









EARTH ENVIRONMENTAL & GEOTECHNICAL

Phase I GeoEnvironmental Desk Study

Berry Brow Clayton Bridge

Manchester

November 2020

On behalf of

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BERRY BROW CLAYTON BRIDGE

MANCHESTER

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FOR

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EARTH ENVIRONMENTAL & GEOTECHNICAL

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1.0 INTRODUCTION

Appointment

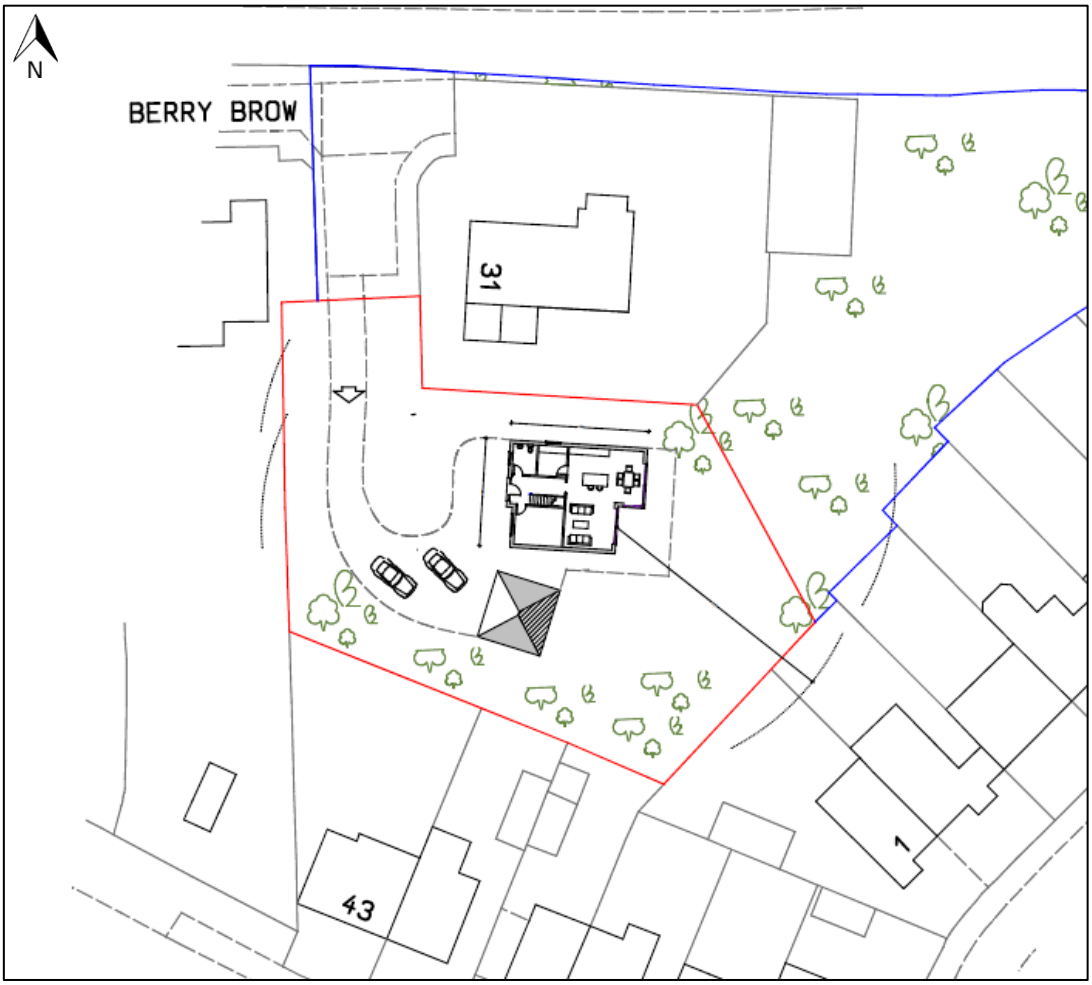
1.1 Earth Environmental & Geotechnical Ltd has been commissioned by Heaton Design Ltd (the Client) to undertake a Phase I GeoEnvironmental Desk Study for the proposed development on the land south of 31 Berry Brow, Clayton Bridge, Manchester.

1.2 It is understood that the Client wishes to construct a new residential property with associated access road/driveway, soft landscaping and detached garage.

1.3 Vehicle access will be routed from Berry Brow to the north of the site.

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 near Droylsden, Manchester approximately 5.21km from Manchester City Centre. The approximate National Grid Reference for the centre of the site is SJ 89053 99554 (X: 389053, Y: 399554) with the closest postcode being M40 1GR.

2.2 The site is an irregular shaped parcel of land with current access via Berry Brow to the north. The maximum dimensions of the proposed site are 39m north to south and 45m west to east. The site occupies an area of approximately 0.12Ha.

2.3 The site is currently a vacant wooded area comprising a mixture of trees, shrubs and weeds and is overgrown in areas. Some of the trees have been cut down to the south. There is a steep slope downwards in a north to south direction.

2.4 The general surrounding area comprises predominantly of residential dwellings to the north and southeast of the site. The other surrounding area is vacant fields and woodland.

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 underlain by artificial deposits of Made Ground (Undivided) which may contain potentially contaminated material, unpredictable engineering conditions and instability.

