









EARTH ENVIRONMENTAL & GEOTECHNICAL

GeoEnvironmental Desk Study

Laystall Street

Manchester

August 2020

On behalf of

McCauls

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LAYSTALL STREET

MANCHESTER

PHASE I GEOENVIRONMENTAL DESK STUDY

FOR

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1.0 INTRODUCTION

Appointment

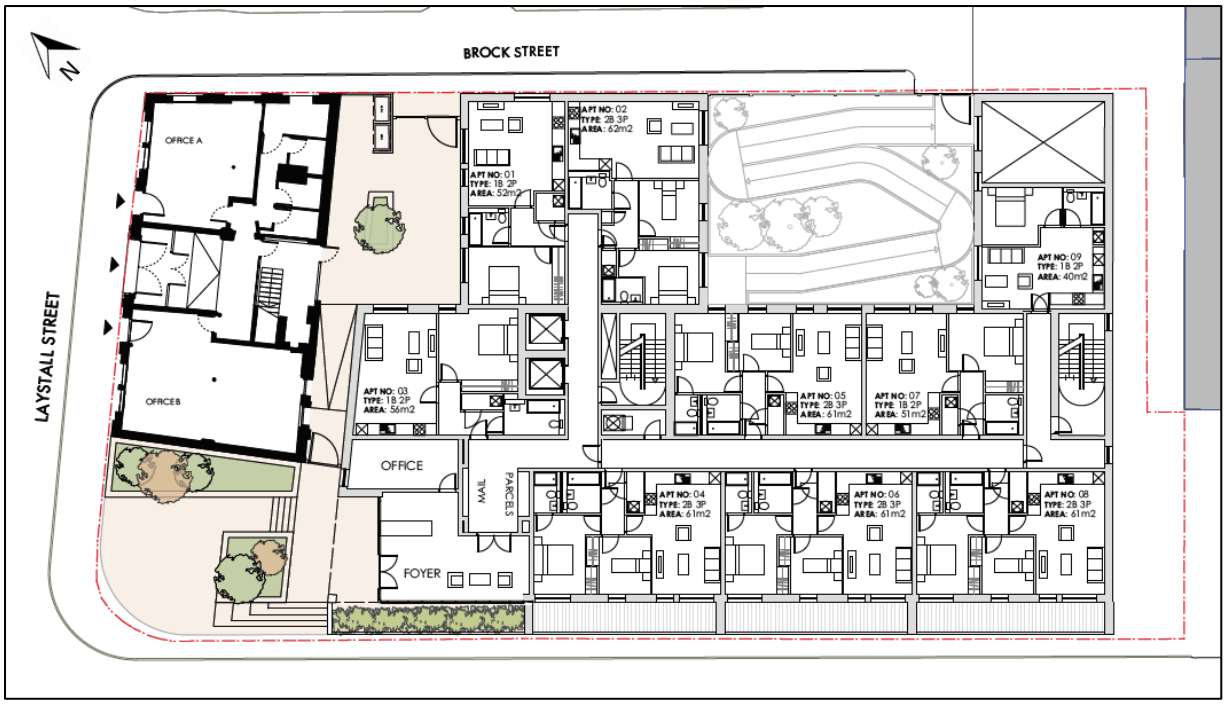
1.1 Earth Environmental & Geotechnical Ltd has been commissioned by McCauls (the Client) to undertake a Phase I GeoEnvironmental Desk Study for the proposed development on land south of Laystall Street, Manchester.

1.2 It is understood that the Client wishes to convert the existing building on site into offices whilst demolishing the surrounding buildings on site to construct a new 8-floor apartment block. Both buildings will have basements.

1.3 No vehicle access will be retained.

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

Figure 1 Proposed Development Plan



Objective

1.5 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

1.6 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 located in Ancoats, less than 1km from Manchester City Centre. The approximate National Grid Reference for the centre of the site is SJ 84978 98263 (X: 384978, Y: 398263) with the closest postcode being M1 2JZ.

2.2 The site is a near rectangular shaped parcel of land with current access via Pigeon Street to the west. The maximum dimensions of the proposed site are 42m north to south and 28.5m west to east. The site occupies an area of approximately 0.11ha.

2.3 The site is currently occupied by several warehouse buildings with a small car park on the west side of the site.

2.4 The general surrounding area comprises predominantly of industrial warehouses with some residential dwellings to the west.

