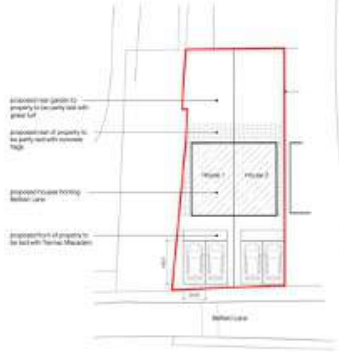


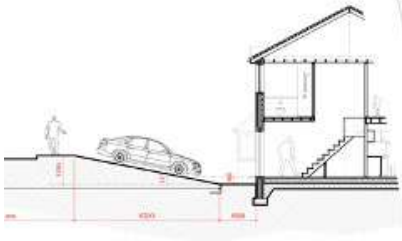
EARTH ENVIRONMENTAL
& GEOTECHNICAL



Phase 1 GeoEnvironmental Desk Study

137 Belfield Lane

Rochdale



June 2020

On behalf of

Future Construction AA Ltd



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137 BELFIELD LANE

ROCHDALE

PHASE I GEOENVIRONMENTAL DESK STUDY

FOR

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Report No. A3539-20 **JUNE 2020**

Report Title:	**137 Belfield Lane, Rochdale** **Phase I GeoEnvironmental Desk Study**
Report Reference:	**A3539-20**
Client:	**Future Construction AA Ltd**
Issue Date:	**13th June 2020**
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EARTH ENVIRONMENTAL & GEOTECHNICAL

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1.0 INTRODUCTION

Appointment

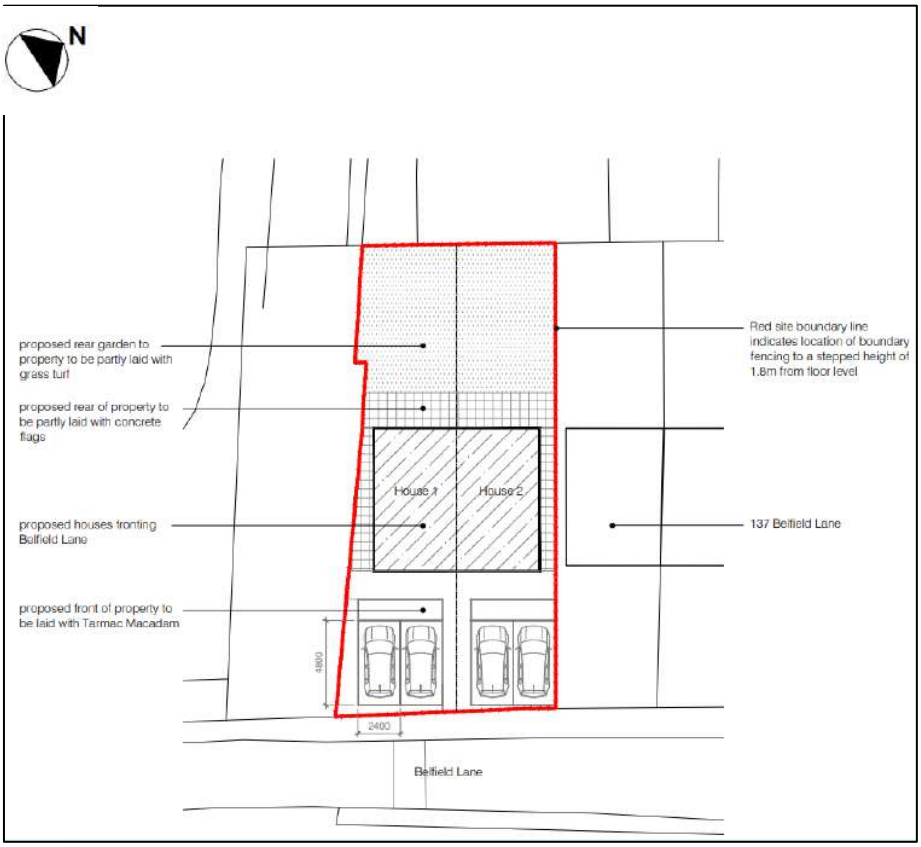
1.1 Earth Environmental & Geotechnical Ltd has been commissioned by Octopus Architects on behalf of Future Construction AA Ltd to undertake a Phase I GeoEnvironmental Desk Study for the proposed development on the land to the north west of Belfield Lane, Rochdale, Greater Manchester.

