
 - Future land users;
 - Construction workers during site development works;
 - Groundwater within the underlying aquifer.

Potential Pathways

- 6.8 The following pathways have been considered for the construction and operational stages of the proposed redevelopment.
- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils;
 - Downward vertical migration of leachate to shallow groundwater;
 - Vertical or lateral migration of ground gas.

Table 5: Preliminary Conceptual Model

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Made Ground across site (Heavy Metals, PAH & TPH)	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Likely	Moderate	Moderate risk	The site is currently occupied as a commercial property. The potential areas of contamination were covered by hardstanding, making direct contact unlikely. However, at the time of the site walkover, excavation and some development had already begun, creating a potential contamination risk. The risk is therefore considered to be MODERATE .
		Adjacent land users	Low Likelihood	Moderate	Moderate to Low risk	Commercial properties partially surround the site. The risk is considered MODERATE to LOW and usual dust control measures should be implemented as part of good site working practices during construction to reduce dust generation.
		Future land users	Low Likelihood	Moderate	Moderate to Low risk	The proposed development will include an extension to the existing commercial building. The risk to future site users via direct exposure is considered to be MODERATE to LOW . This assessment is based on the sensitivity of the receptor.
		Construction Workers	Low Likelihood	Moderate	Moderate to Low risk	Construction workers are likely to be exposed to potentially contaminated Made Ground materials during construction works, however exposure duration will be short-term only. Assuming appropriate health and safety measures are adopted (in line with CDM and other relevant health and safety guidance) a LOW risk to construction workers is anticipated.
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Low Likelihood	Moderate	Moderate to Low risk	Shallow groundwater may be present beneath the site and there is an abstraction license 217m to the southwest. The risk to groundwater is therefore considered MODERATE to LOW .
	Vertical or lateral migration of ground gas	Current Site Users	Very Likely	Moderate	High risk	Due to the ground history of the site, there is a high likelihood of ground gas. The risk to current site users from ground gas is therefore considered HIGH .
		Adjacent land users	Likely	Moderate	Moderate risk	Due to the ground history of the site, there is a high likelihood of ground gas. The risk to adjacent site users from ground gas is therefore considered MODERATE .
		Future land users	Low Likelihood	Moderate	Moderate to Low risk	Due to the history of the site, there is a high likelihood of ground gas. However, if the proper remediations are implemented the risk to future land users can be considered MODERATE to LOW .

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Construction Workers	Low Likelihood	Moderate	Moderate to Low risk	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	Likely	Moderate	Moderate risk	Asbestos may be present in the Made Ground soils beneath the site and in the buildings currently on site. However, asbestos is only harmful when disturbed. The site is currently occupied and there will be alterations to the building on site, creating a potential pathway for contamination. The risk to current site users is therefore MODERATE .
		Adjacent land users	Low Likelihood	Moderate	Moderate to Low risk	Asbestos may be present in the Made Ground soils beneath the site and in the current buildings. Disturbance of soil during the construction phase may allow fibres to become airborne. The risk is therefore considered MODERATE . Dust control measures (dampening down) should be implemented as part of good site working practices in order to reduce the risk to LOW .
		Future land users	Low Likelihood	Moderate	Moderate to Low risk	Disturbance of potential ACM by future occupants may allow fibres to become airborne. The risk is therefore considered MODERATE . However, due to the remainder of the site being covered by hardstanding, unless further construction takes place on site there is a low chance of further contamination. A contamination assessment of the existing on-site soils and appropriate remediation, if required, will reduce the risk to LOW .
		Construction Workers	Low Likelihood	Moderate	Moderate to Low risk	Construction workers will be exposed to potential asbestos in soils during the construction phase. The risk is considered MODERATE . A contamination assessment of the existing on-site soils would be required to determine the level of risk and necessary mitigation measures.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- 7.1 The site is currently occupied by a retail establishment that takes up the majority of the site, with the remainder being covered by hardstanding, preventing pollutant linkages. However, construction has recently begun, and the concrete broken, creating a potential pathway for contamination. Prior to 1960, the site was part of a large brick works, with a clay pit present between 1890 and 1933.
- 7.2 The proposed development of the site includes a small extension to the current commercial building, along with demolishing a section of the current building. The extension is said to be used partly for offices, storage and toilets.
- 7.3 The site is underlain by superficial deposits of Devensian till (Secondary undifferentiated aquifer) and the solid geology of Chester Pebble Beds (Principal aquifer).
- 7.4 The overall risk from soil contamination to commercial end users and construction workers is concluded to be **MODERATE**.
- 7.5 The risk to controlled waters is concluded to be **MODERATE to LOW** based on the underlying cohesive geology but the presence of a nearby abstraction.
- 7.5 Given the presence of an infilled clay pit on-site the risk from ground gas to end users is considered to be **LOW to MODERATE**.