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

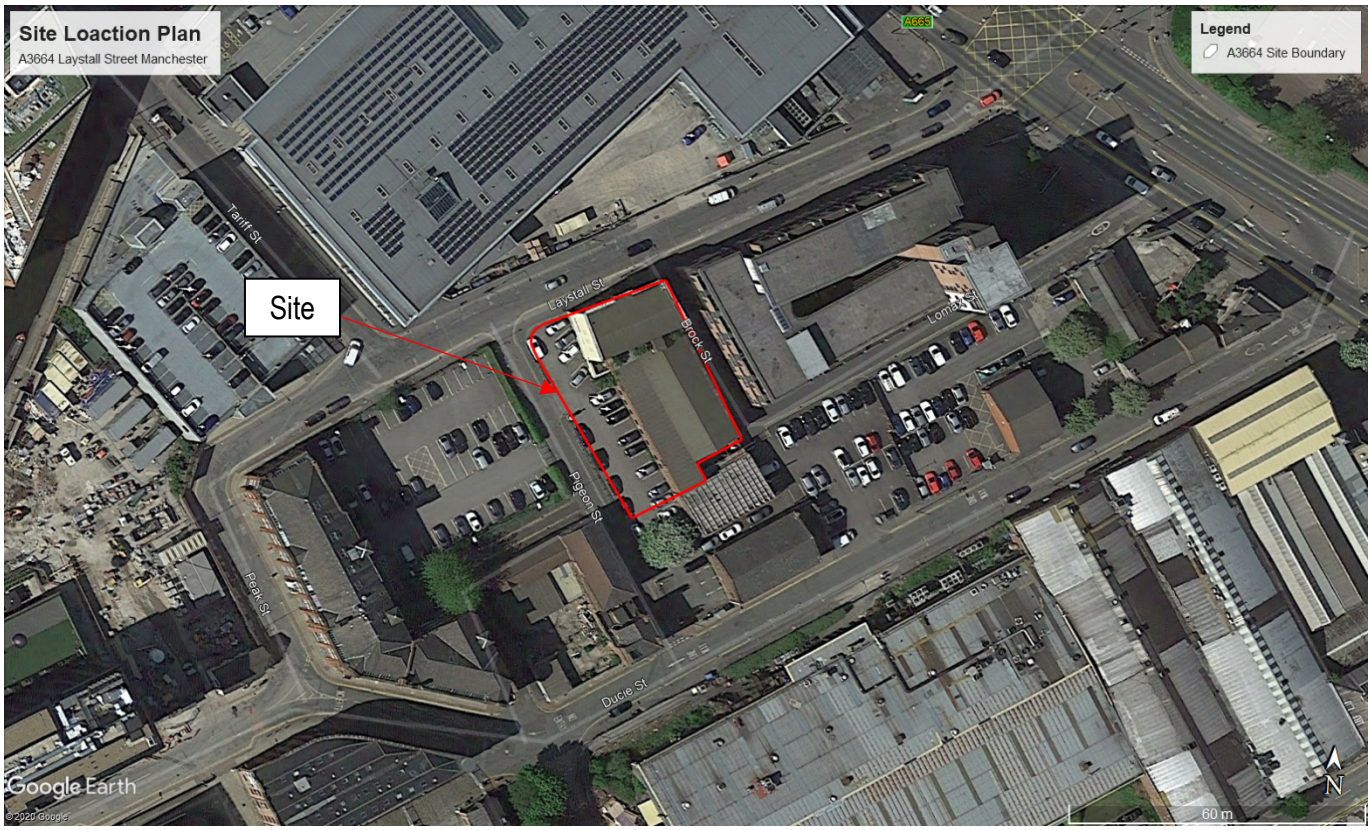


Figure 3 Site Photograph



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 is not underlain by artificial deposits.

3.4 The site is underlain by superficial deposits of glacial deposits, comprising Diamicton, commonly known as Boulder Clay.

3.5 The solid geology beneath the site is shown to be the Triassic 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 fault located 228m southwest of the site.

3.7 There are no records of landslips within 500m of the site boundary.

3.8 There are 38 borehole records identified within 250m of the site. The closest record is located 105m west of the site (BGS Reference: SJ89NW364), drilled in 1987 is summarised below:

- Brick and clay fill to 3m
- Stiff and very stiff brown grey mottled boulder clay to 15m.

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

Ground Workings

3.10 There are 62 records of historical surface ground working features identified within 250m of the site boundary. The closest record refers to an unspecified wharf located 67m to the southwest of the site, dated 1923. Other records in the vicinity refer to other unspecified wharves, canal, water bodies, unspecified ground workings, a pond and disused canal.

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. Reference to the Coal Authority Interactive viewer shows the site is not located within a Development High Risk Area.

3.13 There are 2 records for non-coal mining areas located within 1km of the site. The closest record refers to a vein mineral located 734m northeast of the site. The BGS states:

> *'Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered'.*

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 site is not located in a Radon Affected Area, as less than 1% of the properties are above the Action Level. Therefore, no radon protection measures are necessary.

Hydrogeology and Hydrology

3.18 The superficial deposits are classified by the Environment Agency (EA) as a Secondary Undifferentiated Aquifer. The glacial deposits of Diamicton have 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 Formation is 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 a low vulnerability. The BGS states:

> *'Low vulnerability- 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 42 ground water abstraction licence records within 2km of the site. The closest record refers to a historical ground water source at Ardwick, Manchester 750m south of the site.

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

3.23 There are 10 potable water abstraction licence records within 2km of the site. The closest record refers to a historical ground water source in Strangeways, Manchester 1.4km northwest of the site.

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

3.25 There are 9 water network entries within 250m of the site. The closest record refers to the Rochdale Canal located 96m west of the site.

3.26 There are 7 surface water features identified within 250m of the site.

3.27 There is 1 record of a Water Framework Directive (WDF) surface water body located on site. The record refers to River WB catchment in the Medlock (Lumb Brook to Irwell) of. The water body was a good chemical rating and moderate ecological rating in 2016.

3.28 There is 1 record of a Water Framework Directive (WDF) groundwater body located on-site. The record refers to Manchester and East Cheshire Permo-Triassic Sandstone Aquifer which was a poor chemical rating in 2015.

Landfill & Waste Management Activity

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

3.30 There are no records of historic Environment Agency/Natural Resource Wales landfill sites within 500m of the site.

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

3.32 There are 7 records of historical waste sites from the Local Authority and Historical Mapping Records within 500m of the site. The closest record refers to a waste paper mill located on site, dated 1932. The closest record off-site refers to a waste paper mill located 10m northeast of the site, dated 1931.

3.33 There are 7 records of a waste treatment, transfer or disposal site within 500m of the study site. The closest record refers to a treating waste exemption site located 250m to the northwest of the site. The site is described as screening and blending of waste.

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

Industrial Land Use Information

3.35 There are 255 records of potentially contaminative historical land uses identified within 500m of the site, the closest record being for a clothing factory 38m southeast of the site dated 1938. Other records in the vicinity refer to other clothing factories, unspecified factories, sawmills, an unspecified disused foundry, unspecified warehouses, unspecified wharves, unspecified mills, unspecified ground workings, unspecified workshops, goods stations, railway sidings, disused canal, grain stores, corporation yards, unspecified depots, vulcan works, etc.

3.36 There are 38 records of current potentially contaminative land uses identified within 250m of the site. The closest record refers to a factory located on-site. The closest record off-site refers to an electricity substation located 21m to the west of the site. Other records in the vicinity refer to consumer products, published goods, industrial products and features, marketing, hire services, moorings and unloading facilities, travelling cranes and gantries, electrical features, etc.

3.37 There are 112 records of historical tanks identified within 500m of the site. The closest records refer to 5 unspecified tanks located 5m southwest of the site, dated 1953-1967.

3.38 There are 67 records of historical energy features identified within 500m of the site. The closest record refers to an electricity substation located 176m to the southeast of the site, dated 1997.

3.39 There is 1 record for current petrol or fuel sites within 500m of the site. The record refers to a site located 381m to the northwest of the site with an obsolete status.

3.40 There is 1 record of historical petrol or fuel sites within 500m of the site. The record refers to a service garage located 166m northwest of the site, dated 1948.

3.41 There are 91 historical garage and motor vehicle repair site records identified within 500m of the site. The closest record refers to a garage located 7m east of the site, dated 1991-1992.

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

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

3.44 There are 26 historical railway and tunnel features identified within 250m of the site. The closest record refers to railway sidings located 86m north of the site, dated 1953.