3.4 The site is underlain by superficial deposits of Devensian Till, comprising Diamicton.

3.5 The solid geology beneath the site is shown to be the Collyhurst Sandstone Formation, comprising sandstone.

3.6 There are no records of linear features within 500m of the site boundary.

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

3.8 There are 13 borehole records identified within 250m of the site. The closest record available is located 100m south of the site (BGS Reference: SJ89NE159), drilled in 1957 is summarised below:

- Topsoil to 0.23m
- Brown Sand to 1.91m
- Sand and Gravel to 5.79m
- Red Sand to 12.65m
- (Soft) red Sandstone (Collyhurst Sandstone) to 91.44m

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

Ground Workings

3.10 There are 75 records of historical surface ground working features identified within 250m of the site boundary. The closest records refer to an unspecified heap located 54m north of the site, dated 1906-1938. Other records in the vicinity refer to more unspecified heaps, unspecified ground workings, unspecified pits, refuse heaps, unspecified disused tips, ponds, unspecified quarries, sewage works, cuttings and reservoirs.

3.11 According to the BGS, there are 2 records of a British Pit within 500m of the site. The closest record refers to Red Sand Quarry located 141m east of the site. The site produced silica sand from a surface mineral working. Production is noted to have ceased.

Mining and Other Underground Workings

3.12 The site is not located within 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 is 1 record for non-coal mining areas located within 1km of the site including a vein mineral located 797m southeast 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 3 records for historical underground working features identified within 1km of the site. The closest record refers to an unspecified shaft located 166m west of the site, mapped in 1978.

Radon Potential

3.17 The property is not located in a Radon Affected Area, as between 1% and 3% of the properties are above the Action Level. Therefore, no radon protection measures are necessary.

Hydrogeology and Hydrology

3.18 The BGS state the underlying Artificial Deposits have a mixed flow type and have a very high to low permeability.

3.19 The superficial deposits are classified by the Environment Agency (EA) as a Secondary A Aquifer. The Devensian Till Deposits have a mixed flow type and a high to low permeability. 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.'*

3.20 The Collyhurst Sandstone Formation is classified by the Environment Agency (EA) as a Principal Aquifer with an intergranular flow type and a 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.*

3.21 The groundwater vulnerability and soil leaching potential of the site has been classified as a low vulnerability and a low leaching potential. 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 17 ground water abstraction licence records within 2km of the site. The closest record refers to a historical ground water source at Clayton Mill Bridge, Manchester 47m southeast of the site.

3.23 There are 6 surface water abstraction licence records within 2km of the site. The closest record refers to a historical surface water source at Ashton Canal, Manchester 1.56km southwest of the site.

3.24 There are no potable water abstraction licence records within 2km of the site.

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

3.26 There are 7 water network entries within 250m of the site. The closest record refers to an inland river not influenced by normal tidal action, 76m west of the site.

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

Landfill & Waste Management Activity

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

3.29 There are 5 records of historic Environment Agency/Natural Resource Wales landfill sites within 500m of the site. The closest record refers to a historical landfill site at Clayton Vale Power Station with an inert, industrial, commercial, household, special and liquid sludge waste type, located 38m southwest of the site. The landfill accepted material from 1965-68.

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

3.31 There are 45 records of a historical waste site from the Local Authority and Historical Mapping Records within 500m of the site. The closest record refers to a refuse tip located 73m west of the site, mapped in 1963.

3.32 There are 34 records of a waste treatment, transfer or disposal site within 500m of the site. The closest record refers to a storing waste exemption site located 177m northeast of the site. The site is described as storage of waste in a secure place, not on a farm.

3.33 There are 3 records of current Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site. The closest record refers to a metal recycling site located 280m northeast of the site, license issued 2003.

Industrial Land Use Information

3.34 There are 176 records of potentially contaminative historical land uses identified within 500m of the site, the closest record being for a railway building 50m northeast of the site dated 1923.

3.35 Other records in the vicinity refer to unspecified heaps, unspecified ground workings, a smithy, other railway buildings, railway stations, unspecified pits, unspecified mills, refuse heaps, dye and bleach works, unspecified disused tips, an unspecified quarry, dye works, dyeing and finishing works, sewage works, unspecified shafts, cuttings, unspecified depots, printworks, etc.

3.36 There are 8 records of current potentially contaminative land uses identified within 250m of the site. The closest record refers to a pipeline located 109m southeast of the site. Other records in the vicinity refer to an electricity substation, a garage, pylons, vehicle parts and accessories, a depot and unspecified works or factories.

3.37 There are 21 records of historical tanks identified within 500m of the site. The closest record refers to an unspecified tank located 208m northeast of the site, dated 1908.

3.38 There are 12 records of historical energy features identified within 500m of the site. The closest records refer to two electricity substations, both located 104m south of the site, dated 1982-1985.

3.39 There are no records for current petrol or fuel sites within 500m of the site.

3.40 There are no records of historical petrol or fuel sites within 500m of the site.

3.41 There are no historical garage and motor vehicle repair site records identified within 500m of the site.

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 4 historical railway and tunnel features identified within 250m of the site. The closest record refers to railway sidings located 10m north of the site, dated 1893.

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

3.46 There are 13 current active railway line records identified within 250m of the site. The closest record refers to a rail located 28m north of the site.

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

3.48 The site is not within 500m of the route of the High Speed 2 rail project.

3.49 The site is not within 500m of the route of the Crossrail 1 rail project.

Environmental Permits, Incidents and Registers

3.50 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	1
Category 3 or 4 Radioactive Substance Authorisations	0
Licensed Discharge Consents	30
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)	11
Pollution Inventory Substances, Wastes and Radioactive Wastes	0

3.51 There is 1 record of a Part (2) and Part B Activities and Enforcement within 500m of the study site. This record refers to a current Part B Permit for a waste oil burner at Kenny Bros located 423m east of the site.

3.52 There are 30 records of Licensed Discharge Consents within 500m of the site. The closest record refers to sewage discharges – sewer storm overflow – water company into the Berry Brow Culvert located 81m southwest of the site.

