



Rochdale Sixth Form College, Rochdale

Preliminary Environmental Risk Assessment

June 2022

Waterman Infrastructure & Environment Limited

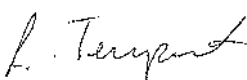
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Client Name: Waterman Structures Limited.
Document Reference: WIE19085-105-R-1-1-3-PERA
Project Number: WIE19085

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

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Comments

Comments

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Executive Summary

Objectives

Waterman Infrastructure & Environment Limited (“Waterman”) was instructed by Waterman Structures Limited on behalf of Rochdale Sixth Form College to undertake a Preliminary Environmental Risk Assessment for ground contamination for the proposed redevelopment at Rochdale Sixth Form College (hereafter termed “the Site”).

Site Setting

Current Use	The Site comprises a small rectangular parcel of land running alongside the River Roch and extends to approximately 0.4 ha. The Site currently comprises of car parking for Rochdale Sixth Form College, the main building of which is present to the south of the Site.
History	A review of the available historical mapping indicates most of the Site was in use until the 1960s as Sunny Bank Mills (Cotton and Woollen), at which point the former buildings were cleared. The Site has been used for car parking since at least 1999. Between mapping from 1890 to 1930 the northern most corner of the Site was occupied by a Town Mill Dye Works. The River Roch is located to the east of the Site and would have been a useful asset to the wool and cotton mills in the area. The course of the River Roch was moved in the 1960s, such that the river now flows adjacent to the eastern site boundary. Within the surrounding area various industrial land uses were recorded including landfills, refuse heaps, engineering works, warehouses, iron works, mills and gas works.
Geology	The geology underlying the Site is anticipated to comprise Made Ground underlain by Alluvium and Glacial Deposits. The solid geology is the Pennine Lower Coal Measures. The Arley coal seam is indicated to subcrop to the north of the Site and is likely to be present at relatively shallow depth beneath the Site.
Controlled Waters	The Alluvium and Pennine Lower Coal Measures Formation beneath the Site are both designated as Secondary A Aquifers. The Site does not lie within a groundwater Source Protection Zone. The River Roch is located adjacent to the Site to the east, flowing from south to north.

Preliminary Conceptual Model

Potential risks identified for the Site are as follows:

- Potential exposure of construction workers and the general public during the Works to contaminated soils, groundwater, airborne dust and run-off from stockpiled soils or exposed shallow ground;
- Potential risks to exposed shallow groundwater from introduction of new potential sources of contamination during the Works;
- Potential risks to the River Roch due to surface run-off from stockpiled materials and introduction of new sources of contamination during the Works;
- Potential exposure of future occupants and visitors of the proposed redevelopment to residual ground contamination via soft landscaping;
- Potential exposure of buried structures and services to ground and groundwater contamination, leading to chemical attack; and
- Potential risk of ground gas and vapour to future Site structures.

Conclusions

The recommendations of this report outline preliminary remedial and mitigation measures that require confirmation through additional works. However, once successfully implemented the environmental risks associated with ground contamination are anticipated to be low. Therefore, the NPPF requirement that on completion the Site can no longer be captured under the Part IIA regime is expected to be met.

Recommendations

The following actions are recommended to address the potentially unacceptable risks identified:

- Given the proximity of the Site to a Coal Authority Development High Risk Area, it is recommended that a Coal Mining Risk Assessment is undertaken to assess the potential risks to the development and inform the scope of proposed ground investigation;
- A detailed ground investigation, as defined by BS 10175:2011+A2:2017, should be completed targeting soils and groundwater and including ground gas and vapour monitoring. The investigation should target the following features:
 - potential on-site migration of ground gas and contamination from the historical landfill to the west of the Site;
 - the areas formerly occupied by Sunny Bank Mills and Town Mill Dye Works;
 - proposed building footprints and soft landscaping areas; and,
 - investigation of any mining related features identified in the recommended Coal Mining Risk Assessment.
- Geotechnical investigation as part of design works for the development should include sampling and testing of soils to assess the risk posed by chemical attack;
- The gas protection measures installed in the adjacent Rochdale 6th Form College building should be confirmed with the assessment included in the White Young Green ground investigation report not matching the information provided by Rochdale Borough Council Building Control. If necessary, mitigation measures to protect the Site from ground gas or vapour ingress should be included in the final development design;
- An environmental watching brief should be undertaken throughout groundworks for the proposed development, with additional environmental sampling undertaken where visual or olfactory contamination is suspected within the Made Ground, Alluvium, or Glacial Deposits;
- A Construction Environmental Management Plan (CEMP) should be developed for the Site, detailing measures to minimise the potential risk to the River Roch and shallow Secondary A aquifer during the development works;
- During the development works, appropriate measures for managing materials, chemicals and waste should be utilised. Measures should also be taken to prevent run-off from stockpiled soils reaching the River Roch, and to suppress the generation of dust;
- Construction workers should be provided with and use personal protective equipment (PPE), respiratory protective equipment (RPE) and informed of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater or ground gas / vapours;
- Concrete used in construction, and any new water pipes installed as part of the redevelopment works should be appropriately protected against chemical attack from potential contamination in Made Ground, shallow soils and shallow groundwater underlying the Site;
- Should significant contamination be identified at the Site and piled foundations be proposed to be founded in Pennine Lower Coal Measures Formation, a Foundation Works Risk Assessment (FWRA) should be prepared to assess risks to the Secondary A Aquifer in the Pennine Lower Coal Measures Formation and identify an appropriate piling methodology which prevents downward vertical migration of contamination;
- Potential re-use of excavated soils should be explored. Any re-use should be done in accordance with the CL:AIRE Definition of Waste: Code of Practice (DoWCoP), subject to environmental risk assessment, and a materials management plan prepared. Alternatively, a waste exemption could be registered to facilitate its re-use; and,
- Soft landscaping at the development should be planted using an appropriate thickness of certified clean cover material.

1. Introduction

1.1 Objectives

Waterman Infrastructure & Environment Limited (“Waterman”) was instructed by Waterman Structures Limited on behalf of Rochdale Sixth Form College to undertake a Preliminary Environmental Risk Assessment for ground contamination for the proposed redevelopment at Rochdale Sixth Form College (hereafter termed “the Site”).

This Preliminary Environmental Risk Assessment has been prepared to support a planning application for the Site.

1.2 Proposed Development

The Site is currently a car park and it is proposed to redevelop the Site for an educational end use. The development proposals include construction of a new four-storey teaching block together with associated infrastructure and soft landscaping.

The proposed development layout (Lea Hough Chartered Surveyors Drawing Ref: BS.21-094 (A)-01) is included in Appendix A.

1.3 Regulatory Context

The National Planning Policy Framework (NPPF) 2018 sets out Government planning policy for England and how this is expected to be applied to development. Paragraph 118 of Section 11 – Making effective use of land and paragraphs 170, 178, 179 and 183 of Section 15 – Conserving and enhancing the natural environment of the NPPF relate to contaminated land matters and state the following:

118. Planning policies and decisions should:

c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

178. Planning policies and decisions should ensure that:

a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990;

c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

179. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

In order to assess the contamination status of the Site, with respect to the proposed end use, it is necessary to assess whether the Site could potentially be classified as “Contaminated Land”, as defined in Part IIA of the Environmental Protection Act 1990 and Contaminated Land Statutory Guidance 2012. This is assessed by the identification and assessment of potential pollutant linkages. The linkage between the potential sources and potential receptors identified needs to be established and evaluated.

To fall within this definition, it is necessary that, as a result of the condition of the land, substances may be present in, on or under the land such that:

- a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) significant pollution of controlled waters is being caused, or there is significant possibility of such pollution being caused.

It should be noted that DEFRA has advised (Ref. Section 4, DEFRA Contaminated Land Statutory Guidance 2012) Local Authorities that land should not be designated as “Contaminated Land” where:

- a) the relevant substance(s) are already present in controlled waters;
- b) entry into controlled waters of the substance(s) from land has ceased; and
- c) it is not likely that that further entry will take place.

These exclusions do not necessarily preclude regulatory action under the Environmental Permitting (England and Wales) Regulations 2016, which make it a criminal offence to cause or knowingly permit a water discharge of any poisonous, noxious or polluting matter to controlled waters. In England and Wales, under The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, a works notice may be served by the regulator requiring appropriate investigation and clean-up.

1.4 Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman Infrastructure & Environment Limited and Waterman Structures Limited, as documented in Waterman’s fee letter (dated: 11th February 2022), and with Waterman’s standard Terms of Appointment.