1.2 It is understood that the client wish to construct two new semi-detached properties on the 340m^2 plot adjacent to 137 Belfield Lane. The development will consist of two double storey houses, two hardstanding car parks, each with spaces for two vehicles, and a rear grass turf garden partly laid with concrete flags.

1.3 Site access will be from the south east of the site just off Belfield Lane.

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

Figure 1 Proposed Development Plan



Objective

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

Scope

1.5 The Phase I Environmental Desk Study comprises of a site reconnaissance visit and a review of the following information sources, some of which was provided by the client.

- British Geological Survey online maps.
- Google Earth imagery.
- Environment Agency online mapping data.
- Historical Ordnance Survey maps.
- The site and surrounding areas environmental, geological and mining data presented in the site specific GroundSure Reports (Appendix 1).
- Rochdale Borough Council planning portal.

2.0 SITE LOCATION AND DESCRIPTION

2.1 The site is located at 137 Belfield Lane, Rochdale, Greater Manchester approximately 61m north of the railway line and 1.6 mile from Rochdale Town Centre. The approximate National Grid Reference for the site is SD 912136 (X: 391231, Y: 413664) with the closest postcode being OL16 2UU.

2.2 The site is vacant land approximately rectangular in shape with a perimeter of 80.7m. Current access is gained via Benfield Lane to the south east of the site. The site occupies a plot of approximately 0.03hectares.

2.3 The surrounding area comprises predominantly of residential dwellings to the north of Belfield Lane. To the north of the site boundary lies a pre-existing residential property and to the south lies a woodland area.