Recommendations

- 7.6 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.
- 7.7 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.
- 7.8 Ground gas monitoring standpipes should be also installed to facilitate future monitoring of the ground gas regime.

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.: A3434/20	Site: 38 Broughton Street
Plate 1 View across site, looking southwest	Plate 2 View across site, looking northwest
	
Date: 11th March 2020	Date: 11th March 2020
Plate 3 View towards Broughton Street, looking southwest	Plate 4 Area of proposed construction, looking southwest
	
Date: 11th March 2020	Date: 11th March 2020

Figure 9 Site Walkover Photo Locations



APPENDIX 3

SITE WALKOVER NOTES

WALK OVER SURVEY REPORT

Site: 38 Broughton Street

Date: 11th March 2020

Job No: A3434/20

Undertaken By: D Shanks

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)		Suburb Retail There is a clothes shop taking up the majority of the site, with the rest covered by hardstanding. Part of the hardstanding has been broken due to construction.
Evidence of Past Activities	Are there: Any relevant street names in area? Features or relics which indicate past history?	Yes/~~No~~ ~~Yes~~/No	Broughton Street to the south.
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		Low lying and level.
Ground Conditions	Is there any evidence of: Mining, Mine entries Subsidence Landslip/slope erosion Former investigation works	~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Topography	Description required for: Are there apparent differences between site and surrounding area? (If yes describe the presence of retaining walls, and slopes). Is there evidence of Made Ground / Fill on site?	~~Yes~~/No ~~Yes~~/No	- The open area of the site, including the area of proposed development, is covered by concrete hardstanding.
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)		Northern boundary – Half palisade fence, half brick wall from existing building. Eastern boundary – Palisade fence. Southern boundary - Half palisade fence, half brick wall from existing building. Western boundary – Brick wall from existing building. The site is surrounded by commercial buildings. There are 2 garages within 150m.
Vegetation	Are there any vegetation/trees on or close to site (if yes describe locations, type, maturity, etc) Is there any evidence of poor health / distress?	~~Yes~~/No ~~Yes~~/No	
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~~ ~~Yes~~/No	100% hardstanding. The majority of the site houses the building, the rest is covered by concrete.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Drainage	Are there any drain covers / soakaways (if yes describe locations) Are there any outfalls/water courses on site (note the condition of water courses in open water courses. discolouration, odour, eutrophication, oily sheen, gas bubbling water, clear or cloudy) Where a watercourse runs alongside or crosses a site are there any differences in visible water quality upstream and downstream of the site?	~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	
Electrical Equipment	Are there any electricity sub stations on or adjacent to the site? Are there any electrical transformers, capacitors, pylons etc on site?	Yes/ ~~No~~	There is a service box adjacent to the southern boundary of the site.
Buildings	Is there any evidence of asbestos construction materials e.g. roofing, insulation materials. Do any buildings have basements? Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?	Yes/~~No~~ ~~Yes~~/No ~~Yes~~/No	Asbestos thought to be present in roofing of occupied building due to age.

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

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Waste	Are there any waste skips present on site? Are waste storage facilities adequate? Is there any litter/fly tipped material?	~~Yes~~/No ~~Yes~~/No Yes/~~No~~	Small fly tipped pile in the northeast corner of the site.
Atmospheric	Are there any fumes, odours originating from site or affecting site from neighbouring sites?	~~Yes~~ /No	
Access / Further Investigations	If a Phase 2 Investigation is likely to be required, describe any access problems including headroom where relevant, services, overhead cables, restricted access areas, confined spaces, trafficked areas, etc that are likely to affect investigation scope/techniques. Identify possible site office and storage locations. Identify possible water supply		N/A Access road to the east of the site. N/A
Site Environs	Are there any local features that could have a harmful influence e.g. landfill, industrial processes, railway land? Are there any sensitive water features/courses near to the site?	Yes/~~No~~ ~~Yes~~/No	Nearby garages.
Local Knowledge / Anecdotal Evidence			
Site Dimensions	Describe shape of Site in plan and measure dimensions.		31m northwest to southeast, 31m northeast to southwest.

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 2020 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.