3.53 There are 11 record of Substantiated Pollution Incidents (Category 1 and 2) within 500m of the site. The closest record refers to storm sewage released 109m south 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

3.54 There are 3 Sites of Special Scientific Interest (SSSI) within 2km of the site. The closest record refers to Rochdale Canal SSSI located 1.36km north of the site.

3.55 There are 2 Special Areas of Conservation (SAC) within 2km of the site. The closest record refers to a floating water-plantain in Rochdale Canal, located 1.36km north of the site.

3.56 There are 2 records of Local Nature Reserves (LNR) within 2km of the site. The closest record refers to Clayton Vale located 37m southwest of the site.

3.57 There is 1 record of a Nitrate Vulnerable Zone (NVZ) within 2km of the site. This record refers to the River Irk (Moston Brook to River Irwell) NVZ located 1.1km north of the site.

3.58 There are 3 records of Greenbelt land within 2km of the site. All the records refer to Liverpool and Manchester Green Belt but the closest record is located 41m southwest of the site.

3.59 There are no other Environmentally Sensitive Sites within 2km of the site.

Ecology

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

3.61 However, the site is classified as urban land.

Archaeology

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

3.63 However, there is 1 record of a Conservation Area within 250m of the site. This record refers to Graver Lane, Manchester, located 51m north of the site.

3.64 There are no records of World Heritage Sites, Listed Buildings and Scheduled Ancient Monuments with 250m of the site.

Potential Flood Risks

3.65 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.

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

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

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

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

3.70 The highest risk of surface water flooding occurring on-site is negligible.

3.71 The highest risk of groundwater flooding occurring on-site is moderate and high within 50m of the site.

Previous Site Investigations

3.72 Earth Environmental & Geotechnical Ltd are not aware of any previous site investigations carried out for the site.

4.0 SITE HISTORY

4.1 The historical development of the site has been determined by reference historical plans and Google Earth imagery. The reviewed historical plans comprise only readily available records and may be limited; however, the information available to date indicates that additional searches are unlikely to add to our understanding of the site. The earliest available historical mapping covering the site dates back to 1848.

4.2 The site history is summarised in Table 2, below, followed by selected extracts from maps and aerial photographs.

Table 2: Summary of Site History

Date	On-Site History	Surrounding Land Use History
1848 1:10,560	The site comprises a vacant agricultural field.	The immediate surroundings are the rest of an agricultural field. A train line and associated banking are located 20m north of the site. A river is located 80m south of the site. Culcheth Station is located 100m northwest of the site. A smithy is located 100m south of the site. A viaduct is located 150m east of the site. A farm is located 200m south of the site. Clayton Bridge is located 200m south of the site. Bury Brow is located 200m north of the site. Mill houses and associated reservoirs are located 250m northeast of the site. Clayton Bridge Print Works are located 350m east of the site. Dye and Bleach Works are located 450m west of the site. Several reservoirs/ponds are located west of the site.
1890-1892 1:10,560 1893-1894 1:2,500	No significant change.	Residential properties and associated gardens are located adjacent to the western boundary of the site. A Sunday school is located 50m south of the site. A bowling green is located 80m southeast of the site. Old sand pits are located 100m northwest of the site. A smaller river (later Sunny Bank Brook) is located 240m south of the site. Old sand pits are located 250m southeast of the site. Clayton Bridge Dyeing works are located 350m east of the site.

Date	On-Site History	Surrounding Land Use History
		Victoria rubber works are located 500m west of the site.
1918, 1923 1:10,560 1922 1:2,500	No significant change.	St Cuthbert's Church is located 50m south of the site. A large pit is located 100m northwest of the site. Clayton Bridge Dyeing works are now dyeing and finishing works. Sewage works and associated tanks are located 450m northeast of the site. Allotment gardens are located 500m northwest of the site. Brookdale Park is located 500m north of the site.
1933-1934, 1934-1938 1:10,560 1931-1932 1:2,500	No significant change.	A quarry is located 100m east of the site. Several large pits are located 300m southwest of the site.
1954-1956 1:10,560 1950-1951 1:2,500 1950 1:1,250	No significant change.	The dyeing and finishing works to the west of the site no longer present. Quarry to the east is now a pond. More residential properties to the north and northwest of the site. Large pits present 100m southwest of the site. Allotments located 100m north of the site. More residential development to the south and southeast of the site.
1965-1968 1:10,560 1965 1:2,500 1963-1968 1:1,250	No significant change.	Residential properties located adjacent to the southern and south eastern boundaries of the site. Residential development to the northwest of the site. The pond to the east is no longer present. A large refuse tip is located 100m west of the site. An electricity substation is located 100m south of the site. Depots are located 250m northeast of the site. Overhead electricity cables and pylons, orientated NE-SW are located 300m southeast of the site.
1980-1982, 1991 1:10,000 1975-1980, 1982-1985, 1991-1992 1:1,250	No significant change.	The tips are now disused to the southwest. Shafts are located within the disused tips. Boiler works to the west are no longer present. St Cuthbert's Church is no longer present.

Date	On-Site History	Surrounding Land Use History
2001 1:10,000 2003 1:1,250	No significant change.	No significant change.
2009 Aerial Photograph	No significant change.	A residential property is being constructed adjacent to the northern boundary.

