



EARTH ENVIRONMENTAL
& GEOTECHNICAL

Phase I GeoEnvironmental Desk Study

Lowther Crescent

Middleton

May 2022

For

Clear Architectural Services

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PHASE I GEOENVIRONMENTAL DESK STUDY

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FOR

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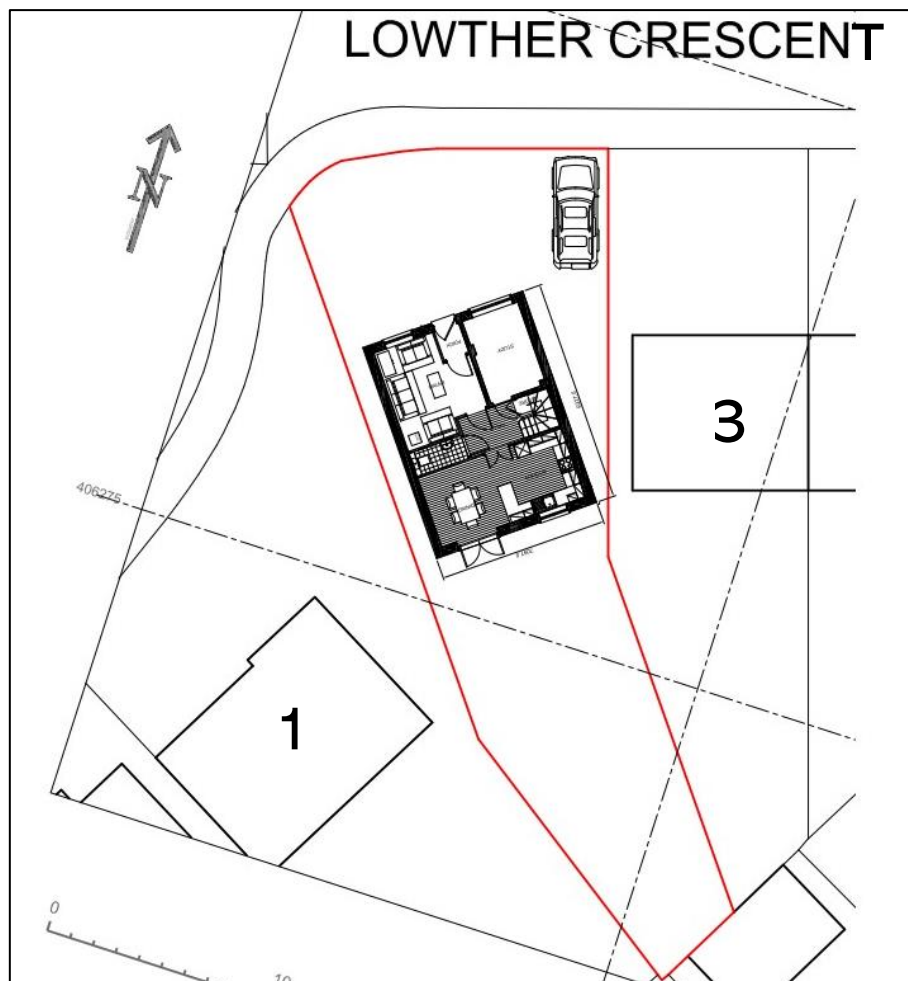
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1.0 INTRODUCTION

Appointment

- 1.1 Earth Environmental & Geotechnical Ltd has been commissioned by Clear Architectural Services on behalf of Mr. Tolu Abudiore (the Client) to undertake a Phase I GeoEnvironmental Desk Study for a proposed development on land adjacent to 3 Lowther Crescent, Middleton,
- 1.2 The report is required to support a planning application (20/01492/OUT) to Rochdale Metropolitan Borough Council.
- 1.3 It is understood that the client wishes to construct a two-storey, three bedroomed detached residence with parking and soft landscaping on the property. Planning permission was granted with conditions by the council in November 2021.
- 1.4 Vehicle access will be gained from Lowther Crescent, north of the property.
- 1.5 A proposed development plan for the site is shown in Figure 1 below.

Figure 1 Proposed Development Plan



Objective

- 1.6 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

- 1.7 The Phase I Environmental Desk Study comprises of a site reconnaissance visit and a review of the following information sources, some of which was provided by the client.
- British Geological Survey online maps.
 - Google Earth imagery.
 - Environment Agency online mapping data.
 - Historical Ordnance Survey maps.
 - The site and surrounding areas environmental, geological and mining data presented in the site specific GroundSure Reports (Appendix 1).
 - Coal Authority Interactive Viewer.
 - Rochdale Borough Council Planning Portal.