2.4 A location plan is shown below as Figure 2, together with a recent aerial photograph as Figure 3 (overleaf).

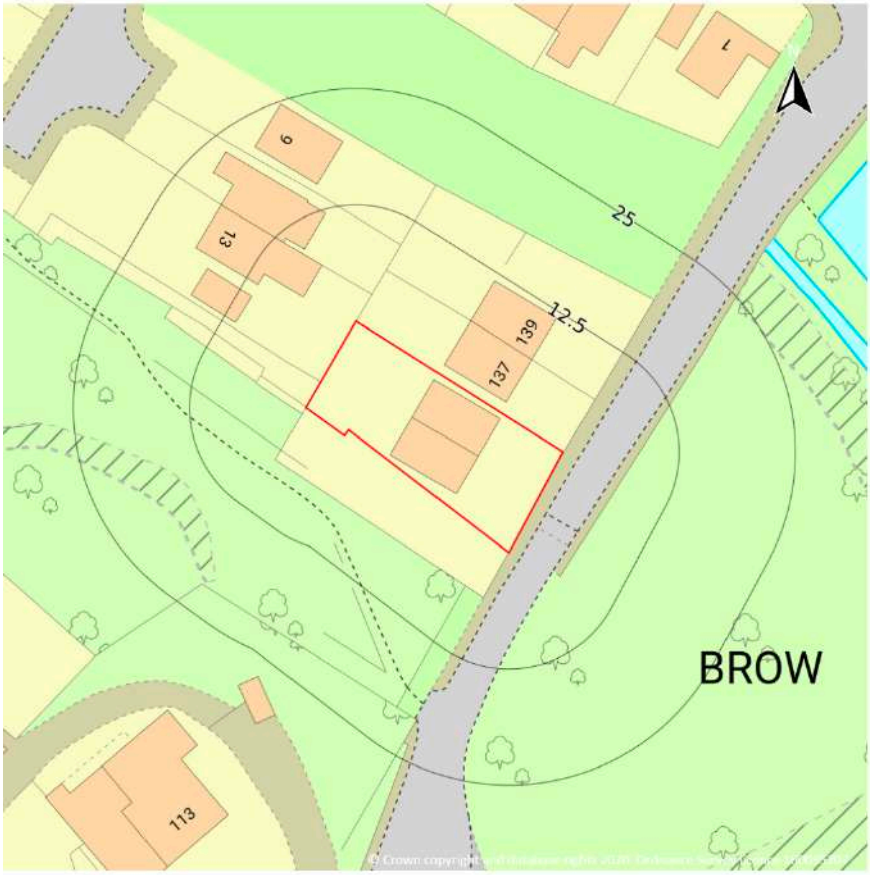
Figure 2 Site Location Plan



Figure 3 Site Plan Overlay



Figure 4 OS Master MapSite Plan



Site Utility Services

2.5 Site service plans have not been obtained for the site on behalf of the client. The status of all services should be checked prior to any development (including site investigation) commencing.

3.0 ENVIRONMENTAL SETTING

3.1 The geology of the site is covered by British Geological Survey (BGS) online data and the site specific GroundSure Enviro+Geo Insight report (Appendix 1).

3.2 Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site specific GroundSure Enviro+Geo Insight report (Appendix 1).

Geology

3.3 The BGS states that the site is not underlain by artificial deposits.

3.4 The site is underlain by superficial deposits of glacial till commonly known as Boulder Clay and alluvium.

3.5 The bedrock geology beneath the site is shown as the Pennine Lower Coal Measure Formation, consisting of mudstone, coal seams, siltstones and sandstones.

3.6 There are no recorded linear features within 500m of the site boundary. The closest record refers to an inferred coal seam located 126m to the north of the site boundary.

3.7 There are no records of landslips within 500m of the site boundary. There are 12 borehole records identified within 250m of the site. The closest record is located 8m to the southwest of the site (GR: 391240 413590). This borehole reveals the following sequence of strata:

- Made ground to 1.4m.
- Firm to Stiff Clay to 3.6m.
- Loose Sand to 5.5m.
- Very stiff clay to the base of the borehole at 7.4m.

3.8 The site is in an area where the compressible deposits hazard rating is variable across the plot. Within the southwest of the site, the hazard rating is negligible whereas in northeast of the site, hazard risk is moderate (due to alluvium) meaning compressibility and uneven settlement hazards are probably present. The hazard rating for dissolution of soluble rocks is negligible.

3.9 The hazard rating is negligible to very low with regard to shrink swell clays and collapsible deposits, and low-very low for running sands.

3.10 The hazard with respect to landslides rating is low ("slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site").

Ground Workings

3.11 There are 69 records of historical surface ground workings identified within 250m of the site boundary. The closest record refers to an unspecified ground workings located 14m to the southwest of the site, dated 1954. Other records in the vicinity refer to ponds, reservoirs, refuse heaps, filter beds, cuttings, unspecified disused quarries and coal pits.

3.12 According to the BGS, there are no records of British Pits or Natural cavities within 500m of the site.

Mining and Other Underground Workings

3.13 The site lies within the specified search distance (1km) of an identified coal mining area. Historical land use from the Ordnance Survey presents 20 records of underground workings within a 1km range, with the closest being a disused mine shaft 86m south in 1976.

3.14 The Coal Authority Interactive Viewer shows that the site lies within a Development High Risk Area.

3.15 There are no records for non-coal mining areas located within 1km of the site.

3.16 There are no areas of brine extraction, gypsum extraction, tin mining or clay mining within 1km of the site.

3.17 There are no records for non-coal cavities or natural cavities identified within 1km of the site.

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

Radon Potential

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

Hydrogeology and Hydrology

3.20 The superficial deposits are classified by the Environment Agency (EA) as being partly a Secondary A Aquifer, with a Secondary Undifferentiated aquifer located partially on the site and another 38m northeast of the site. The glacial deposits of Diamicton have a mixed flow type and a low to high 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.'*
>
> ***Secondary Undifferentiated Aquifer*** *'Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.'*

3.21 The Pennine Lower Coal Measure Formation is classified by the Environment Agency (EA) as a Secondary A Aquifer with a fracture flow type and a low permeability.

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

'High vulnerability- Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.'

3.23 There are 5 groundwater abstraction licence records within 2km of the site, with the closest a historical abstraction 1km east of the site.