The benefit of this report is made to Rochdale Sixth Form College.

The information contained in this report is based on a review of available historical, geological and hydrogeological sources and consultation with the regulatory authorities.

Waterman has endeavoured to assess all information provided to them during this investigation, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this site investigation includes an assessment of the presence of asbestos containing materials in the ground at the site but not within buildings or structures or below ground structures (basements, buried service ducts and the like).

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

2. Methodology

This Preliminary Environmental Risk Assessment has been undertaken in general accordance with the Land Contamination: Risk Management Guidance (LCRM: Environment Agency, 19 April 2021).

The report includes the following:

- Definition of overall objectives;
- Collation of available current and historical information about the Site and the potential contaminants expected to be present;
- Findings of site reconnaissance;
- Formulation of an outline Conceptual Model;
- Qualitative risk assessment; and
- Record of findings and recommendations for further action.

3. Hazard Identification

3.1 Description and Reconnaissance

The site is located at National Grid Reference SD 892 133 south of College Road, in the north of Rochdale. The Site comprises a small rectangular parcel of land running alongside the River Roch and extends to approximately 0.4 ha. A site location plan and site layout plan are presented in Appendix A.

A site walkover was undertaken in June 2022. A selection of photographs taken during the site inspection are presented as Appendix B.

The Site currently comprises of car parking for Rochdale Sixth Form College, the main building of which is present to the south of the Site. The majority of the Site is flat, however, an access road slopes down from a bridge over the River Roch immediately to the west of the Site. The majority of the Site consists of hard standing with small, planted areas placed sporadically around the carpark. The tarmac in the car park and on the access road are generally good quality with no damage noted. No visual or olfactory evidence of contamination was noted during the site walkover.

The River Roch is located to the northern and eastern perimeter of the red line boundary. An access road to the College is present within the Site, along the western site boundary. A pedestrian walkway follows the River Roch in the north and east of the Site. Adjacent to the walkway is a substantial fence and a grassed slope down to the River. A pedestrian bridge across the River Roch and a ramp providing access to the river are located at the eastern end of the Site.

Rochdale Sixth Form College is located to the south of the Site. The River Roch is located to the northern and eastern perimeter of the red line boundary, having been moved from a channel further north in the 1960s. To the west of the Site is a superstore and carpark. Car parking for Hopwood Hall College is located to the north of the River Roch.

According to the Groundsure Insights report (Appendix B), the following licences and consents are registered to the Site:

A licensed discharge to controlled water (permit number: 016950161) is present for sewage from sewer storm overflows to the River Roch, to the north east of the Site, on the opposite bank of the river. This licence is shown to have been revoked 27/10/2020.

A licensed discharge to controlled water (permit number: 01ROC0082) is present for sewage from sewer storm overflows approximately 80m upstream on the Site River Roch. This licence is still active.

The Site is noted to lie within a Control of Major Accident Hazards (COMAH) site relating to a historical Notification of Installations Handling Hazardous Substances (NIHHS) record. It is unclear why this designation covers the Site, however, it may be related to a former gas works approximately 250m south west of the Site, as the company is recorded as British Gas. A historical COMAH site is recorded for the location of the former gas works.

3.1.1 Site Surroundings

A summary of the current surrounding land uses, including relevant licences and consents, is shown in Table 1.

Table 1 Summary of surrounding land uses

Location	Description
North	River Roch, with Hopwood Hall College car park beyond.
East	The River Roch is present wrapping around the eastern perimeter of the red line boundary. Further east is Hopwood Hall College and St Mary's Gate Road.
South	Rochdale Sixth Form College, with Dane Street beyond.
West	Superstore and car park, with petrol station beyond, approximately 140m south-west of the Site. Two historical landfill sites are located 200m and 485m west. Numerous waste exemptions are present to the west with Mitchell Hey Mill located 152m west and Mellor Street Storage located 224m south-west being the two closest.

3.2 History

Figure 1: Historical Site Use



Source: Groundsure Enviro Insight Report

In summary, the historical mapping indicates most of the Site was in use until the 1960s as Sunny Bank Mills (Cotton and Woollen), at which point the former buildings were cleared. The Site has been used for car parking since at least 1999. Between mapping from 1890 to 1930 the northern most corner of the Site was occupied by a Town Mill Dye Works. The River Roch is located to the east of the Site and would have been a useful asset to the wool and cotton mills in the area. The course of the River Roch was moved in the 1960s, such that the river now flows adjacent to the eastern site boundary.