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site is in a residential area of Middleton, approximately 1km northwest of Middleton town centre in Greater Manchester. The National Grid Reference for the centre of the site is SD 86049 06284 (X:386049, Y: 406284), with the closest postcode being M24 4ES.
- 2.2 The site is an irregular shaped parcel of land on the corner of Lowther Crescent and Eycott Drive. Access to the site is from a pedestrian gate off Lowther Crescent, to the right of No. 3.
- 2.3 The site is fenced and covered in weeds and brambles with a few small saplings and ornamental trees. The ground is uneven, and slopes to the southeast. There is a small brick outbuilding on the site which is accessed from No. 3. There is a telephone exchange box and an electricity substation on the pavement adjacent to the site.
- 2.4 The maximum dimensions of the proposed site are 35m north to south and 10m east to west. The site occupies an area of approximately 295m sq.
- 2.5 The immediate surrounding area is residential; brick late 50's -60's terraced houses on Lowther Crescent and more recent (2000's) single to three storey brick houses on Eycott Drive backing on to the golf course. There are no signs of historical or recent industrial activity. The 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).

Ground Workings

- 3.3 There are 2 records of historical surface ground workings identified within 250m of the site boundary. These refer to a sand pit 131m northeast of the site mapped in 1851 and a sand hole 157m northeast, mapped in 1891.
- 3.4 According to the BGS, there is 1 record of a British Pit within 500m of the site. This record refers to the ceased High Barn Sand Pit located 162m northeast of the site.

Mining and Other Underground Workings

- 3.5 Reference to the Coal Authority Interactive Viewer shows the site is located within an identified coal mining area but not within a Development High Risk Area.
- 3.6 There are no records of natural cavities within 500m of the site.
- 3.7 There are no records for non-coal mining areas identified within 1km of the site.
- 3.8 There are no records of non-coal mining cavities, which may result in subsidence, located within 1km of the site.
- 3.9 There are no records for historical underground working features, identified from Ordnance Survey Mapping, within 1km of the site.
- 3.10 There are no areas of brine extraction, gypsum extraction, tin mining or clay mining on the site.

Radon Potential

- 3.11 The site is not located in a Radon Affected Area. Less than 1% of the properties on site are estimated to be above the Action Level. Therefore, radon protection measures are not required.

Geology

- 3.12 The BGS states that the site is not underlain by artificial made ground deposits.
- 3.13 The site is shown to be underlain by superficial deposits of hummocky glacial sand and gravel.
- 3.14 The solid geology beneath the site is mapped as the Pennine Lower Coal Measures Formation, which consist of interbedded grey mudstone, siltstone and pale grey sandstone, commonly with coal seams and marine fossils.

- 3.15 There are 6 records of linear features within 500m of the site boundary. The closest of these are inferred coal seams 202m and 271m south of the site. Other features refer to a normal fault, coal seams and a buried canal.
- 3.16 There are no records of landslips within 500m of the site.
- 3.17 There are no BGS borehole records identified within 250m of the site.
- 3.18 The site is in an area where the hazard rating is very low about running sands, collapsible deposits and landslides and negligible for shrink swell clays, compressible deposits and dissolution of soluble rocks.

Hydrogeology and Hydrology

- 3.19 The superficial deposits of glacial sand and gravel are classified by the Environment Agency (EA) as a Secondary Undifferentiated Aquifer which has a high to very high permeability and intergranular flow type. The BGS states the following:

Secondary Undifferentiated Aquifer *'Where it is not possible to attribute either a category A or B 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 Pennine Lower Coal Measures Formation is classified by the Environment Agency (EA) as a Secondary A Aquifer. The Coal Measures have a low to moderate permeability and a fracture flow type. The BGS states the following:

Secondary A Aquifer *'Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.'*

- 3.21 The groundwater vulnerability of the site has been classified as a low vulnerability for both superficial deposits and bedrock. The soil leaching potential is also low. 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.'*

- 3.22 There are 3 historical groundwater abstraction licence records within 2km of the site. All three refer to a borehole at Siddal Fold Farm, Birch, for a licence issued in 1991.
- 3.23 There are 5 surface water abstraction licence records within 2km of the site. The closest active licence is 583m south of the site and relates to a reservoir fed by surface drainage at North Manchester Golf Club.
- 3.24 There are no potable water abstraction licence records within 2km of the site.
- 3.25 The site is not located within a Source Protection Zone or Source Protection Zone of a confined aquifer.

- 3.26 There is 1 water network entry within 250m of the site. The record refers to an inland river 63m south of the site which is on the ground surface and contains water all year round.
- 3.27 There are 2 water surface water features identified within 250m of the site which refer to a lake next to Parkfield Primary School and a stream to the south of the site on the golf course.
- 3.28 There is 1 record of Water Framework Directive (WDF) surface water bodies which refers to the River IRK (Wince to Irwell) which had a failed chemical rating and moderate ecological rating in 2019.
- 3.29 There is 1 record of a Water Framework Directive (WDF) groundwater body located on-site. The record refers to the Northern Manchester Carboniferous Aquifers which had a poor chemical rating in 2019.

Landfill & Waste Management Activity

- 3.30 There are no records for current Environment Agency/Natural Resource Wales landfill records within 500m of the site.
- 3.31 There are no records of a BGS/DoE non-operational landfill sites within 500m of the site.
- 3.32 There are no records of an historical landfill from the Local Authority and Historical Mapping records within 500m of the site.
- 3.33 There are no records of an historic Environment Agency/Natural Resource Wales landfill within 500m of the site.
- 3.34 There are no records of historical waste sites from the Local Authority and Historical Mapping records within 500m of the site.
- 3.35 There are no records of a current Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site.
- 3.36 There are 2 records of a waste treatment, transfer or disposal sites which are exempt from needing a permit within 500m of the site. Both records refer to a site of Keswick Close, Langley Middleton for treating (screening and blending) and using construction waste.