Figure 4 OS Map Extract 1848

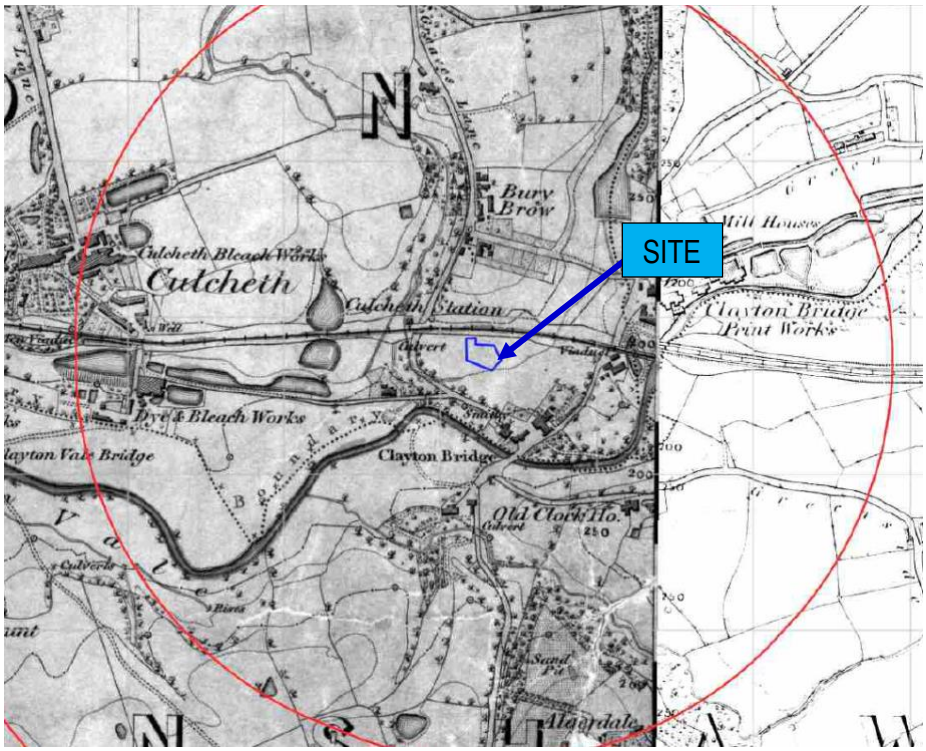


Figure 5 OS Map Extract 1922

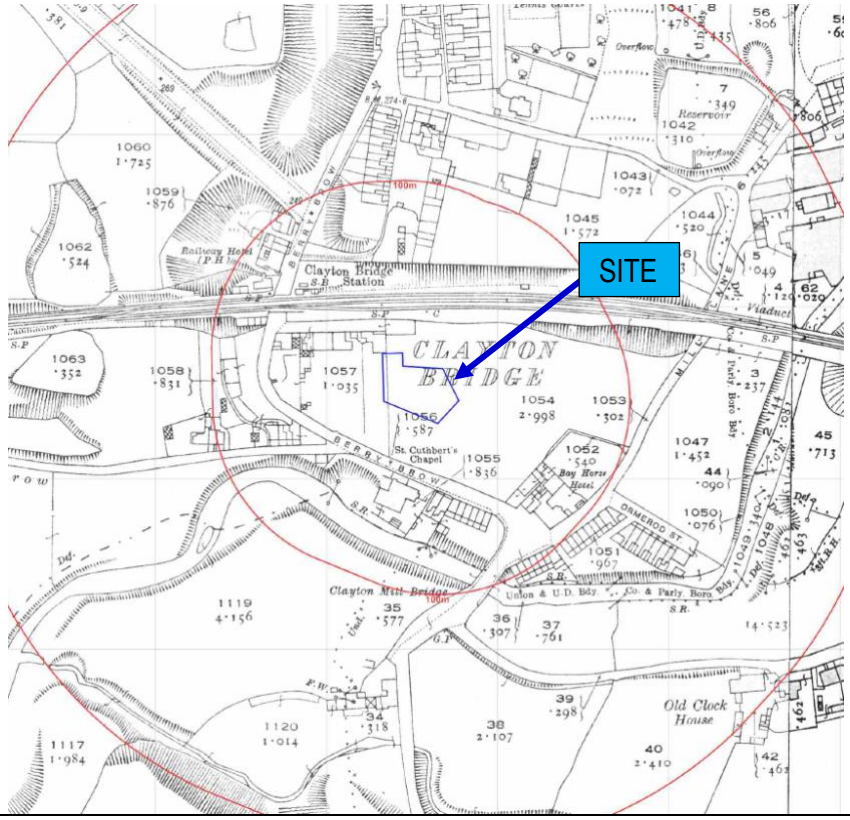


Figure 6 OS Map Extract 1963-1968

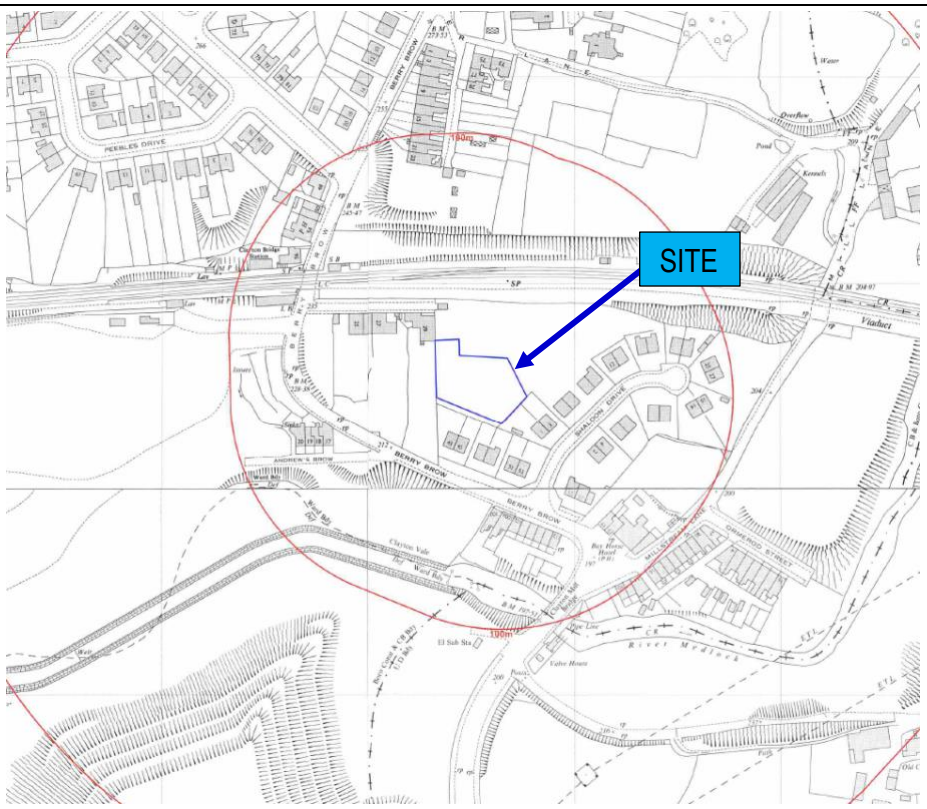
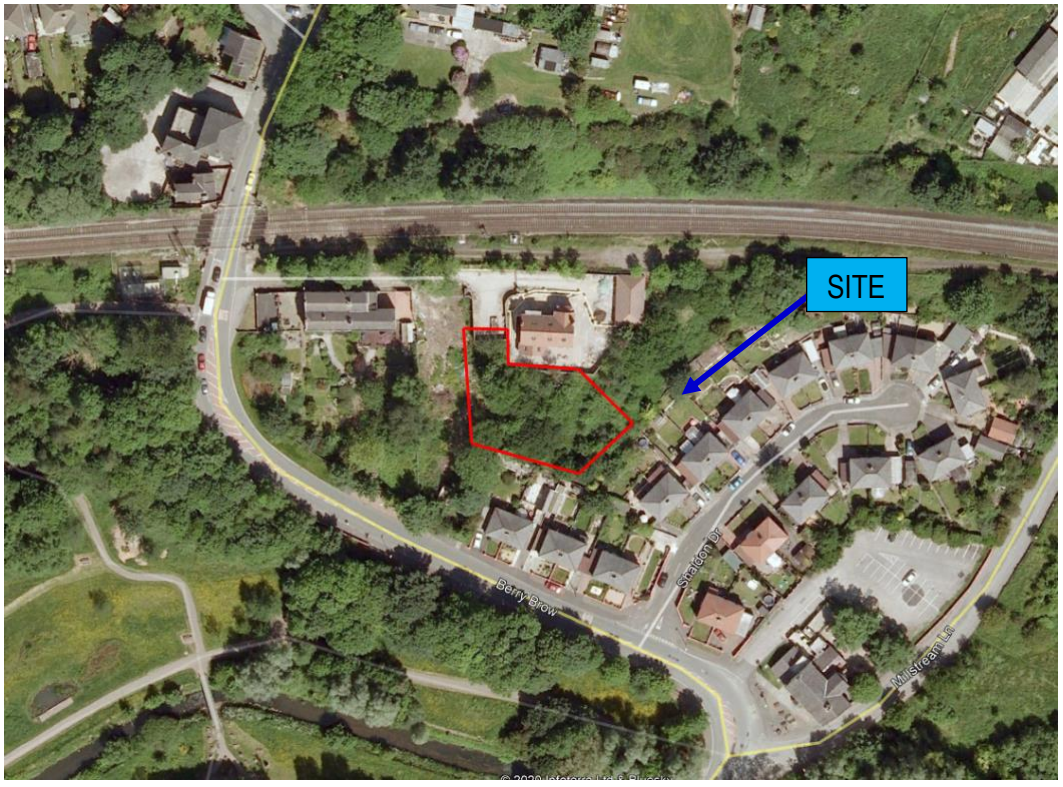


Figure 7 Aerial Photograph 2009



5.0 WALKOVER SURVEY

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

5.2 The site is accessed via a gate to the west of the rear garden of the residential property at 31 Berry Brow. There are three steps leading from the entrance onto the site.

5.3 The site is currently vacant and comprises of woodland with trees, shrubs and weeds. There is a steep slope downwards in a north to south direction.