A review of historical maps obtained from Groundsure Historical Maps has been undertaken, and a summary of relevant information is shown in chronological order in Table 2.

Table 2: Site History

Date (decade)	Feature	On-Site/ distance off-site
1851-1992	Unspecified mills/ works	119-130m west
1851-1968	Sunny Bank wool and cotton mill	On-site
1890-1930	Dye Works	On-site

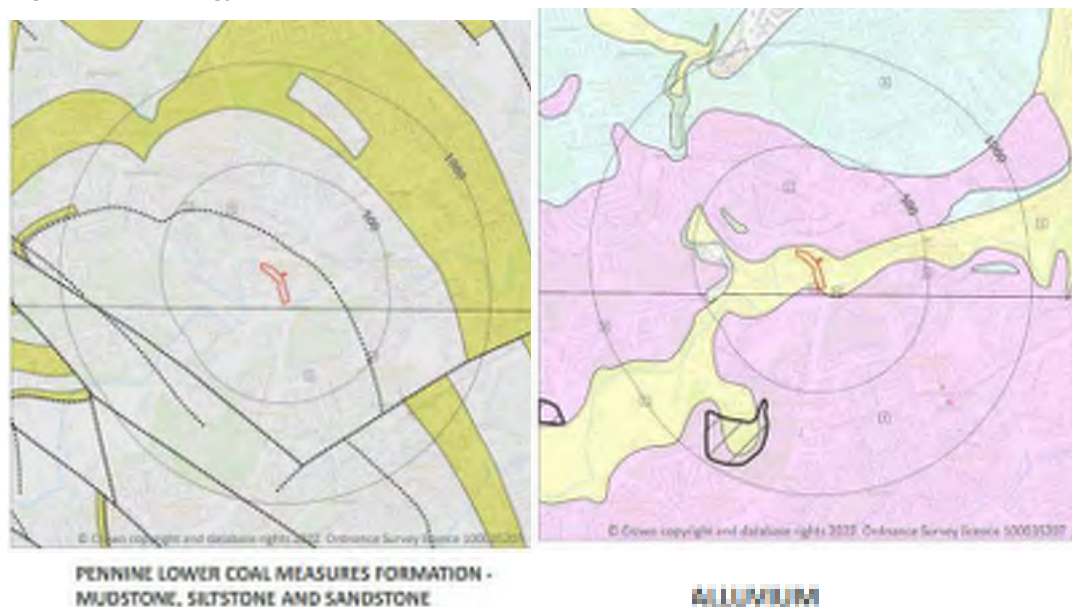
Date (decade)	Feature	On-Site/ distance off-site
1890-2001	Cricket pitch	South-west of site perimeter
1890-1993	Tanks	Within 400m south/ south west
1851-1938	Refuse heap	137m south
1908-1968	Unspecified commercial/ industrial and unspecified mill	On-site
1928-1968, 1968-1975	Police Station	131m east, 232m east
1890-1930	Unspecified tank	On-site
1928-1968	Unspecified commercial/ industrial	140m south-west
1928-1949	Mill pond	366m west
1928-1949	Railway sidings	374m west
1949-1968	Unspecified pit	152m east
1987-1992	Telephone exchange	93m north
1851, 1890-1908, 1890-1908	Gasometer	208m, 241m south-west, 269m south-west
1851	Brick field	49m west
1851	Rope walk	152m north, 185m north, 205m south, 252m north-east
1851	Fulling Mill	347m west
1968-1992, 1987-1992, 1890	Unspecified ground workings	203m south, 249m west, 250m south, 264m west
1908	Gas works	92m south-west
1908	Corn Mill	307m east
1908	Graveyard	355m south-east
1949, 1928-1939	Unspecified quarry	353m west, 365m west
1949, 1928-1938	Mortuary	230m east, 267m east
1949	Unspecified heap	On-site
1949	Unspecified mill	4m east
1949	Iron works	186m south-west
1968	Unspecified tank	144 south-west
1968,1975-92	Unspecified ground workings	70m south-east, 74m north-west

^a potentially contaminative uses are shown in bold italics.