3.45 There are no historical railway lines identified within 250m of the site.

3.46 There are no current active railway line records identified within 250m of the site.

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

3.48 The site lies within 500m of the route of the High Speed 2 rail project. The closest track will be a bridge/viaduct located 306m south of the site on the current preferred consultation route.

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	0
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	3
Category 3 or 4 Radioactive Substance Authorisations	0
Licensed Discharge Consents	6
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)	9
Pollution Inventory Substances, Wastes and Radioactive Wastes	0

3.50 There are 3 records of Part (2) and Part B Activities and Enforcements within 500m of the study site. The closest record refers to a current Part B Permit for non-ferrous metal foundry processes located 80m southeast of the site.

3.51 There are 6 records of Licensed Discharge Consents within 500m of the site. The closest record refers to sewage discharges – sewer storm overflow, located 142m south of the site.

3.52 There are 9 records of Substantiated Pollution Incidents (Category 1 and 2) within 500m of the site. The closest record refers 'other pollutant' released 80m to the southwest of the site. The pollutant was a category 3 (minor) impact on water and a category 4 (no impact) on land and air.

Environmentally Sensitive Sites

3.53 There are 4 records of Nitrate Vulnerable Zones (NVZ) within 2km of the study site. The closest refers to the existing River Irk (Moston Brook to River Irwell) NVZ located 407m northeast of the site.

3.54 There are no other records of Environmentally Sensitive Sites located within 2km of the site.

Ecology

3.55 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.

3.56 However, the site is classified as urban land.

Archaeology

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

3.58 However, there are 11 records of Listed Buildings within 250m of the site. The closest record refers to 32 to 34 Laystall Street, Manchester which is a Grade II Listed Building located on-site.

3.59 There are no records of World Heritage Sites and Scheduled Ancient Monuments with 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 Zone 2 or Zone 3 floodplain.

3.61 There is no risk of flooding from rivers and sea (RoFRaS) within 50m of the site.

3.62 There are no records of flood defences located within 250m of the site.

3.63 There are no records of areas benefitting from flood defences within 250m of the site.

3.64 There are no records of areas used for flood storage within 250m of the site.

3.65 The highest risk of surface water flooding occurring on-site is 1 in 1000 year, 0.3 - 1.0m.

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

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, 1890-1894 1:10,560 1889-1893 1:2,500 1851, 1891 1:1,056	The site comprises of residential dwellings and a public house (Welsh Harp).	The site is bounded by more residential properties to the south of the site with Bank Street, Lees Street and Pidgeon Street to the east, north and west of the site. More residential dwellings are located to the east, south, west and northeast. A machine manufacturing site is located 10m south of the site. 2 wire mills with associated boiler house are located 20m east of the site. Harrington Timber Wharf is located 30m north of the site. Ince Hall Coal Wharf is located 40m northwest of the site. A disused foundry is located 40m southeast of the site. A tin plate manufacturing site is located 50m south of the site. A colliery wharf is located 50m northeast of the site. Browns Field Coal and Kings Coal Wharves are located 60m north of the site. Lead mills are located 80m southwest of the site. Warehouses are located 80m southwest of the site. An iron works and timber yard are located 90m southeast of the site. A sand yard is located 90m west of the site. Great Ancoats Street is located 90 northeast of the site, orientated NW-SE A boiler yard is located 100m southeast of the site. City coal wharf is located 100m north of the site. Lock 85 and lock house are located 110m northwest of the site.

Date	On-Site History	Surrounding Land Use History
		The canal is located 100-120m north and south of the site. Piccadilly Basin is located 230m west of the site. A corporation yard is located 250m northeast of the site. London Road Station (will become Piccadilly Station) is located 500m south of the site. Ancoats Hospital is located 500m east of the site.
1905-1906 1:10,560 1908, 1922 1:2,500	No significant change.	The disused foundry is now a clothing factory and iron and steel works. The Piccadilly Basin is now Dale Street basin.
1930-1931 1:2,500	No significant change.	Ducie House is located 60m west of the site. Junction works is located 80m southwest of the site.
1948-1953, 1965 1:2,500 1948-1953, 1952-1954, 1951-1955 1:1,250	Clothing factory now located on site.	An embroidering works are located 10m east of the site. A tank is located 10m west of the site. The wire mills are no longer present. Large wharves to the north are now sawmills or engineering works. A garage is located 90m east of the site.
1968-1971, 1971-1978 1:1,250	Residential properties located on west side of the site have now been demolished.	Lees Street is now Laystall Street. Packing works, warehouse and depot located 20m north of the site (no longer sawmills). A garage is located 50m north of the site. Part of the Rochdale canal (north) is now disused. A builder's yard is now located 100m north of the site.
1988-1991 1:10,000 1987-1990, 1988-1992, 1992-1994 1:1,250	No significant change.	Rochdale canal now disused. A retail park is located 100m east of the site.
2001 1:10,000 2003 1:1,250 2003, 2005 Aerial Photo	The vacant part of the site is used for car parking.	The buildings located east of the site are now demolished. The packing works, warehouse and depot north of the site are now demolished and replaced with car park. This was replaced with a retail complex by 2005. Garage to the north has been replaced with car parking. The buildings in between the site and Ducie House are now demolished and land used for car parking.

Date	On-Site History	Surrounding Land Use History
2020 1:10,000 2016 Aerial Photograph	No significant change.	No significant change.