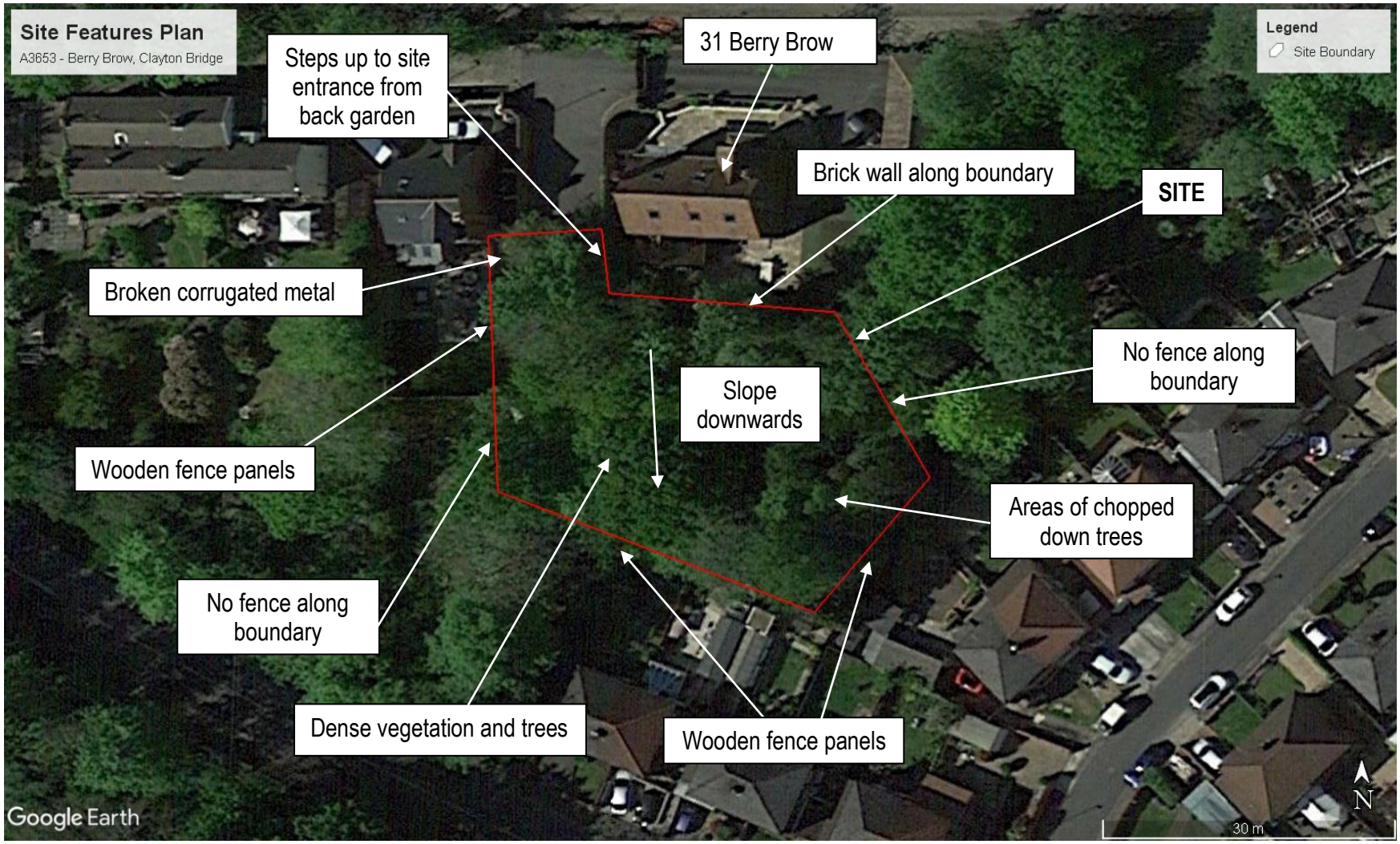
5.4 The site is demarcated by a brick wall to the north along 31 Berry Brow. To the west and south are a mixture of wooden fence panels. However, part of the west boundary contains no fencing. There is no definitive site boundary to the east.

5.5 Located to the north and southeast are the gardens of residential properties. There is dense vegetation to the east and southwest . A new development for a residential property is to the west.

5.6 Further to the north is a railway line and to the southwest is Clayton Vale Nature Reserve which the River Medlock runs through.

5.7 A site features plan is presented as Figure 8 overleaf.

Figure 8 Site Features Plan



6.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

Introduction

6.1 The following paragraphs outline a Preliminary Risk Assessment (PRA) for the site based on the above desk study information as defined by DEFRA and the EA Model Procedures for the Management of Land Contamination, CLR11(2004).

6.2 Table 5 provides a Preliminary Conceptual Model (PCM) which considers the source-pathway-receptor linkages present alongside the likelihood, severity and risk level as defined within Table 3 and Table 4 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and CLR11.

6.3 Table 5 considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists, but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.

6.4 The PCM/PRA is based on a 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 has remained vacant since 1848 and comprises of an area of woodland.

6.6 Potential off-site sources of contamination include a historical refuse tip located 73m west of the site and a historical landfill site at Clayton Vale Power Station located 38m southwest of the site.

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

- Artificial deposits of Made Ground which underly the site
- Ground gas associated with the nearby historical refuse tip and historical landfill site

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

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 ground contamination E.g. Heavy Metals, PAH, TPH and ground gases	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Low	The site is currently vacant land. The risk is therefore considered to be **LOW**.
		Adjacent land users	Unlikely	Moderate	Low	Residential properties predominantly surround the site. 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 a new residential property with associated access road/driveway, soft landscaping and detached garage. 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 Made Ground to be present beneath the site.
		Construction Workers	Low Likelihood	Moderate	Moderate to Low	Construction workers may be exposed to potentially contaminated Made Ground soils during construction works, however exposure duration will be short-term only. The risk to construction workers is considered **MODERATE** to **LOW.** Appropriate health and safety measures (in line with CDM and other relevant health and safety guidance) will reduce the risk to **LOW.**
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Unlikely	Moderate	Low	The underlying superficial soils are anticipated to be cohesive. The soils have a low leaching potential and there is a low groundwater vulnerability. The risk to groundwater is therefore considered **LOW.**
	Lateral migration in surface waters	Surface water	Unlikely	Moderate	Low	The Rive Medlock is located 79m to the southwest. However, there are no obvious sources of leachable contaminants on site. Therefore, the perceived risk to surface waters is considered to be **LOW.**
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Moderate	Low	The site is underlain by artificial deposits of Made Ground and located near a historical landfill and refuse tip. However, the site is currently vacant land. Therefore, the risk to current site users from ground gas is therefore considered **LOW.**
		Adjacent land users	Low Likelihood	Moderate	Moderate to Low	Residential properties predominantly surround the site. The site is underlain by artificial deposits of Made Ground. However, the site is undeveloped and therefore ground gases have likely dissipated. The risk to adjacent site users from ground gas is therefore considered **MODERATE to LOW.**

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Future land users	Low Likelihood	Moderate	Moderate to Low	The proposed development consists of a new residential property with associated access road/driveway, soft landscaping and detached garage. A large historical refuse tip and landfill site are located nearby which are a potential source of ground gas. Therefore, the risk if considered **MODERATE** to **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 vacant land. Asbestos is not anticipated to be on site. Asbestos is only harmful when disturbed. The risk to current site users is considered to be **LOW.**
		Adjacent land users	Unlikely	Moderate	Low	Residential properties predominantly surround the site. Asbestos is not anticipated to be on site. 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	Unlikely	Moderate	Low	The proposed development consists of a new residential property with associated access road/driveway, soft landscaping and detached garage. The risk is therefore considered **LOW.** A contamination assessment of the existing on-site soils would be required to determine the level of risk and necessary mitigation measures.
		Construction Workers	Unlikely	Moderate	Low	Construction workers may be exposed to potential asbestos in Made Ground soils associated with adjacent construction. However, this potential area is very small. The risk is considered **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 has remained vacant since 1848 and currently comprises of an area of woodland.