3.24 There are 10 surface abstraction licence records within 2km of the site, with the closest a historical abstraction 467m north west of the site.

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

3.26 The site has 1 record of an Outer Catchment Source Protection Zone located 299m south of the site boundary.

3.27 There are no records of a Source Protection Zone within a confined aquifer within 500m of the site.

3.28 There are 5 water network entries within 250m of the site with the closest including an inland river not influenced by normal tidal action 31m north east of the site.

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

Landfill & Waste

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

3.31 There are 4 records of historical landfill sites within 500m of the study site. The closest record refers to the land 292m southwest of the site off Belfield Land. The landfill first accepted inert and industrial waste in 1942 and had an Environmental Permitting Regulations licence in 1994.

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

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

3.34 There are 3 records of historical waste sites from the Local Authority and Historical Mapping Records within 500m of the site. The record refers to a waste recycling centres located 304m south west, 405m west and 406m south west from the site. The two closest sites are dated to 1958 and comprise of ground workings and refuse heaps. The furthest site is dated to 1976 and refers to a formerly used scrap yard.

3.35 There is 1 record of a waste treatment, transfer or disposal site within 500m of the study site. The record refers to the Belfield Lane Industrial Waste Landfill site located 357m southwest of the site.

3.36 There is 1 record of current Environment Agency/Natural Resources Wales licensed waste sites within 500m of the site. The record refers to the Belfield Lane Landfill located 357m southwest of the site. The site accepted Industrial waste (Factory curtilage) since 1994.

Industrial Land Use Information

3.37 There are 100 records of potentially contaminative historical land uses identified within 500m of the site including 4 print works and 1 unspecified works located on the future development site, dated 1851-1976. Other records in the vicinity refer to chimneys, refuse heaps, unspecified disused shafts, unspecified commercial/industrial use, unspecified tanks, works, mills, groundworks, heaps, filter beds, textile machinery works and cuttings.

3.38 There are 8 records of current potentially contaminative land uses identified within 250m of the site. The closest record refers to Electronic Equipment owned by 1st Security Systems located 59m west of the site. Other records in the vicinity refer to a disused shaft, 3 electricity sub-stations, a storage depot, a Euro vehicle recovery service, and a scrap metal merchants.

3.39 There are 5 records of historical tanks identified within 500m of the site. The closest record refers to an unspecified tank located 237m to the east of the site, dated 1979-1984.

3.40 There are 13 records of historical energy features identified within 500m of the site dating 1971-present. The closest record refers to an electricity substation located 155m to the east of the site, dated 1985-1998.

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

3.42 There is 1 historical garage record identified 495m south of the site, dated 1979.

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

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

3.45 There are no historical railway or tunnel features identified within 250m of the site.

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

3.47 There are 10 current active railway line records identified within 250m of the site. The closest record refers to a rail located 63m to the southeast of the site.

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

3.49 The site is not within 5km of the route of the High Speed 2 rail project.

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

Environmental Permits, Incidents and Registers

3.51 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	7
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)	3
Pollution Inventory Substances, Wastes and Radioactive Wastes	0

3.52 There is 1 record of a Part (2) and Part B Activities and Enforcements within 500m of the study site. The closest record refers to a historical Part B Permit for the non-ferrous metal foundry process located 296m to the south of the site.

3.53 There are 7 records of Licensed Discharge Consents within 500m of the site. The closest record refers to effluent discharges – site drainage located 22m to the north east of the site.

3.54 There are 3 records of Substantiated Pollution Incidents (Category 1 and 2) within 500m of the site. The closest record refers to a sewage released 338m to the southeast of the site. The pollutant was a category 4 (No impact) impact on land and air, and category 3 (Minor) on water.

Environmentally Sensitive Sites

3.55 There are 2 Sites of Special Scientific Interest (SSSI) within 2km of the study site. The closest record refers to Rochdale canal located 429m east of the site.

3.56 There are 12 Priority Habitat Inventory records identified within 250m of the site, and 1 record located on site. The on-site record refers to the deciduous woodland across the southwestern side of the site.