Industrial Land Use Information

- 3.37 There are 25 records of potentially contaminative historical land uses identified within 500m of the site. The closest refers to a sand pit located 131m northeast of the site mapped in 1851. Other records relate to a sand hole (157m northeast) and further afield >200m, unspecified pits and ground workings.
- 3.38 There are 2 records of current potentially contaminative land uses identified within 250m of the site. Both refer to electricity substations 119m northeast and 202m east of the site.
- 3.39 There are 2 records of historical tanks identified within 500m of the site. Both records are for an unspecified tank 372m west of the site mapped between 1909 and 1922.

- 3.40 There are 15 records of historical energy features identified within 500m of the site, all of which refer to electricity substations. The closest substation is 114m northeast mapped in 1986.
- 3.41 There are no records of historical garages within 500m of the site.
- 3.42 There are no records of current petrol or fuel sites within 500m of the site.
- 3.43 There are no records of an historical petrol stations within 500m of the site.
- 3.44 There are no National Grid high voltage underground electricity transmission cables within 500m of the site.
- 3.45 There are no National Grid high-pressure gas transmission pipelines within 500m of the site.
- 3.46 There are no historical railway and tunnel features identified within 250m of the site.
- 3.47 There are no historical railway lines identified within 250m of the site.
- 3.48 There are no current active railway line records identified within 250m of the site.
- 3.49 There are no underground railway lines or tunnels identified within 250m of the site.
- 3.50 The site is not within 500m of the route of the High Speed 2 rail project.
- 3.51 The site is not within 500m of the route of the Crossrail 1 or Crossrail 2 rail project.

Environmental Permits, Incidents and Registers

- 3.52 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
Sites Determined as Contaminated Land under Part 2A EPA 1990	0
Dangerous or Hazardous (COMAH and NIHHS) Sites	0
Regulated Explosive Sites	0
Planning Hazardous Substance Consents and Enforcements	0
Historical Licensed Industrial Activities (IPC)	0
Part A (1) and IPPC Authorised Activities	0
Part A (2) and Part B Activities and Enforcements	0
Licensed Discharge Consents	0
Pollutant Release to Surface Waters (Red List)	0
List 1 Dangerous Substances Inventory Sites	0
List 2 Dangerous Substances Inventory Sites	0
Substantiated Pollution Incidents (Category 1 and 2)	0

Pollutant Release to Public Sewer	0
Pollution Inventory Substances, Wastes and Radioactive Wastes	0
Category 3 or 4 Radioactive Substance Authorisations	0

- 3.53 There are no records of Environmental Permits, Incident or Registers within 500m of the site.

Environmentally Sensitive Sites

- 3.54 There are no records of Sites of Special Scientific Interest (SSSI) within 2km of the site.
- 3.55 There are no Conserved Wetland sites (Ramsar sites) or Special Areas of Conservation (SAC) within 2 km of the site.
- 3.56 There are no Special Protection Areas of Conservation (SPA) or National Nature Reserves (NNR) or within 2km of the site.
- 3.57 There are 3 records for Local Nature Reserves (LNR) within 2km of the site: Alkington Woods, 798m south and two records for Hopwood Woodlands, 1.9km northeast.

Ecology

- 3.58 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.
- 3.59 There are 5 records of habitats of principal importance within 250m of the site which refer to areas of deciduous woodland on the golf course south of the site. The closest of these is 92m south of the site.
- 3.60 The site is within an area classified as Urban Land.

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.
- 3.62 There are no records of a Listed Building within 250m of the site
- 3.63 There are no records of Conservation Area within 250m of the site.
- 3.64 There are no records of Ancient Monuments or Registered Parks and Gardens within 250m of the site
- 3.65 There are no records of World Heritage Sites or areas of Outstanding Natural Beauty within 250m of the site.

Potential Flood Risks

- 3.66 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 3 floodplain.

- 3.67 There are no records of a flood risk from rivers and sea (RoFRaS) within 50m of the site.
- 3.68 There are no records of historical flood events recorded within 250m of the site.
- 3.69 There are no records of flood defences located within 250m of the site.
- 3.70 There are no records of areas benefiting from flood defences located within 250m of the site.
- 3.71 There are no records of areas used for flood storage within 250m of the site.
- 3.72 The highest risk of surface water flooding occurring on-site (because of extreme rainfall) in a 1-to-30-year return period according to data from the Ambiantal Risk Analytics surface water FloodMap is negligible.
- 3.73 The highest risk of groundwater flooding occurring on-site, based on the Ambiantal Risk Analytics 1 in 100-year 5m Digital Terrain Model is moderate.