3.3 Geology

The geology beneath the site has been established from the British Geological Survey (BGS) 1:50,000 scale Geological Map, Sheet 76 Rochdale, Bedrock and Superficial Deposits Edition, and the BGS website (accessed online 14/06/2022) and is shown in Figure 2.

Figure 2: Geology



Source: Groundsure Geo Insight Report

A summary of the geology is provided in Table 3:

Table 3: Site geology

Stratum	Area Covered	Estimated Thickness	Typical Description
Made Ground	The majority of the Site, with the exception of the area immediately adjacent to the River Roch	Variable, approx. 2m on adjacent site	Materials likely to be derived from the demolition of former structures at the Site, typically containing brick, concrete etc.
Alluvium	Whole Site	Variable, approx. 1.5m on adjacent site	Alluvium is a general term for clay, silt, sand and gravel comprising detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope.
Glacial Deposits	Whole Site	Variable, approx. 4.5m on adjacent site	Glacial Deposits comprising sand and gravel (Glaciofluvial Deposits) and clay (Glacial Till) are likely to be present beneath the Site.
Pennine Lower Coal Measures Formation	Whole Site	Up to 650m. Rockhead identified at between 8.1m bgl and 8.5m	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.

Stratum	Area Covered	Estimated Thickness	Typical Description
		bgl on adjacent site	The Arley coal seam is indicated to subcrop to the north of the Site and is likely to be present at relatively shallow depth beneath the Site. Rockhead depth is indicated to be variable in the vicinity of the Site, with the closest historical borehole records indicating rockhead at between 8.0m and 12.5m depth.

3.3.1 Ground Stability

The Groundsure dataset identifies a very low risk of ground stability hazards beneath the Site with slope instability problems unlikely to occur.

3.3.2 Coal Mining

The site is located in an area that could be affected by coal mining activity. A Coal Authority report (Groundsure Ref: WTM1-8813132) has been commissioned for the site, and reported the following:

- The property does not lie within the potential zone of influence of any recorded underground coal workings;
- The property is indicated to lie in an area where coal deposits have been worked at shallow depth in the past but for which no plan exists;
- The property does not lie within the boundary of an underground site from which coal is being removed by underground methods;
- The property does not lie within the boundary of an underground site for which the Coal Authority is determining whether to grant a licence, or has granted a licence, to remove coal by underground methods;
- The property does not lie within the zone of likely physical influence on the surface of planned future underground workings;
- No notices have been given under Section 46 of the Coal Mining Subsidence Act 1991 stating that the land is at risk of subsidence;
- No coal mine entries are recorded to lie within 20 metres of the property;
- No damage arising from geological faults or other lines of weakness activated by coal mining are recorded within the property;
- The property does not lie within the boundary of an opencast site from which coal was removed by opencast methods;
- The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods;
- The property does not lie within 800 metres of the boundary of an opencast site for which the Coal Authority are determining whether to grant, or has granted, a licence to remove coal by opencast methods;
- We have no evidence of a damage notice or subsidence claim for the property or within 50m of the property since 31st October 1994;
- No mine gas emissions are recorded within the boundary of the property;

- No Emergency Surface Hazard Call Out procedures are recorded against the property;
- The property does not lie in an area where the right to withdraw support has been granted.

The Groundsure Report does not identify a risk of metalliferous mining beneath the Site.

3.3.3 Ground Gas

Radon

Information recovered from the Groundsure Report, BGS, and PHE show that the Site is not in an area of high radon levels. Correspondingly, protective measures are not required in the proposed development.

Radon is a colourless and odourless radioactive gas, formed from the decay of naturally occurring uranium within soils and rocks. The radioactive elements formed by the decay of radon may be inhaled, entering the lungs, and potentially leading to localised damage, and lung cancer.

Current Building Regulations, endorsed by Public Health England (PHE) detail that all new buildings or extensions require radon protective measures where the development is in an area of high radon.

In 2009 the Health Protection Agency ((HPA), now Public Health England) recommended that radon protection measures be built into all new occupied buildings in the UK, whether or not they were situated in radon sensitive area as identified by British Geological Survey (BGS) maps. The Building Regulations Advisory Committee supported the HPA's proposal. However, the then Government rejected this recommendation and the current Building Regulations (2013) do not include it.

This approach should be confirmed with the Building Control Officer.