3.57 There are 2 Special Areas of Conservation (SAC) within 2km of the study site. The closest record refers to Rochdale canal located 429m east of the site.

3.58 There are no Special Protection Areas within 2km of the study site.

3.59 There are no records of listed Ramsar sites within 2km of the study site.

3.60 There are 2 records of Ancient Woodland within 2km of the study site. The closest record is located 1.8km to the north of the site at Buckley Woods.

3.61 There are no records of Local Nature Reserves (LNR) within 2km of the study site.

3.62 There site is not located within a Nitrate Vulnerable Zone.

3.63 There are no records of National Parks (NP) within 2km of the study site.

3.64 There is 1 records of Greenbelt land located 542m northeast of the site in the Liverpool and Manchester region.

Ecology

3.65 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.

3.66 However, the site is classified as urban land.

Archaeology

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

3.68 There are no records of Listed Buildings, World Heritage or Scheduled Ancient Monuments within 250m of the site.

Potential Flood Risks

3.69 Detailed assessment of flood risks is outside the scope of this report. However, the site does not lie within an Environment Agency Zone 2 or Zone 3 floodplain.

3.70 The nearest Flood Zone 2 is 7m south east of the site and the nearest Flood Zone 3, 12m east.

3.71 There is high risk of flooding from rivers and sea (RoFRaS) within 50m of the site.

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

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

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

3.75 The highest risk of surface water flooding occurring on-site is negligible. The highest risk of surface water flooding within 50m of the site is 1 in 30 year, greater than 1.0m.

3.76 The highest risk of groundwater flooding occurring on-site is moderate.

Previous Site Investigations

3.77 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 1888.

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
1888-1913 1:2,500	The site lies upon Belfield Print Works due north of Belfield Lane.	Lancashire and Yorkshire railway line located 63m to the southeast of the site. Filter beds connected to Stanney Brook located north east of the site. 5 sluice pits located around the north east of the site, the closest is located approximately 40m east
1892-1914 1:2,500	The site lies partly on the Belfield printworks site to the north of Belfield Lane. A building associated with the works occupies the central part of the site.	
2000 Aerial Photograph	Belfield printworks appears to have been demolished. The proposed site appears undeveloped and surrounded by a wooded area along the southern boundary and residential property along the northern boundary.	There appears to be the development of 9 residential properties on the land formerly occupied by Belfield printworks. A residential expansion has ensued on the land south of the site, around Newbold Brow. The area approximately 92m northeast of the site formerly comprising of filter beds appears densely wooded.
2012 Aerial Photograph	No significant change.	Residential development on the land due south of the railway line next to formerly existing property.
2018 Aerial Photograph	No significant change.	No significant change.
2019 Aerial Photograph	Evidence for development on the plot and the construction of a wooden building frame in the centre of the plot.	No significant change.