Previous Site Investigations

- 3.74 Earth Environmental and Geotechnical are not aware of any previous site investigations or planning applications 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 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	Surrounding Land Use History
1848 1:10,560	The site is pastureland 200m south of High Barn Farm.	200m north is High Barn Farm 250m to the northeast is a sand hole 200m southeast is a sand pit 400, south is Asker Dam and between 500 and 750m south are several dams 400m north is Middleton Wood 500m east is Throstle Hall There is a bleach works 800m south
1891 1: 10,560 1893 1:2,500	No significant change	Residences have extended westwards from Middleton. There are 3 reservoirs 500m to the east of the site Parkfield Mills are 700m to the south.
1907 1:10,560 1909 1:2,500	No significant change	There are no sand holes or sandpits on the map.
1915 1:10,560	No significant change	No significant change
1932 1:10,560 1932 1:2,500	No significant change	The North Manchester Golf Course has been established 200m south of the site. Infill building encroaching westwards from Middleton.
1955-1956 1:10,560	The area is pastureland on the adjacent and west of a recent housing development.	Houses have been built on Yewdale Drive a residential housing development next to the site. High Barn Farm has been demolished

Date	On-Site	Surrounding Land Use History
1954 1:2,500		A Roman Catholic Church built on the site with a primary school opposite 400m to the north of the site. Large residential areas are being planned out 500m to the northwest of the site and 250m north of the site. Two to the reservoirs to the east of the site have been filled in.
1965-1968 1:10,560 1961-1966 1:2,000	Houses have been built to the north of the site and adjacent to it (no3) on Lowther Crescent.	There are now large residential areas in Langley and to the north of the site.
1974-1975 1:2000	No significant change	Older houses demolished and new houses planned for Wood Street area 500m east of the site.
1973-1977 1:10,000	No significant change	School built 400m to southeast.
1981-1982 1:10,000	No significant change	No significant change
2001 1:10,000 Google Earth 2000	No significant change	No significant change
2003 Google Earth	Construction of houses on south side of Lowther Crescent and Eycott Drive	No significant change
2022 Google Earth	No significant change	No significant change