Ground Gas

There are no registered active landfills within 500m of the Site. Historical records indicate two former landfills within 500m, the closest located 200m west for Central Tip. No information relating to the dates of operation, or the types of waste accepted is available.

Coal mining activities undertaken historically close to or beneath the Site indicate a potential risk from mines gas.

The Site is considered to be a moderate risk for ground gas issues. Based on the proposed end-use, ground gas monitoring is recommended as part of a ground investigation at the Site.

Vapours

A number of former land use with the potential to result in ground contamination that could cause a risk from vapours are listed below:

- Former mill, including tanks, on-site.

3.4 Controlled Waters

3.4.1 Surface Waters

The nearest surface water to the Site is the River Roch flowing from south to north on the eastern perimeter of the Site. The Environment Agency (EA) has classified this section of the River Roch under the Water Framework Directive as failing for chemical quality and as having moderate ecological potential. The overall rating is moderate.

There are 29 recorded surface water discharge consents within a 500m radius of the site, the closest of which is located on the opposite bank of the River Roch and relates to sewer storm overflow.

Five pollution incidents with a minor impact on water have been recorded with the closest 154m east to do with diesel. The remaining incidents are to do with crude sewage, diesel, unidentified oil, dust and construction materials.

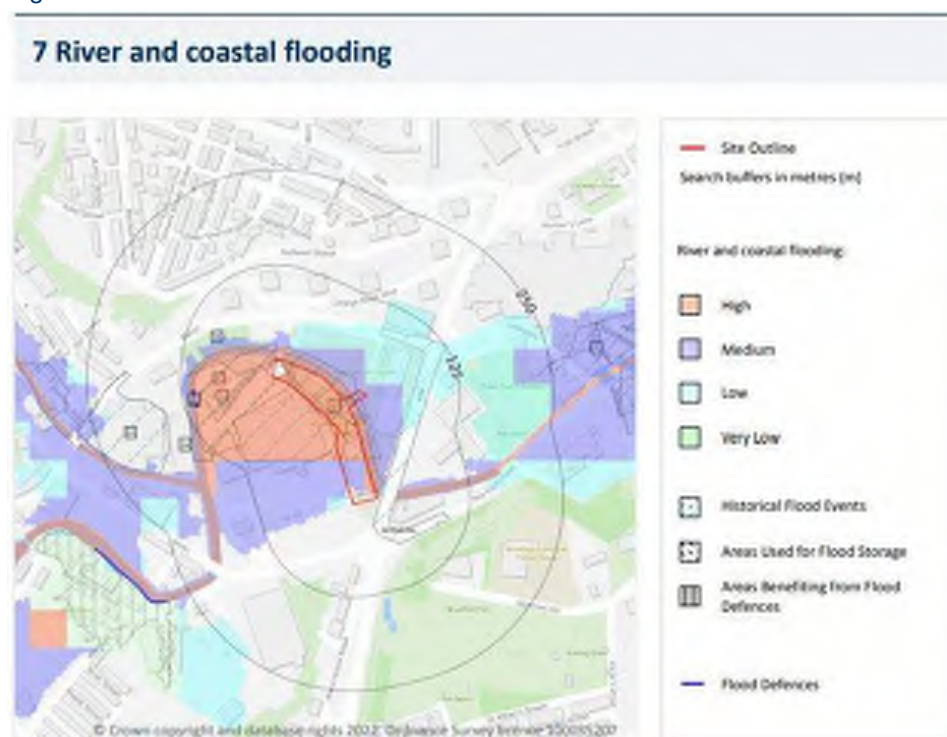
No surface water abstraction licences are registered within 500m of the Site.

3.4.2 Flood Risk

According to EA indicative flooding data, the majority of the Site is within a Flood Zone 3, meaning there is assessed to be a high probability of flooding from rivers in any year. There are no recorded flood defences in the area and historical flood events have occurred.

The risk of flooding from rivers or seas is shown in Figure 3:

Figure 3: Flood Risk



Source: Groundsure Flood Zone Map

3.4.3 Groundwater

According to the BGS Hydrogeological Map of England (1:625,000 scale), the geological deposits underlying the site are classified as per Table 4:

Table 4: Summary of hydrogeological properties of the main geological strata

Stratum	BGS Classification	Hydrogeological Significance
Alluvium	Secondary A	May be important in supporting local abstractions or in providing baseflow to rivers and streams
Pennine Lower Coal Measures Formation	Secondary A	May be important in supporting local abstractions or in providing baseflow to rivers and streams

The Northern Manchester Carboniferous Aquifers (i.e. the aquifer within the Pennine Lower Coal Measures Formation) is classified as having low chemical quality and a good quantitative rating. The overall rating is poor.