7.2 The site is underlain by artificial deposits of Made Ground which may contain potentially contaminated material, unpredictable engineering conditions and instability.

7.3 Potential off-site sources include ground gas associated with the historical refuse tip and historical landfill site at Clayton Vale Power Station.

7.4 The proposed development of the site includes the construction of a new residential property with associated access road/driveway, soft landscaping and detached garage.

7.5 The site is underlain by glacial deposits, comprising Diamicton (Secondary A Aquifer) and the solid geology of the Collyhurst Sandstone Formation (Principal Aquifer).

7.6 Given the potential for Made Ground, 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 **LOW** based on the underlying cohesive superficial soils and low leaching potential.

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 the historical refuse tip and landfill site.

7.9 The site is not located within a Zone 2 or Zone 3 floodplain. However, the risk of groundwater flooding is **MODERATE**.

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 from the Made Ground.

7.12 Due to the proximity to the historical landfill and refuse tip it is recommended that a ground gas investigation should be conducted as part of the investigation.

7.13 Prior to commencement of the development an ecological survey should be carried out.

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.: A3653/20

Site: Berry Brow, Clayton Bridge

Plate 1 View showing the steps leading to the site entrance accessed from the rear garden of 31 Berry Brow



Date: 2nd November 2020

Plate 2 View facing west of the entrance showing overgrown vegetation and broken metal corrugated panels



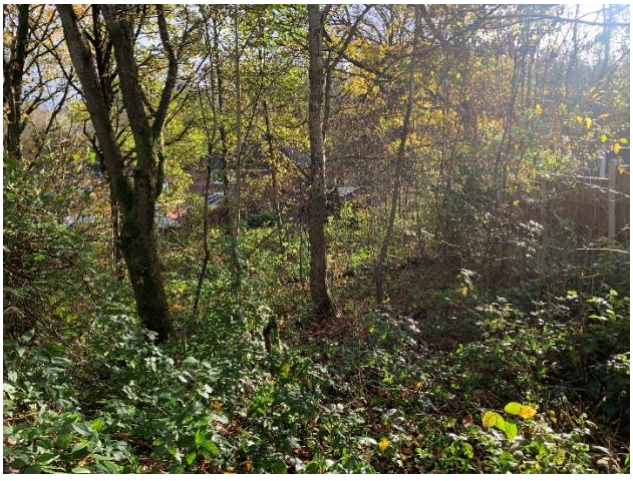
Date: 2nd November 2020

Plate 3 View facing northeast showing the steep slope towards the site entrance



Date: 2nd November 2020

Plate 4 View facing south showing the dense vegetation and trees downslope of the site entrance



Date: 2nd November 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.: A3653/20</td><td>Site: Berry Brow, Clayton Bridge</td></tr>
<tr><td>Plate 5 View facing north showing the dense vegetation and trees upslope</td><td>Plate 6 View showing the brick wall boundary to the north of the site separating the garden of 31 Berry Brow</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Date: 2nd November 2020</td><td>Date: 2nd November 2020</td></tr>
<tr><td>Plate 7 View facing southwest from the wall boundary showing the trees and adjacent properties in the distance</td><td>Plate 8 View facing west showing the wooden fence panels along the south boundary and chopped down trees</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Date: 2nd November 2020</td><td>Date: 2nd November 2020</td></tr>
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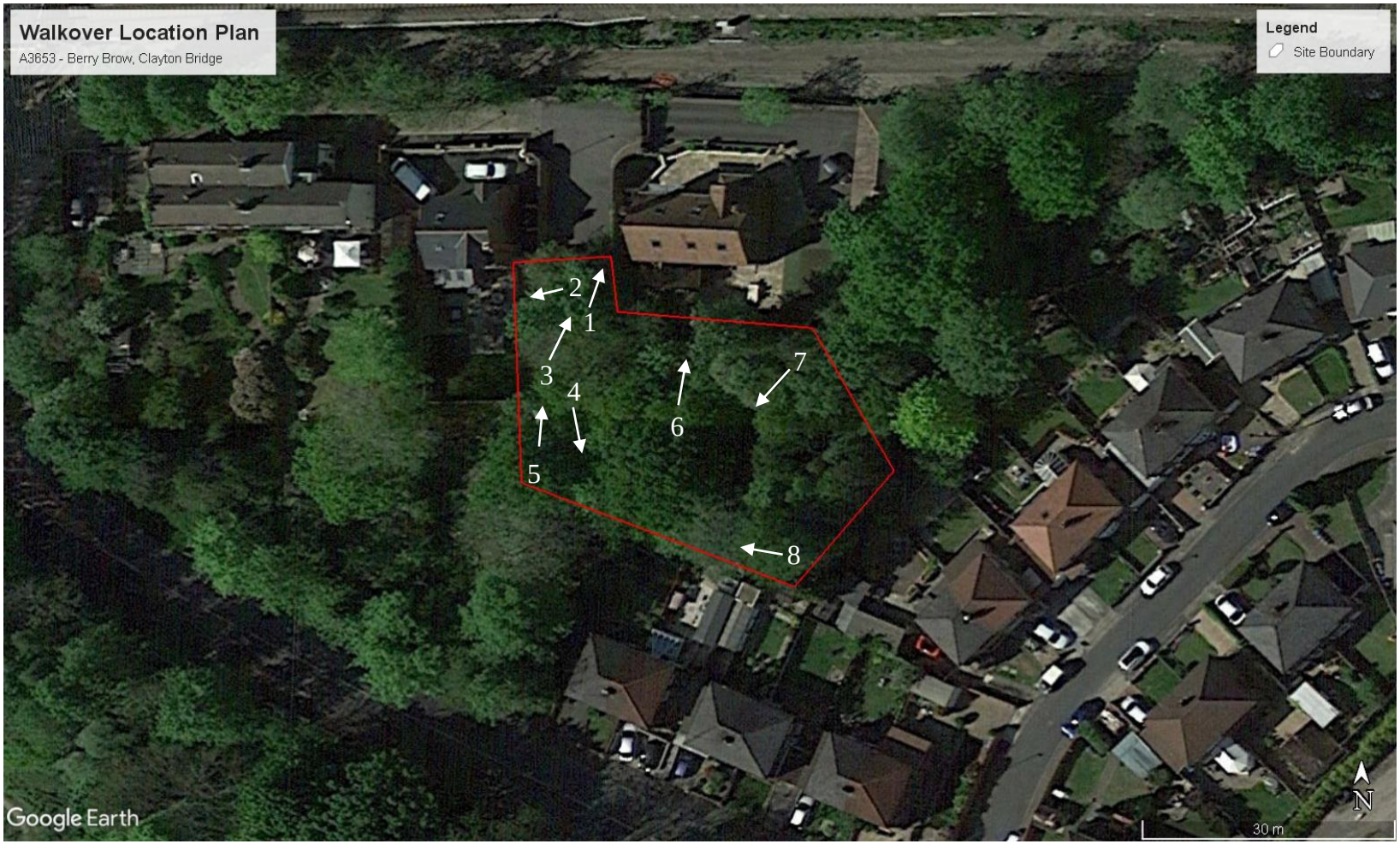
Figure 9 Site Walkover Photo Locations