Figure 4 OS Map Extract 1891

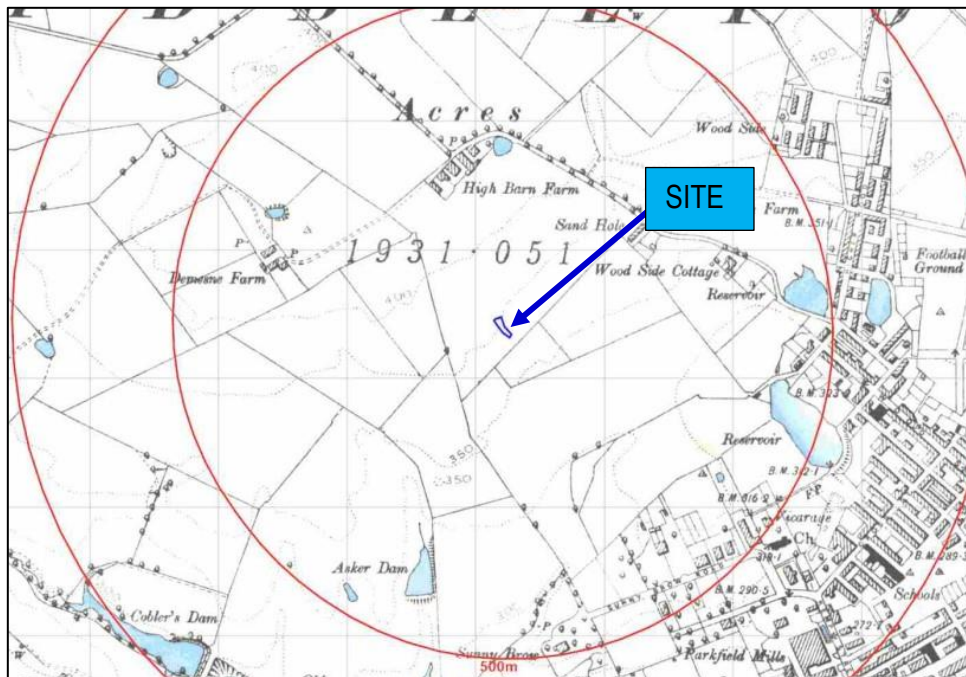


Figure 5 OS Map Extract 1955

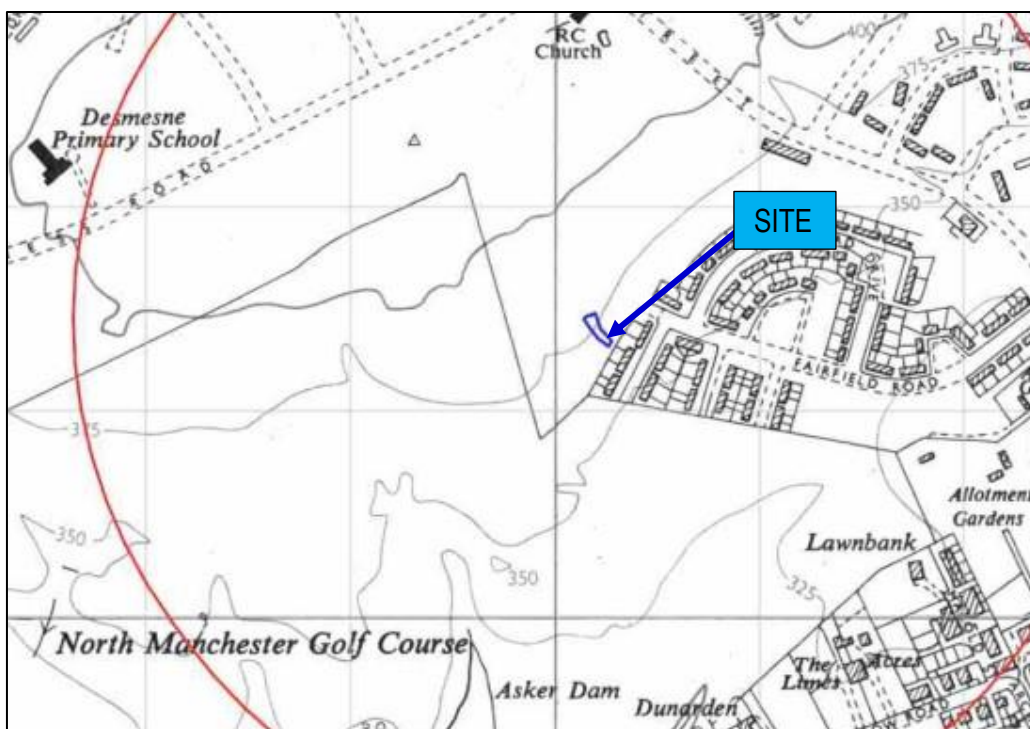


Figure 6 OS Map Extract 1965

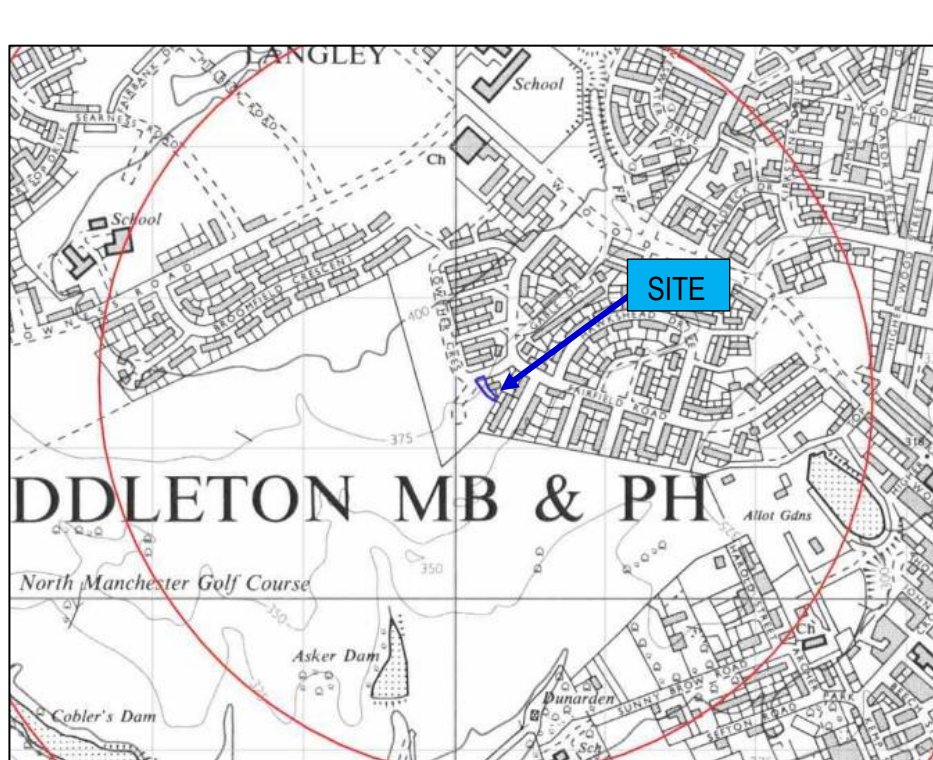


Figure 7 Google Earth Image 2000



Figure 8 Google Earth Image 2005



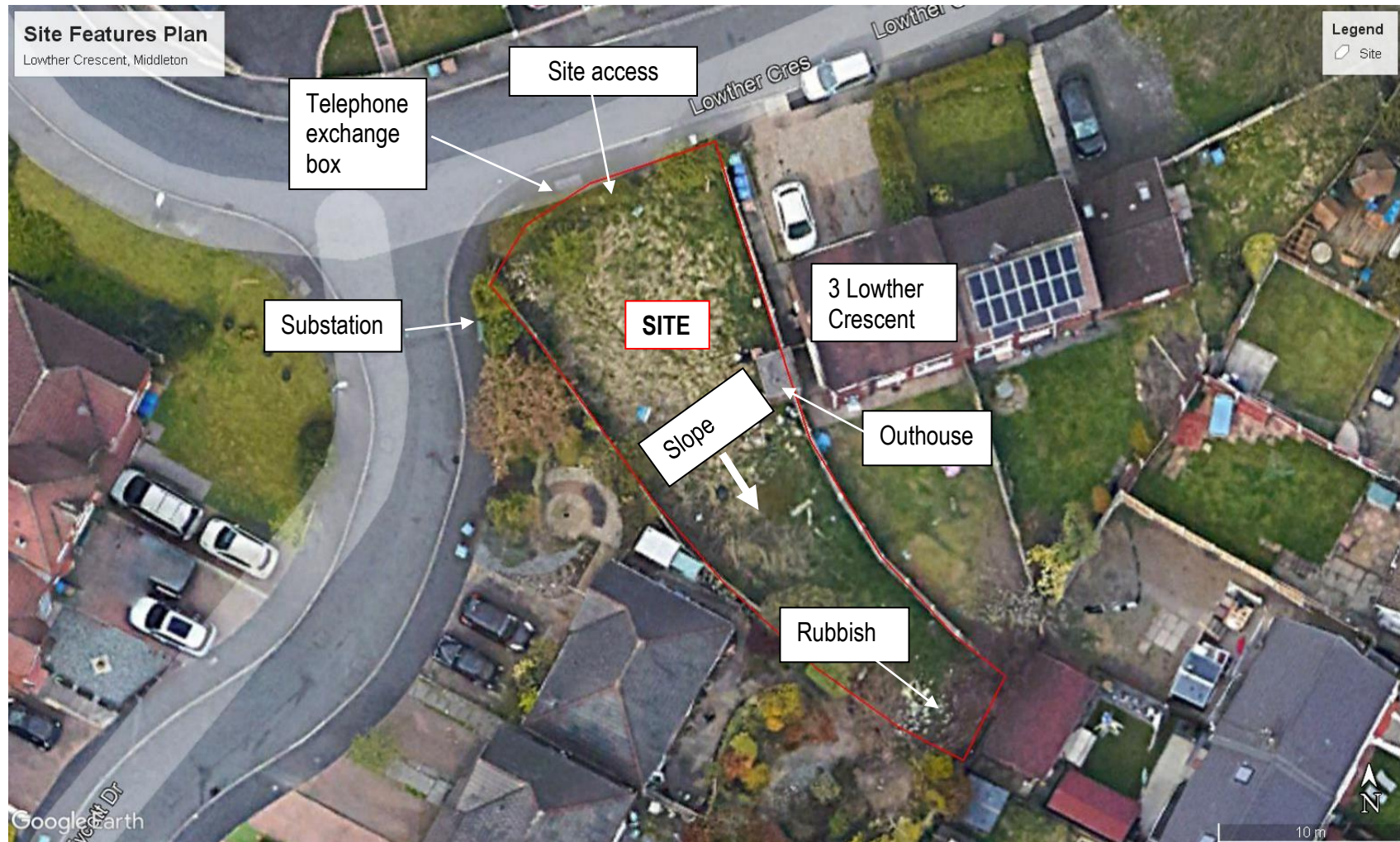
Figure 9 Google Earth Image 2022



5.0 WALKOVER SURVEY

- 5.1 A walkover survey was completed on 30th May 2022. The photographs and notes from this survey are appended to this report as Appendix 2 and Appendix 3 respectively.
- 5.2 The site access is from a pedestrian gate on the south side of Lowther Crescent.
- 5.3 The site slopes (1:17) to the southeast and is fenced on all sides with a hedge on the street frontage and wooden panel fencing (1.2 – 1.8 m) with concrete base boards and posts for the remainder. The fence is broken in the far southern corner.
- 5.4 There is a small brick building on site (2 x 2 m approx.) with a felt roof which was accessed from number 3 Lowther Crescent.
- 5.5 The ground cover was grass, weeds, brambles and iris and there are several small cherry saplings and small ornamental trees around the edge of the site (buddleia, lilac, cherry). There was a small amount of fly tipped garden and plastic rubbish.
- 5.6 On the pavement next to the site was a streetlamp, telephone exchange box near the site access and a small electricity substation box on the corner with Eycott Drive.
- 5.7 The closest properties are number 3 Lowther Crescent to the east, 2 Eycott Drive to the west and the rear of a property on Yewdale Drive.
- 5.8 Surrounding properties are 50's brick built two storey terraces and later (2000's) single to three storey houses. The area is exclusively residential.
- 5.9 A site features plan is presented as Figure 10 overleaf.

Figure 10 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 residential end use.

Table 3: Consequence, Probability and Risk

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

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

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

Potential Sources

- 6.5 Historically the site has always been vacant, being pastureland until the 1950's when a residential area was built adjacent to the east and expanded through the 1960's to include the house adjacent to the site number 3 Lowther Crescent. More residences were added to the west of Lowther Crescent in 2003.
- 6.6 The area has always been farmland or residential, with very little in the way of industrial activity within 500m of the site. There is not thought to be a risk of mobilised off-site sources of contaminants.
- 6.7 There is therefore limited potential for the presence of contamination.