Figure 5 OS Map Extract 1888-1913

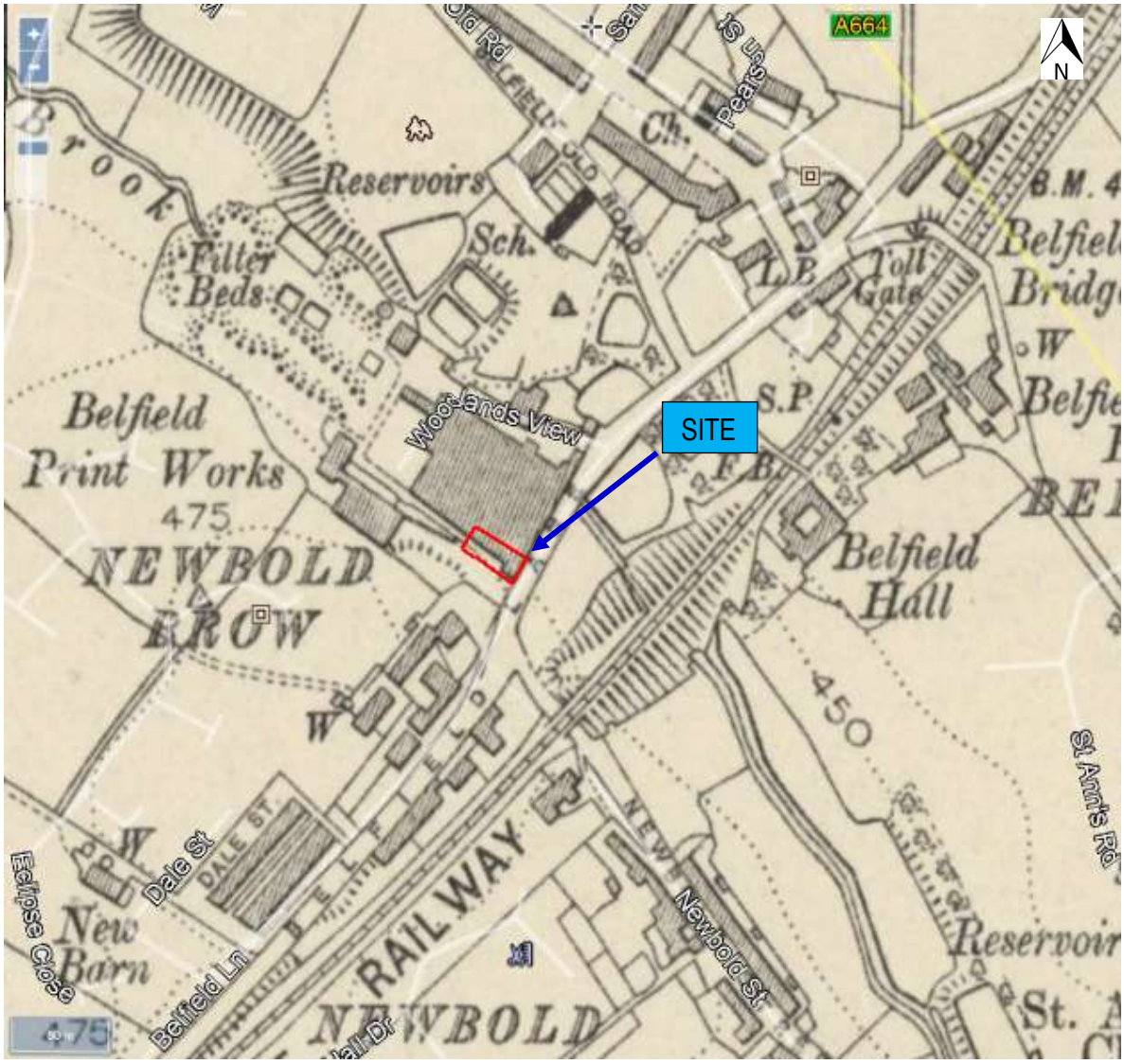


Figure 6 OS Map Extract 1892-1914

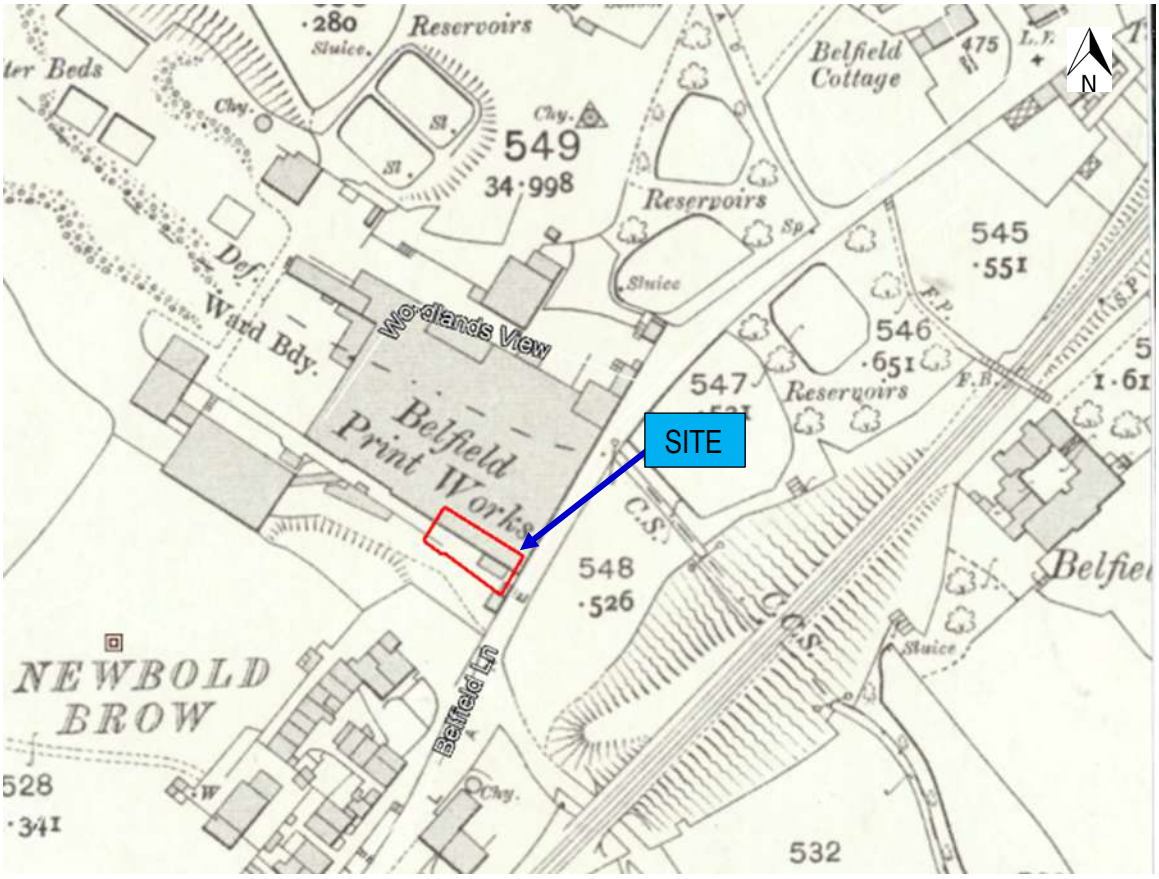


Figure 7 Aerial Photograph 2000



Figure 8 Aerial Photograph 2012



Figure 9 Aerial Photograph 2018



Figure 10 Aerial Photograph 2019



5.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

Introduction

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

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

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

5.4 The PCM/PRA is based on a proposed residential end use.

Table 3: Consequence, Probability and Risk

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

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

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

Potential Sources

5.5 Historically the site comprised of a former industrial works, with historical records detailing the presence of a paper works, four records of print works and an unspecified industrial works. An industrial building was situated upon the north eastern side of the site, with records of industrial activity dating from 1851-1976. By 1995, the works had been replaced by residential developments.

5.6 Potential off-site sources of contamination include five historical landfill sites with the closest located 292m southwest of the site. Additionally, there are 3 records of historical waste sites within 500m of the site, consisting of two ground working and refuse heaps and a scrap yard.

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

- Made Ground from various phases of on-site development
- Contaminative soils associated with historic land-use
- Asbestos containing materials (ACM) from former structures

Potential Receptors

5.8 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

5.9 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 from historic land-use E.g. Heavy metals, particularly chromium, magnesium, zinc, silver and inorganic acids, VOCs	Dermal contact, ingestion and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Moderate risk	The site is currently residential land, occupied occasionally by local residents. The risk is therefore considered to be **MODERATE**.