Figure 4 OS Map Extract 1851

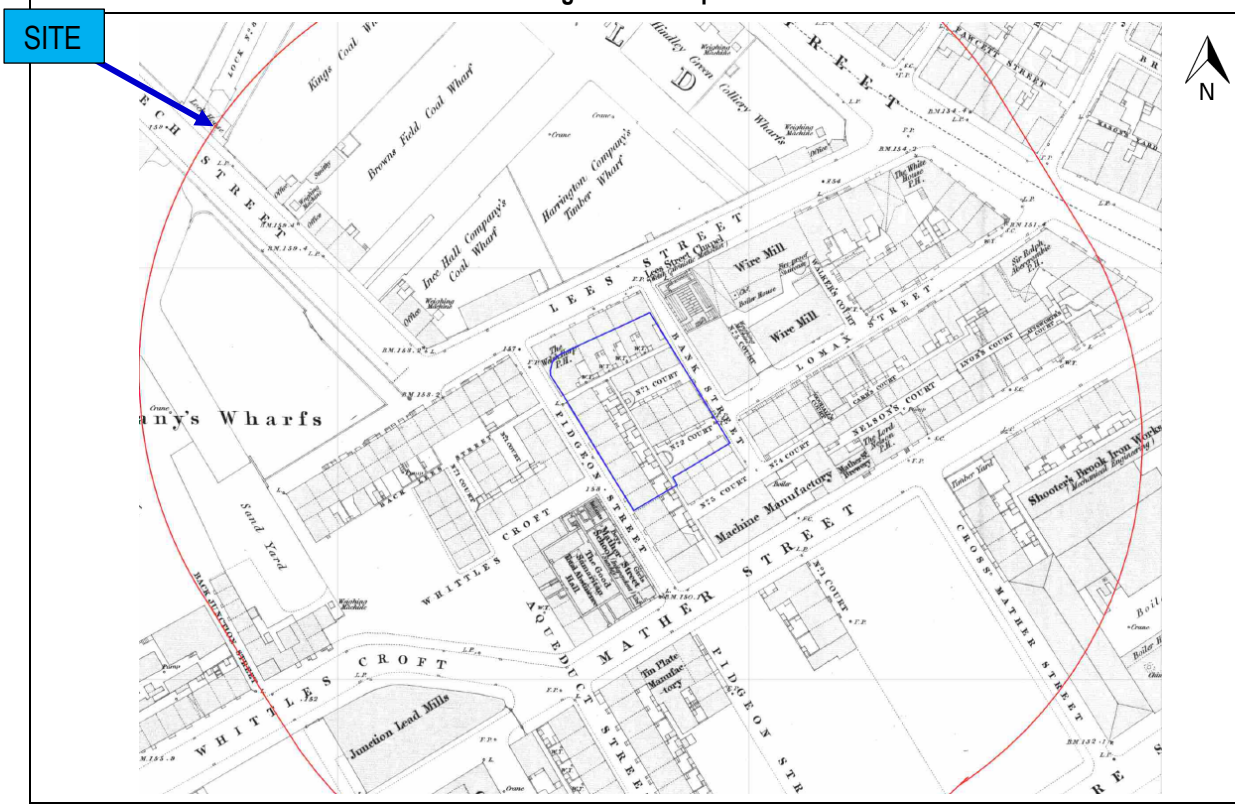


Figure 5 OS Map Extract 1908

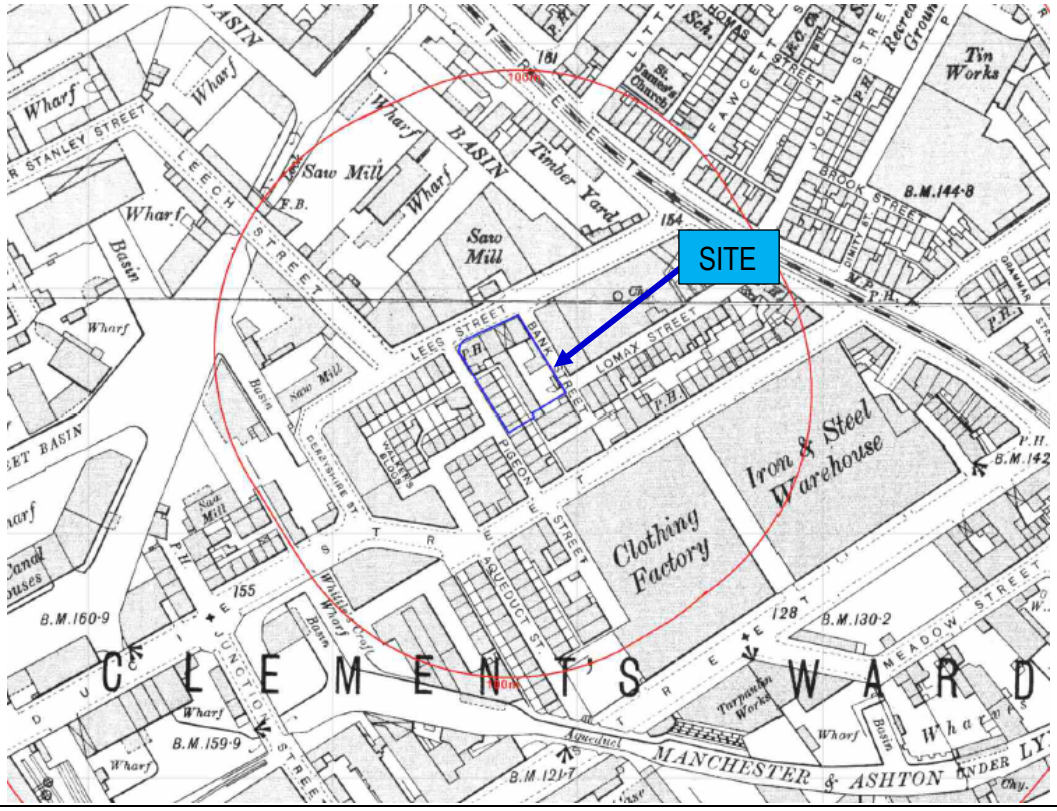


Figure 6 OS Map Extract 1965

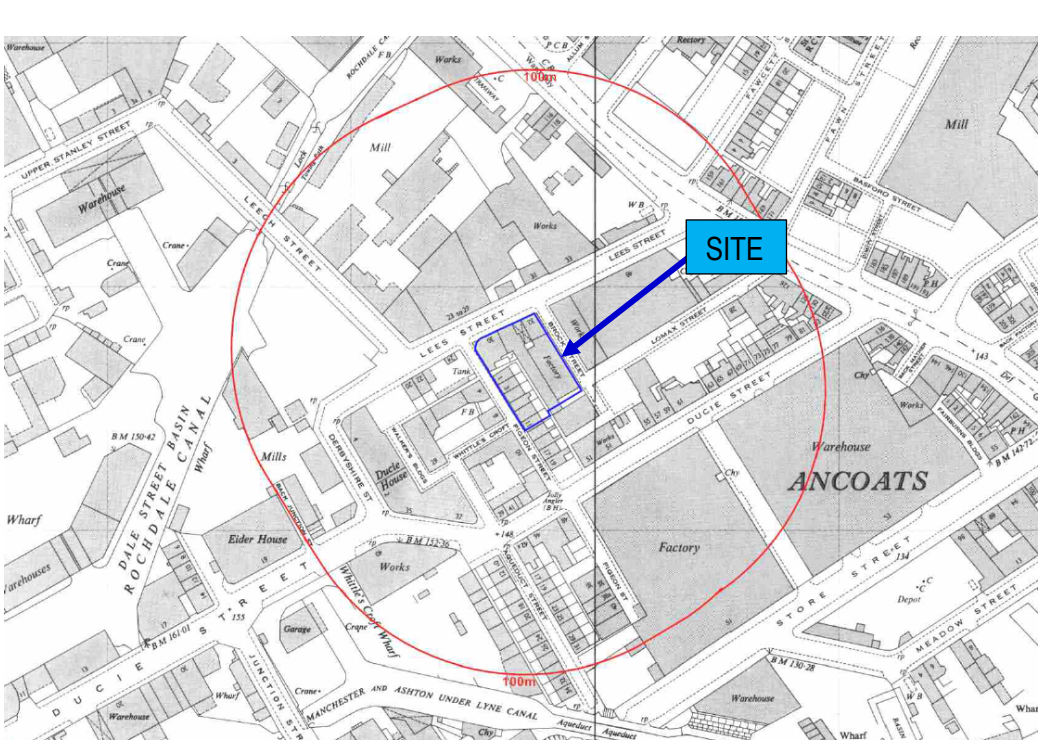


Figure 7 OS Map Extract 1988-1992

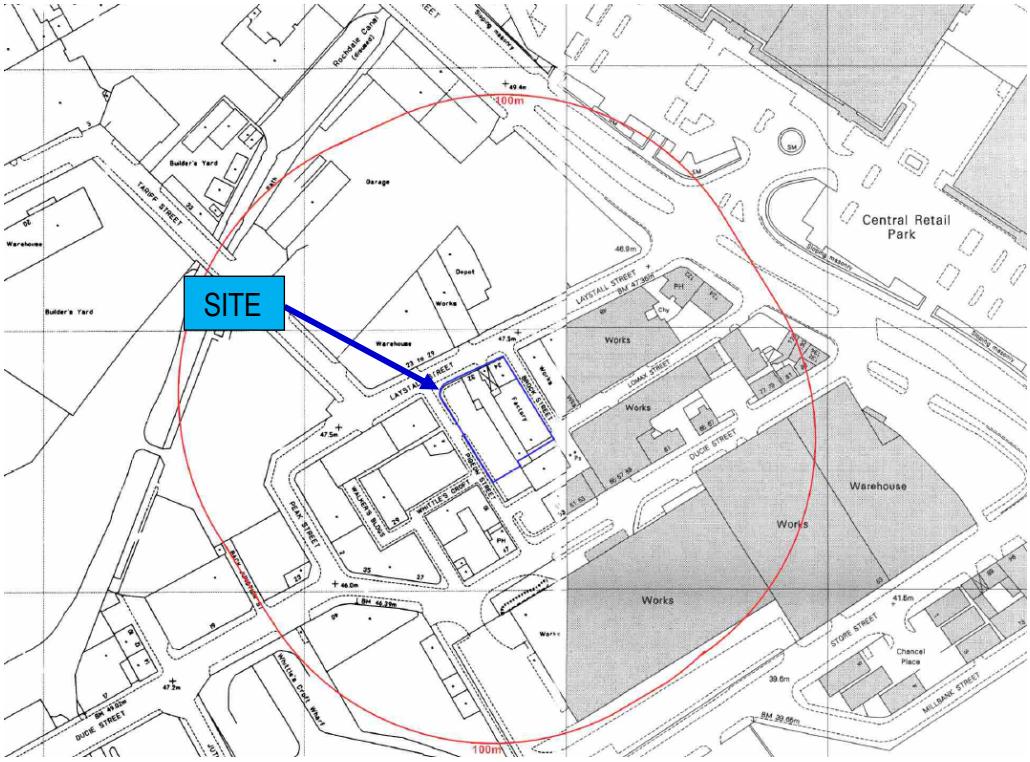
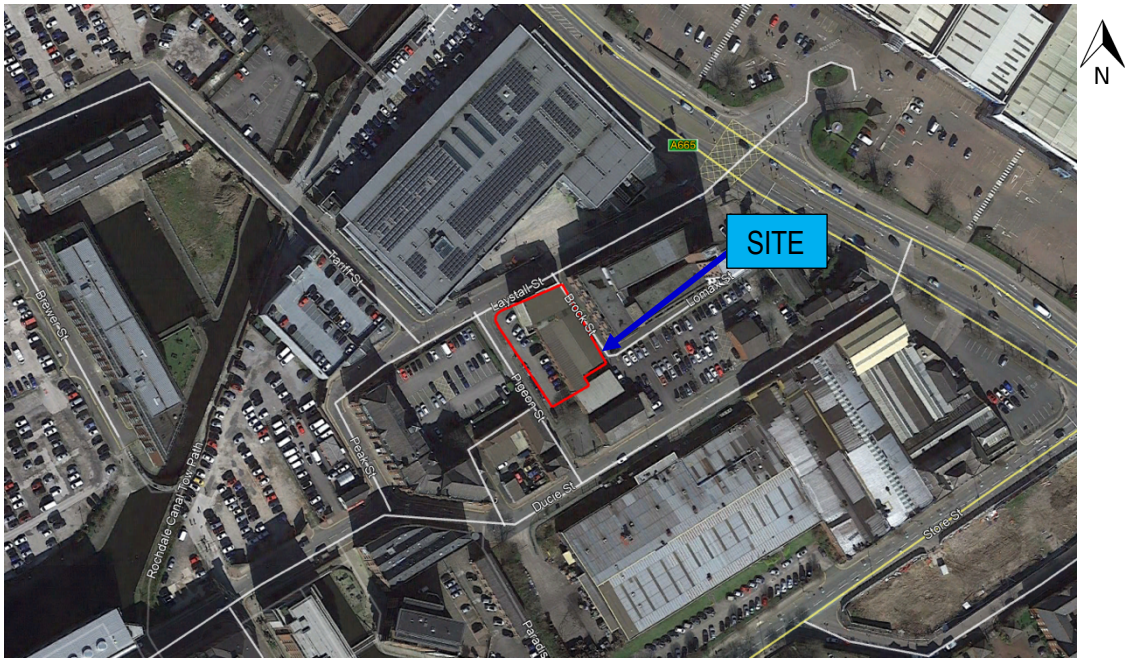


Figure 8 Aerial Photograph 2017



5.0 WALKOVER SURVEY

5.1 A walkover survey was completed on 14th August 2020. The photographs and notes from this survey are appended to this report as Appendix 2 and Appendix 3 respectively.

5.2 The site comprises an old textiles factory building and presumed associated warehouse. There is a car park to the west of the site that is still in use.

5.3 The site is accessed via the car park entrance on Pigeon Street to the west of the site. The site currently comprises of two disused buildings and a car parking area.