The Site is not located within a groundwater Source Protection Zone.

One groundwater abstraction license and one surface water abstraction are present within 1km of the Site.

Based on available information, it is anticipated that shallow groundwater flow will be in a northerly direction reflecting the flow of the adjacent River Roch.

One groundwater abstraction license is present within 1km of the Site, which is located 494m west and is a historical license for Alexander Drew & Sons Ltd. for process water from a borehole.

3.5 Ecological Systems

The Groundsure Report did not identify any ecological systems within 500m of the Site.

3.6 Consultations

The agencies and individuals which have been contacted and/or their records reviewed during the course of this study are listed in Table 5.

Table 5: List of parties consulted during this study

Organisation	Consultee	Response
Rochdale Borough Council		
Environmental Health	-	-
Planning	Website	June 2022
Building Control	David Oakes	May 2022

3.6.1 Environmental Health

Information has been requested from the Environmental Health Officer (EHO) but a response is currently pending.

3.6.2 Planning Department

The planning website of Rochdale Borough Council was consulted in June 2022. The planning application for the adjacent Rochdale Sixth Form College building was identified, with approval dating to May 2009. Further planning applications relating to modifications to the existing Rochdale Sixth Form College building are also identified. All documents relating to these applications appear to have been

archived. Although it is understood that the White Young Green report reviewed in section 4 of this report was submitted as part of the application for the existing Rochdale Sixth Form College building.

3.6.3 Building Control Department

The Building Control Department reported that on the main college building site, to the south east of the Site, the ground conditions included approximately 3m of Made Ground on average.

The adjacent site was treated as Character Situation 2 (CS2) and therefore full gas protection measures were included in the design.

Building Control also indicated that the main college building was piled when it was constructed in 2009, using 375mmsq piles and pile caps/reinforced concrete ground beams.

At the time that the main college building was constructed, the risks posed from soil & groundwater contamination were also generally considered to be low.

4. Previous Environmental Assessments

The following environmental report was provided with respect to the subject site:

- White Young Green Environmental Ltd. document “*Geo-Environmental Ground Investigation Interpretative Report, Rochdale 6th Form College, Rochdale Campus of Hopwood Hall College*”, Ref: E13212_RSFC_RC_SI_CEC_V1, Dated: February 2008.

The White Young Green ground investigation was primarily targeted at the area to the south east of the Site where the main Rochdale Sixth Form College building is located. The investigation included the drilling of 4No. window sample holes to between 0.6m bgl and 4.45m bgl, 1No. cable percussion borehole to 9.69m bgl and 1No. rotary open hole to 30m bgl. Chemical analysis was undertaken and 6No. rounds of gas and groundwater monitoring were completed following completion of the fieldwork. 2No. window sample holes, the cable percussion borehole and the rotary open hole were drilled at the south-eastern end of the Site. No investigation was undertaken in the western half of the Site.

Ground conditions were found to comprise up to 2m of Made Ground, approximately 1.5m of alluvium, up to 4.7m of Glacial Deposits and Bedrock from between 8.1m bgl and 8.5m bgl.

The Made Ground was found to be variable in composition, but was generally granular in nature. WS7, in the south eastern corner of the Site, was terminated at 0.6m bgl as a concrete obstruction was encountered. The hole was moved, however, WS7A also encountered a concrete obstruction at 0.6m bgl.

The Alluvium is described as very soft brown grey sandy gravelly Clay. Glacial Deposits comprising Glaciofluvial Deposits (Sand and Gravel) of brown grey silty sandy Gravel or grey Sand were encountered in all holes, other than the rotary open hole. Glacial Till was encountered in all holes below the Glaciofluvial Deposits and generally comprised brown slightly gravelly sandy Clay.

The Pennine Lower Coal Measures bedrock was found to generally comprise alternating layers of sandstone and mudstone, but was predominantly mudstone. The ground conditions encountered were generally in accordance with those anticipated from a review of the geological maps.