Potential Receptors

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

Potential Pathways

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

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

Table 5: Preliminary Conceptual Model

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
Potential soil contamination E.g., Heavy Metals, PAH, TPH, BTEX, PCBs and ground gases.	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Low	The site is currently vacant, fenced and covered in weeds and brambles. There is a small amount of garden and plastic waste on site. The risk is therefore considered to be LOW .
		Adjacent land users	Unlikely	Moderate	Low	Residences are located adjacent to the site on east west and southern sides. The site is currently vacant, fenced and covered in weeds and brambles. The risk is considered LOW .
		Future land users	Unlikely	Moderate	Low	The proposed development consists of constructing a two storey three bedroomed residence. Given the history of the site and the fact there is only a small brick built shed to demolish. The risk to future site users via direct exposure is LOW .
		Construction Workers	Unlikely	Moderate	Low	Construction workers are unlikely to be exposed to contaminated soils given the history of the site and the current use. The risk to construction workers is considered LOW .
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Unlikely	Moderate	Low	The superficial soils are mapped as glacial sand and gravel. The site is well drained and in a suburban area where storm water is managed. The risk to groundwater is therefore considered LOW .
	Lateral migration in surface waters	Surface water	Unlikely	Moderate	Low	The site is well drained in a suburban area where storm water is managed. There are no waterbodies nearby and no contamination was noted. Therefore, the perceived risk to surface waters is LOW .
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Moderate	Low	Sources of potential ground gas are not thought to be likely on site and were not observed on site. The radon risk is low as <1% of properties are above the Radon Action Level. This risk to current site users is therefore LOW .
		Adjacent land users	Unlikely	Moderate	Low	Sources of potential ground gas were not observed on site and research indicates it is unlikely. The risk to adjacent site users from ground gas is therefore considered LOW .

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Future land users	Unlikely	Moderate	Low	Sources of potential ground gas were not observed on site and research indicates it is unlikely There is low potential for radon gas and no radon protection measures should be implemented, therefore the risk is considered LOW .
		Construction Workers	Unlikely	Moderate	Low	Construction workers are unlikely to be exposed to ground gas given the nature of the underlying superficial deposits and history of the site. The risk to construction workers from ground gas is considered LOW .
Asbestos Containing Material (ACM)		Current Site Users	Unlikely	Moderate	Low	Asbestos was not observed on site however there is a small brick building that requires demolition. Given the age of the building, ACM may also be present inside. Asbestos is only harmful when disturbed. The risk to current site users is LOW .
		Adjacent land users	Unlikely	Moderate	Low	Residences are located on either side of the site. Asbestos is only harmful when disturbed. 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 constructing a two storey, three bedroomed detached property. There is a small brick building on site that requires demolition and material will be removed from site. Asbestos is only harmful when disturbed. The risk is therefore considered MODERATE to LOW . A pre-demolition asbestos survey and soil contamination assessment will reduce the risk to LOW .
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers may be exposed to potential asbestos during the demolition of the shed for the new construction. The duration will be short term. The risk is considered MODERATE to LOW . Appropriate health and safety measures (in line with CDM and other relevant health and safety guidance) would reduce the risk. A pre-demolition asbestos survey and soil contamination assessment will reduce the risk to LOW .

7.0 GEOTECHNICAL HAZARDS ASSOCIATED WITH THE DEVELOPMENT

7.1 In addition to the environmental hazards there are also geotechnical hazards associated with the stability of the ground including load bearing capacity, slope stability and effects of ground mining activities. Local Authorities follow NPPF (2012) which requires that a site is suitable for its new use considering of ground conditions and land instability, including from natural hazards to former activities such as mining. A summary of the geotechnical considerations is provided below in Table 6.

Table 6: Summary of Geotechnical Hazards

Geohazards:	
Highly Compressible Ground	Negligible risk.
Collapsible Soils	Very low risk.
Swelling Clay	Negligible risk.
Running Sand	Very low risk.
Ground Dissolution	Negligible risk.
Landslip	Very low risk.
Mining & Quarrying	There is no mining or quarrying other than historic sand pits over 100m northeast of the site.
Geotechnical Design Considerations	
Site Clearance	The site currently has a small 2x2m shed on it which would require demolishing.
Trees	There are small saplings and immature ornamental garden trees / shrubs around the boundary of the site.
Existing Buildings/Obstructions	There is a small brick building on site. (shed / out house)
Foundations	The depth and type of proposed foundations would depend on the ground conditions present on site. There is a possibility of made ground due to buildings previously being demolished on the site. Geological mapping suggests that the superficial deposits are glacial sand and gravels. An intrusive geotechnical investigation is recommended prior to any construction works to explore the on-site ground conditions.
Floor Slabs	Again, an intrusive geotechnical investigation is recommended prior to any construction works to discover the most suitable floor slab design for the on-site ground conditions.

Geotechnical Design Considerations	
Groundwater	Exact groundwater conditions are not known at this stage. For more detailed knowledge of the groundwater regime, an intrusive geotechnical investigation would be needed. However, it is recorded that the secondary deposits on site are expected to be glacial sand and gravels. The site will utilise the current stormwater / sewer system. The highest risk of groundwater flooding occurring on-site, based on the Ambiantal Risk Analytics 1 in 100-year 5m Digital Terrain Model is MODERATE .
Earthworks	The site slopes and would require levelling and building up for the house foundations.
Slopes	The site slopes 1:17 to the southeast
Retaining Walls	There are no retaining walls
Chemically aggressive ground conditions	Chemically aggressive ground conditions are not expected at this site. However, an intrusive geotechnical investigation would be necessary to confirm this.