5.4 There is a gentle gradient to the south of the site.

5.5 There are small vents at the base of both buildings. As well as numerous pipes exiting both buildings along the eastern and northern boundary.

5.6 There are no overhead cables located on site.

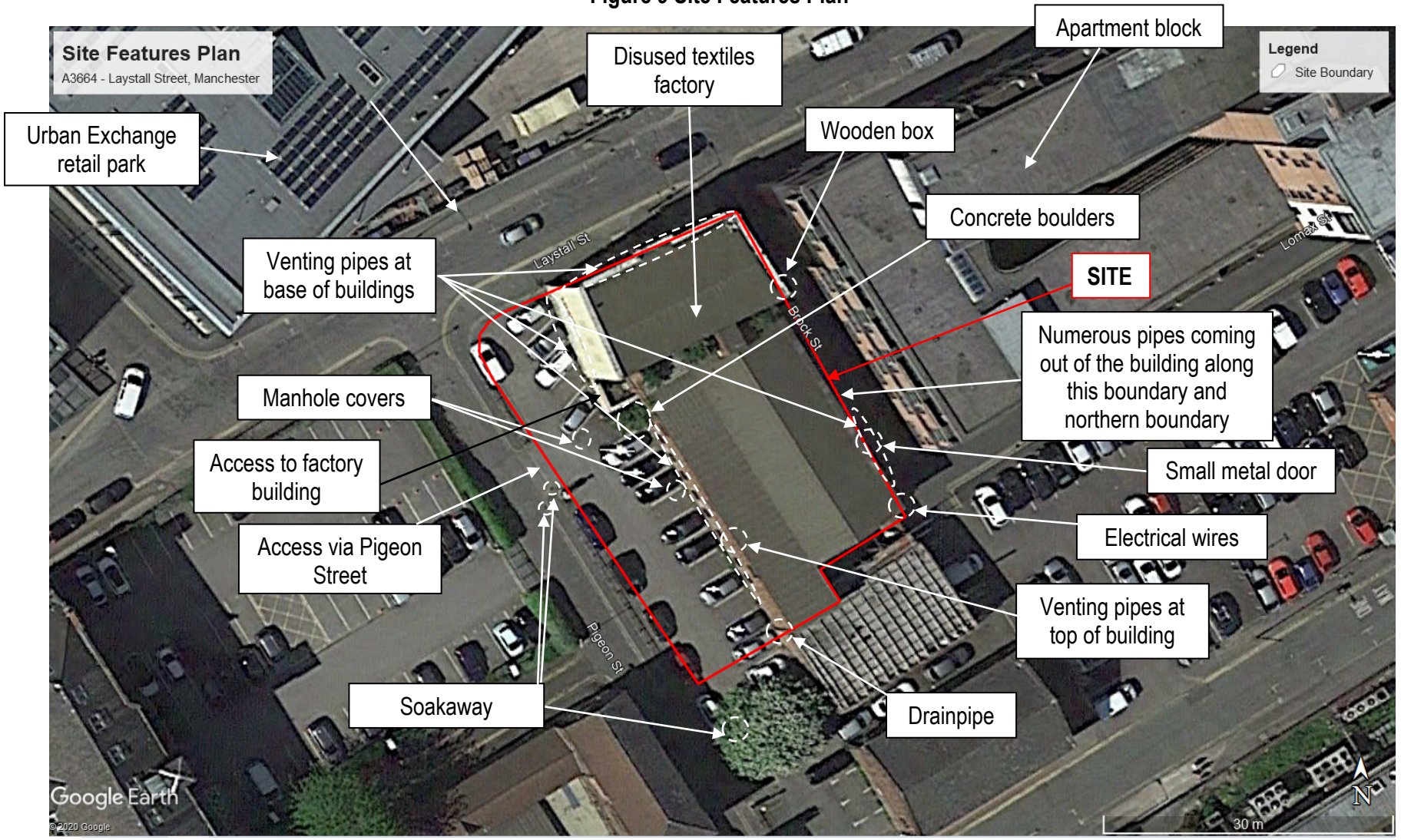
5.7 A wooden box is located on the eastern boundary of the site with unknown contents.

5.8 The site is demarcated by a raised pavement and bollards (some of which are missing) along the western boundary and part of the northern boundary. The other boundaries are demarcated by the edges of buildings on site.

5.9 To the west, north and east, roads are adjacent to the site with another warehouse building to the south of the site. The surrounding area comprises predominantly industrial usage with a car park to the south east and an apartment block to the east. The Urban Exchange retail park is located north of the site.

5.10 A site features plan is presented as Figure 9 overleaf.

Figure 9 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 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

6.5 Historically the site comprised residential dwellings from the 1840s until the 1940s when it became a clothing factory on the eastern side of the site. In the 1970s the rest of the housing was demolished leaving the western part of the site vacant. Since 2003 the vacant part of the site has been used as a car park.

6.6 Potential off-site sources of contamination include the numerous factories and works surrounding the site, including the canal, wharves, garages, builder's yards, depots and warehouses and associated constructions and demolitions.

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

- Large areas of Made Ground from various phases of on-site and off-site development
- Asbestos containing materials (ACM) from former and present structures
- Ground gas associated with any nearby infilled land.

6.8 Contaminants may therefore include heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), asbestos and ground gases (carbon dioxide, methane), radon gas.

Potential Receptors

6.9 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

6.10 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 5: Preliminary Conceptual Model**

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Potential soil contamination E.g. Heavy Metals, PAH, TPH, BTEX and ground gases.	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Low	The site is currently a disused factory and warehouse with hardstanding car park. The risk is therefore considered to be **LOW**.
		Adjacent land users	Unlikely	Moderate	Low	The site is predominantly surrounded by industrial works/warehouses with a residential apartment block to the east and a commercial unit to the north. 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	Moderate to Low	The proposed development consists of converting the listed building onsite into offices and then demolishing other buildings to build an 8-storey apartment block with basement. The risk to future site users via direct exposure is considered to be **MODERATE to LOW.** This assessment is based on the potential for contamination to be present beneath the site.
		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	Low Likelihood	Moderate	Moderate to Low	The underlying superficial soils are anticipated to be cohesive with a low permeability. There are 52 abstraction licences within 2km. The risk to groundwater is therefore considered **LOW.**
	Lateral migration in surface waters	Surface water	Unlikely	Moderate	Low	There are several surface water features are located within 250m of the site however the closest record is 96m north. Therefore, the perceived risk to surface waters is considered to be **LOW.**
	Vertical or lateral migration of ground gas	Current Site Users	Low Likelihood	Moderate	Moderate to Low	The site is currently a disused factory and warehouse with hardstanding car park. Large areas of Made Ground associated with former structures are anticipated. The site is not located in a radon affected area. The risk to current site users from ground gas is therefore considered **LOW.**