		Adjacent land users	Unlikely	Moderate	Moderate Risk	Residential properties partially surround the site and a large residential estate lies within 500m to the south of 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 **MODERATE.**
		Future land users	Low Likelihood	Moderate	Moderate to Low risk	The proposed development consists of two double story houses, two hardstanding car parks, each with spaces for two vehicles, and a rear grass turf garden partly laid with concrete flags. The site will be surfaced predominantly in hardstanding materials. The risk to future site users via direct exposure is considered to be **MODERATE to LOW.** This assessment is based on the potential for contamination to be present beneath the site.
		Construction Workers	Low Likelihood	Moderate	Moderate to Low risk	Construction workers may be exposed to potentially contaminated soils during construction works, however exposure duration will be short-term only. The risk to construction workers is considered **MODERATE** to **LOW.** Appropriate health and safety measures (in line with CDM and other relevant health and safety guidance) will reduce the risk to **LOW.**
	Downward vertical migration of leachate to groundwater	Groundwater within the Underlying Aquifer	Low Likelihood	Moderate	Moderate to High risk	The underlying superficial soils are anticipated to consist of a Secondary A aquifer and Secondary undifferentiated aquifer. There are two records of high-vulnerability secondary superficial aquifers on site. Superficial permeability is considered to have mixed to intergranular flow type and a high maximum permeability. There are 5 abstraction licences within 2km. The risk to groundwater is considered **LOW**.
	Lateral migration in surface waters	Surface water	Low Likelihood	Moderate	Moderate risk	There are historic records detailing filter beds draining from the Stanney Brook 31m northeast of the site. There are also 3 records of surface water features within 250m of the site and 1 surface body catchment located at the site. Therefore, the perceived risk to surface waters is considered to be **MODERATE.**