8.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

- 8.1 Historically the site has always been vacant, being pastureland until the 1950's when a residential area was built adjacent to the east and expanded through the 1960's to include the house adjacent to the site number 3 Lowther Crescent. More residences were added to the west of Lowther Crescent and Eycott Drive in 2003.
- 8.2 The surrounding area is an always has been residential and it is unlikely that contaminants have been mobilised from nearby. There is a telephone junction box and an electricity box on the pavement adjacent to the site, but both are recent structures and are not of concern.
- 8.3 It is understood that the client wishes to construct a two storey, three bedroomed detached residence with parking on the property. The site will require levelling for the house foundations and the outhouse pertaining to number three will be demolished.
- 8.4 The solid geology on site comprises of the Pennine Lower Coal Measures Formation (Secondary A Aquifer). Superficial deposits are mapped as hummocky glacial sand and gravel. There are no records of made ground on site.
- 8.5 The site is located within an identified coal mining area but not within a Development High Risk Area
- 8.6 The site is not located in a Radon Affected Area, as less than 1% of the properties are above the Action Level.
- 8.7 Given the historical land use and the site is vacant apart from a small brick outhouse, the overall risk from soil contamination, asbestos containing materials and ground gas to end users and construction workers is concluded to be **LOW**.
- 8.8 The risk to controlled waters is concluded to be **LOW** based on the current drainage of the site and the site not being proximal to any water bodies
- 8.9 The site is not located within a flood plain. The risk of groundwater flooding is considered **MODERATE** based on the Ambient Risk Analytics 1 in 100-year 5m Digital Terrain Model however this is less given that the site is sloping and will utilise the current stormwater drainage in the area.

Recommendations

- 8.10 No further recommendations are required with respect to the environmental setting of the stie.

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.: A4832/22	Site: Lowther Crescent, Middleton
Plate 1 Viewing south at the site entrance from Lowther Crescent.	Plate 2 Viewing south showing No3 Lowther Crescent on the left with outbuilding to be demolished.
	
Date: 30th May 2022	Date: 30th May 2022
Plate 3 Viewing East at small brick shed with felt roof.	Plate 4 Viewing south down the slope towards narrowing part of site. Note trees and shrubs.
	
Date: 30th May 2022	Date: 30th May 2022

Earth Environmental & Geotechnical Ltd Tel: 0161 975 6088 Email: info@earthenvironmental.co.uk Web: www.earthenvironmental.co.uk	SITE PHOTOGRAPHS 
Job No.: A4832/22	Site: Lowther Crescent, Middleton
Plate 5 Viewing south at the end of the plot with broken fence, garden waste and plastic litter. Note rear of property on Yewdale Drive.	Plate 6 Viewing north at the rear of no 3 Lowther Crescent.
	
Date: 30th May 2022	Date: 30th May 2022
Plate 7 Viewing west at adjacent property on Eycott Drive.	Plate 8 Viewing south at telephone exchange box on corner of Lowther Crescent and Eycott Drive.
	
Date: 30th May 2022	Date: 30th May 2022

Figure 11 Site Walkover Photo Locations



APPENDIX 3

SITE WALKOVER NOTES

WALK OVER SURVEY REPORT

Site: Lowther Crescent, Middleton

Date: 30th May 2022

Job No: A4832/22

Undertaken By: Heidi Richards

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)		Suburban residential Vacant site,
Evidence of Past Activities	Are there: Any relevant street names in area? Features or relics which indicate past history?	Yes/No Yes/No	
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		Undulating hilly / gently rolling topography
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	

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	Site slopes to southeast in the middle of the sit quite steep. No
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)		Hedge on to street Garden gate Wooden panel fencing with concrete posts and concrete base boards. Dry, no water courses
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	Weeds and brambles, iris. Small cherry sapling, lilac, ornamental purple cherry and buddleia 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	No hard standing.

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	Dry sloping site will use services for street.
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	Electrical substation box on corner of Eycott Drive and Lowther Crescent.
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	

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 amount of plastic waste, laundry basket, plastic boxes, drink bottles etc. Garden Waste
Atmospheric	Are there any fumes, odours originating from site or affecting site from neighbouring sites?	Yes/No	
Access / Further Investigations	If a Phase 2 Investigation is likely to be required, describe any access problems including headroom where relevant, services, overhead cables, restricted access areas, confined spaces, trafficked areas, etc that are likely to affect investigation scope/techniques. Identify possible site office and storage locations. Identify possible water supply		No overhead cables but site access is presently only pedestrian.
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	
Local Knowledge / Anecdotal Evidence			
Site Dimensions	Describe shape of Site in plan and measure dimensions.		

APPENDIX 4

REPORT LIMITATIONS

LIMITATIONS

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

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

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

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

The report was written in 2022 and should be read considering any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

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

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

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full of 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.