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Adjacent land users	Unlikely	Moderate	Low	The site is predominantly surrounded by industrial works/warehouses with a residential apartment block to the east and a commercial unit to the north. Large areas of Made Ground associated with former structures are anticipated. There is no potential for radon gas. The risk to adjacent site users from ground gas is therefore considered **LOW.**
		Future land users	Low Likelihood	Moderate	Moderate to Low	The proposed development consists of converting the listed building onsite into offices and then demolishing other buildings to build an 8-storey apartment block with basement. There is no potential for radon gas and therefore the risk if considered **LOW**.
		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	The site is currently a disused factory and warehouse with hardstanding car park. Asbestos may be present in small areas of the site associated with former and present structures, albeit unlikely. Asbestos is only harmful when disturbed. The risk to current site users is considered to be **LOW.**
		Adjacent land users	Unlikely	Moderate	Low	The site is predominantly surrounded by industrial works/warehouses with a residential apartment block to the east and a commercial unit to the north. Asbestos may be present in small areas of the site associated with former and present structures, albeit unlikely. Disturbance of soil during the construction phase may allow fibres to become airborne. Dust control measures (dampening down) should be implemented as part of good site working practices. Therefore, the risk is considered **LOW**.
		Future land users	Low Likelihood	Moderate	Moderate to Low	The proposed development consists of converting the listed building onsite into offices and then demolishing other buildings to build an 8-storey apartment block with basement. The risk is therefore considered **MODERATE** to **LOW.** A contamination assessment of the existing on-site soils would be required to determine the level of risk and necessary mitigation measures.

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers may be exposed to potential asbestos in Made Ground soils associated with former structures. However, this potential area is small. The risk is considered **MODERATE** to **LOW.** 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 & RECOMMENDATIONS

Conclusions

7.1 The site was historically residential dwellings from the 1840s to the 1940s, when the eastern part of the site became a clothing factory. In the 1970s the rest of the housing was demolished which left the western part of the site vacant land and from 2003 this and has been used as a carpark. The Factory is now disused.

7.2 Potential on-site sources of contamination were identified to be Made Ground, ground gases and asbestos associated with former and present structures. Potential off-site sources include made ground from constant development of the area and associated ground gases.

7.3 The proposed development consists of converting the listed building located on site in the northern corner, into offices and then demolishing current factory and associated warehouse to build an 8-storey apartment block with basement.

7.4 The site is underlain by glacial deposits, comprising Diamicton (Secondary Undifferentiated Aquifer) and the solid geology of the Chester Pebble Beds Formation (Principal Aquifer).

7.5 The property is not located in a Radon Affected Area, as less than 1% of the properties are above the Action Level.

7.6 Given the potential contaminative land uses, the overall risk from soil contamination to end users and construction workers is concluded to be **MODERATE** to **LOW**.

7.7 The risk to controlled waters is concluded to be **MODERATE** to **LOW** based on the underlying superficial soils.

7.8 The risk from ground gas to end users and construction workers is considered to be **MODERATE** to **LOW** given the anticipated extent of Made Ground.

7.9 The site is not located within a Zone 2 or Zone 3 floodplain. The highest risk of groundwater flooding is **LOW**.

Recommendations

7.10 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.

7.11 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 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

EARTH ENVIRONMENTAL & GEOTECHNICAL

Job No.: A3664/20

Site: Laystall Street, Manchester

Plate 1 Viewing southeast showing the site entrance off Pigeon Street and car park located on site.



Date: 14th August 2020

Plate 2 Viewing south showing the front of the listed building located on site.



Date: 14th August 2020

Plate 3 Viewing east showing access door to the factory building, blocked by a metal bar. Note presence and location of vegetation.



Date: 14th August 2020

Plate 4 Viewing north showing the western side of the building. Note the ventilation pipes towards the top of the wall.



Date: 14th August 2020

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SITE PHOTOGRAPHS

EARTH ENVIRONMENTAL & GEOTECHNICAL

Job No.: A3664/20

Site: Laystall Street, Manchester

Plate 5 Viewing northwest showing eastern boundary of the site. Note multiple pipes exiting the building and exposed electrical wires. Also note wooden box and metal door with padlock at the base of the wall.



Date: 14th August 2020

Plate 6 Viewing northwest showing closed up access door, pipes and wooden box – contents unknown but pipe not attached.



Date: 14th August 2020

Plate 7 Viewing west showing small metal door with padlock and ventilation. Note ventilation at base of wall.



Date: 14th August 2020

Plate 8 Viewing south showing ventilation and pipes along the northern boundary.