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Moderate	Low risk	At present the site area is surrounded by residential developments. Within 500m of the site are 7 records of artificial and made ground, but this is not anticipated to be found on site. The risk to current site users from ground gas is therefore considered **LOW.**
		Future land users	Low Likelihood	Moderate	Low risk	The proposed development consists of two residential properties complete with two hardstanding carparks and rear turfed gardens. The radon potential is considered **LOW** as <1% of the properties are affected by radon gas and as such should not require radon protective measures.
Asbestos Containing Material (ACM)		Current Site Users	Moderate Likelihood	Moderate	Moderate risk	The site is currently residential land, occupied by residential developments. Asbestos may be present in small areas of the site associated with former works/structures. Asbestos is only harmful when disturbed. The risk to current site users is considered to be **LOW.**
		Adjacent land users	Moderate Likelihood	Moderate	Low risk	Residential properties partially surround the site. Asbestos may be present in small areas of the site associated with former structures, albeit unlikely. Disturbance of soil during the construction phase may allow fibres to become airborne. Dust control measures (dampening down) should be implemented as part of good site working practices. Therefore, the risk is considered **LOW**.
		Future land users	Low Likelihood	Moderate	Moderate to Low risk	The proposed development consists of two double storey houses, two hardstanding car parks, each with spaces for two vehicles, and a rear grass turf garden partly laid with concrete flags. The risk is therefore considered **MODERATE** to **LOW.** A contamination assessment of the existing on-site soils would be required to determine the level of risk and necessary mitigation measures.
		Construction Workers	Low Likelihood	Moderate	Low risk	Construction workers may be exposed to potential asbestos in the uppermost 0.7m of soil associated with former structures. 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.

6.0 CONCLUSIONS & RECOMMENDATIONS

Conclusions

6.1 The site was formerly used for the Belfield Print Works from the late 1800's to 1954. The site was later used for unspecified industrial works from 1967-1976. These works were demolished and replaced by residential developments on the land surrounding the site by 1995.

6.2 There are no records of land contamination registered within 500m of the site. Potential contaminative land use features on the site include the historic use of six industrial works dated from 1851-1976.

6.3 The site is underlain by superficial deposits comprising of alluvium, and glacial deposits. The solid geology is shown as the Pennine Lower Coal Measure Formation, consisting of mudstone, siltstones, coal seams and sandstones.

6.4 Given the potential contaminative land uses from both historical records and recent use, the overall risk from soil contamination to end users and construction workers is concluded to be **MODERATE** to **LOW**.

6.5 The risk from ground gas to end users and construction workers is considered to be **LOW** given the limited extent of on-site Made Ground and nearby landfill sites.

6.6 The site is not located within a Zone 2 or Zone 3 floodplain. However, the risk of groundwater flooding is **MODERATE** due to the proximity to adjacent flood zones.

Recommendations

6.7 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.

6.8 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 historic land uses.

6.9 The site lies within a Coal Authority Development High Risk Area and therefore a Coal Mining Risk Assessment will be required to accompany any planning application.

APPENDIX 1

GROUNDSURE REPORTS

APPENDIX 2

REPORT LIMITATIONS

LIMITATIONS

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

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

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

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

The report was written in 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.