APPENDIX 3

SITE WALKOVER NOTES

EARTH ENVIRONMENTAL & GEOTECHNICAL

WALK OVER SURVEY REPORT

Site: Berry Brow, Clayton Bridge **Date:** 2nd November 2020

Job No: A36532/20 **Undertaken By:** Shauna McLoughlin

Purpose of Site Walkover:
1) Provide further information for the Desk Study Report;
2) Identify potential contamination sources, pathways and receptors;
3) Identify geotechnical features and potential geohazards;
4) Determine locations for exploratory boreholes.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Setting	Description required for: Town/Country/Suburb Setting Industrial/Residential/Retail Usage Current Site use (if undertaking security and access to the site)		 Suburb setting. Surrounding areas are predominantly residential. The site is currently a vacant area of land which has been undeveloped.
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 on the east of Berry Brow. The overgrown vegetation and trees suggest the site is undeveloped.
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		The site is located on a steep slope in close proximity to Clayton Vale Nature Reserve
Ground Conditions	Is there any evidence of: Mining, Mine entries Subsidence Landslip/slope erosion Former investigation works	 ~~Yes~~/No ~~Yes~~/No ~~Yes~~/No	 N/A N/A N/A

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Topography	Description required for: Are there apparent differences between site and surrounding area? (If yes describe the presence of retaining walls, and slopes). Is there evidence of Made Ground / Fill on site?	Yes/~~No~~ ~~Yes~~/No	There is a steep slope downwards in a north to south direction. No evidence was visible on the site walkover as the site is overgrown. However, artificial deposits are known to underly the site.
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 brick wall to the north along 31 Berry Brow. To the west and south are a mixture of wooden fence panels. However, part of the west boundary contains no fencing. There is no site boundary to the east. Located to the north and southeast are the gardens of residential properties. There is dense vegetation to the east and southwest. A new development for a residential property is to the west. Further to the north is a railway line and to the southwest is Clayton Vale Nature Reserve.
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	The site is woodland and comprises a mixture of trees, shrubs and weeds. No but some of the trees have been chopped down.
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% softcover 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	N/A
	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	The closest watercourse is the River Medlock location within Clayton Vale Nature Reserve.
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.
	Do any buildings have basements?	~~Yes~~/No	The site is an undeveloped parcel of land.
	Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?	~~Yes~~/No	N/A

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	N/A
Process Air Emissions	Point Source: Are there any stacks / vents / cooling towers / abatement equipment?	~~Yes~~/No	N/A
	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	N/A
	Is there any evidence of underground fuel tanks (fuel pumps, covers, vent pipes, how many and how large, fill point, used / disused, and condition)?	~~Yes/~~No	N/A
Accidents	In the event of a large spillage would runoff affect any vulnerable watercourse/culverts?	~~Yes~~/No	The closest watercourse is the River Medlock location within Clayton Vale Nature Reserve so run off is unlikely at this distance.
	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 N/A There are small amounts of litter and broken corrugated metal panels located adjacent the site entrance to the west
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		The site is currently only accessible via a path from the rear garden of 31 Berry Brow. There are three steps down to the site and a steep slope with trees, so access is restricted. Possible site office at on the road adjacent 31 Berry Brow 31 Berry Brow.
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~~	A railway line is located to the north of Berry Brow The closest watercourse is the River Medlock location within Clayton Vale Nature Reserve
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 39m north to south and 45m west to east. The site occupies an area of approximately 0.12Ha.

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.