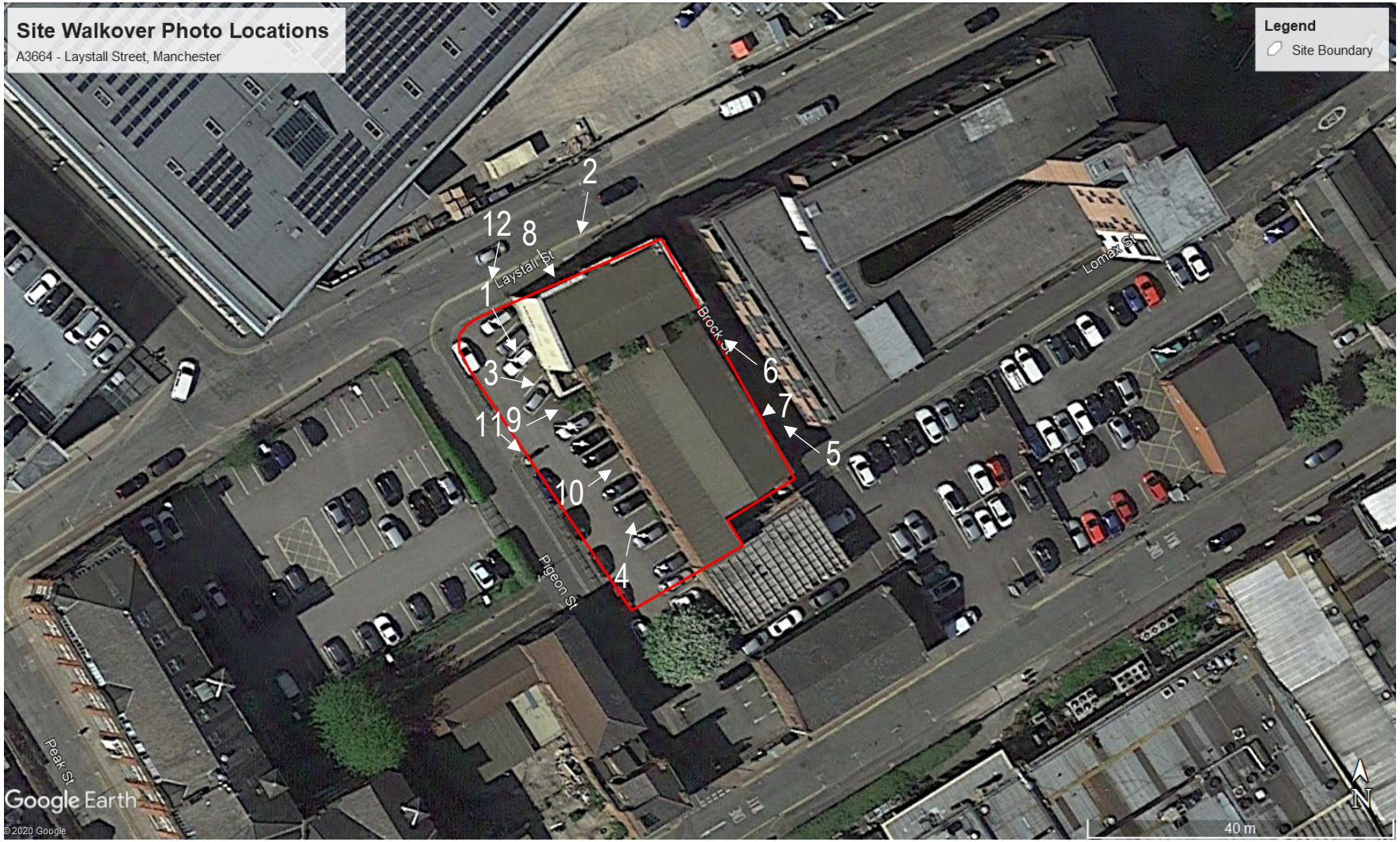
Date: 14th August 2020

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

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

EARTH ENVIRONMENTAL & GEOTECHNICAL</td></tr>
<tr><td>Job No.: A3664/20</td><td>Site: Laystall Street, Manchester</td></tr>
<tr><td>Plate 9 Viewing southeast showing 1 of 2 manholes located in the northern part of the car park. Note location of concrete boulders.</td><td>Plate 10 Viewing east showing the second manhole cover along the western boundary of the building. Note ventilation present in western side of building also.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Date: 14th August 2020</td><td>Date: 14th August 2020</td></tr>
<tr><td>Plate 11 Viewing south showing soakaway located on western boundary of the site.</td><td>Plate 12 Viewing south showing northwest corner of the site, demarcated by raised pavement and bollards. Note several bollards are missing.</td></tr>
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<tr><td>Date: 14th August 2020</td><td>Date: 14th August 2020</td></tr>
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Figure 10 Site Walkover Photo Locations



APPENDIX 3

SITE WALKOVER NOTES

EARTH ENVIRONMENTAL & GEOTECHNICAL

WALK OVER SURVEY REPORT

Site: Laystall Street, Manchester **Date:** 14/08/20

Job No: A3664/20 **Undertaken By:** A Ellams

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)		City Centre Industrial The site is currently a disused factory and warehouse with an operational car park.
Evidence of Past Activities	Are there: Any relevant street names in area? Features or relics which indicate past history?	Yes/~~No~~ Yes/~~No~~	The site is located to the south of Laystall Street with Pigeon Street to the west, and Brock Street to the east The industrial buildings are still present on site.
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		The site is low lying
Ground Conditions	Is there any evidence of: Mining, Mine entries Subsidence Landslip/slope erosion Former investigation works	 ~~Yes~~/No ~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	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~~/No ~~Yes~~/No	No difference to surrounding area Site gently slopes to the south No evidence of Made Ground was visible on the site walkover. However, two large boulders are located on the site and the site is covered with 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)		The site is demarcated by a raised pavement and bollards (some of which are missing) along the western boundary and part of the northern boundary. Other boundaries are demarcated by the edges of buildings on site. An apartment block is located east of the site on the other side of Brock Street
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	Shrubs are growing out of the buildings located on site.
Ground Surface	Are there areas of hardstanding and estimate the split between hard and soft cover? (If yes describe locations, types and conditions). Is the any evidence of any spillages or staining?	Yes/~~No~~ ~~Yes~~/No	100% Hardstanding None visible on the site walkover.

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/~~No~~	1 soakaway is located on site, in the entrance to the car park and 2 are located off site, one on Pigeon Street close to the car park entrance and a second in the southwest corner of the car park.
	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)	~~Yes~~/No	N/A
	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	N/A
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	N/A
Buildings	Is there any evidence of asbestos construction materials e.g. roofing, insulation materials.	~~Yes~~/No	None visible on the site walkover but presence of old buildings indicates that it may be present.
	Do any buildings have basements?	~~Yes~~/No	None observed on site walkover
	Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?	~~Yes~~/No	None observed on site walkover

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~~	Small vents are located around the base of both buildings on site.
Process Air Emissions	Point Source: Are there any stacks / vents / cooling towers / abatement equipment?	Yes/~~No~~	There are venting pipes located towards the top of the warehouse on both the east and west side
	Fugitive Source: is there any stockpiled material / windblown dust / vapour process?	~~Yes~~/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)?	~~Yes~~/No	N/A
	Are there any above ground fuel tanks (if yes, describe locations, volumes, how many, bunding, used / disused, condition?)	~~Yes~~/No	Possible storage on the western side of the building within a wooden box, unable to see inside
	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	
Accidents	In the event of a large spillage would runoff affect any vulnerable watercourse/culverts?	~~Yes~~/No	
	Are emergency procedures / equipment in place?	~~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~~	 N/A Minimal household waste litter
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		Access to buildings and set up within may be a problem as access doors are small On the car park Possibly within the building
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	N/A
Local Knowledge / Anecdotal Evidence			N/A
Site Dimensions	Describe shape of Site in plan and measure dimensions.		The maximum dimensions of the proposed site are 42m north to south and 28.5m west to east. The site occupies an area of approximately 0.11Ha.

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.