Groundwater strikes were recorded at variable depths (0.4m bgl to 16.9m bgl) during the ground investigation, within the Made Ground, Alluvium and Pennine Lower Coal Measures. Monitoring standpipes were installed in the Alluvium, with groundwater levels of between 1.03m bgl and 2.72m bgl being recorded at the south-eastern end of the Site during the monitoring period. It is considered likely that there is a continuous groundwater body present within the Alluvium and Glacial Deposits at shallow depths beneath the Site, and a deeper groundwater body within the Pennine Lower Coal Measures.

No visual or olfactory evidence of contamination was noted within the exploratory holes and a dual phase dip meter used during monitoring did not encounter any free product.

9No. soil samples were subjected to a suite of chemical analysis, which included metals, cyanides, pH, Total Petroleum Hydrocarbons (TPH), speciated Polyaromatic Hydrocarbons (PAHs), phenols and sulphates. 3No. samples were tested for Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs). 5No. samples were screened for the presence of asbestos. 1No. groundwater sample and 2No. surface water samples from the River Roch were subjected to chemical analysis.

The chemical test results for the site soils were screened against Tier 1 Screening Values for a commercial/industrial end use. None of the results exceeded the relevant Screening Values.

The chemical test results for the groundwater and surface water were screened against Tier 1 Screening Values based on Environmental Quality Standards (EQS). Exceedances for Barium, Selenium, Copper and Nitrite were recorded, however, White Young Green concluded that these exceedances could not be attributed to their wider site.

Very limited concentrations of methane and carbon dioxide, and low flow rates, were encountered during the monitoring and White Young Green therefore classified the Site as Characteristic Situation 1, in accordance with CIRIA C659 (which was later superseded by CIRIA C665). This differs from the information provided by Rochdale Borough Council Building Control. It is recommended that the inclusion of gas protection measures within the existing building is confirmed.

The report concluded that the Site posed a low risk to environmental receptors and considered it unlikely that regulators would require remediation to be completed.

The report also recommended that further ground investigation was completed once structures existing at the time of the first phase of ground investigation were demolished. It is not clear whether this additional ground investigation was completed.

5. Hazard Assessment and Preliminary Conceptual Model

The Conceptual Model for the Site is presented in Table 7 below. The risk rating included in Table 7 has been assessed qualitatively using the criteria given in Appendix D.

5.1 Contaminants of Concern

Contaminants of concern identified above are summarised in Table 6.

Table 6: Contaminants of concern

Source	Associated Contaminants
On-Site (current)	
Car parking	Metals, TPHs, PAHs
On-Site (historical)	
Wool and cotton mill ¹	Metals, TPHs, acids and alkalis, VOCs and SVOCs, asbestos
Works ²	Metals, TPHs, PAHs, VOCs and SVOCs, cyanide, sulphides and sulphates, asbestos
Dye Works	Metals, TPHs, PAHs, VOCs and SVOCs, cyanide, sulphides and sulphates, asbestos
Off-site (historical)	
Landfills ³	Ground gas, asbestos, metals, TPHs, PAHs, VOCs, SVOCs, PCBs, cyanides, dioxins and furans,
Works ⁴	Metals, TPHs, PAHs, VOCs and SVOCs, cyanide, sulphides and sulphates, asbestos
Gas Works ⁵	Metals, TPHs, acids and alkalis, PAHs, VOCs and SVOCs including phenols, cyanides, PCBs, asbestos
Industrial land uses including mills ⁶ , foundries and iron works ⁷ , garages ⁸ and timber yards ⁹ .	Metals, TPHs, PAHs, VOCs and SVOCs, sulphides, sulphates, cyanides, asbestos

¹ DoE Industry Profile: Pulp and Paper Manufacturing Works

² DoE Industry Profile: Chemical Works – Coatings, Paints and Printing Inks Manufacturing Works

³ DoE Industry Profile: Waste Recycling, Treatment and Disposal Sites – landfills and other waste treatment or waste disposal sites

⁴ DoE Industry Profile: Chemical Works – Coatings, Paints and Printing Inks Manufacturing Works

⁵ DoE Industry Profile: Gas Works, Coke works and other Coal Carbonisation Plants

⁶ DoE Industry Profile: Textile Works and Dye Works

⁷ DoE Industry Profile: Metal Manufacturing, Refining and Finishing Works – Iron and Steel Works

⁸ DoE Industry Profile: Road Vehicle Fuelling, Service and Repair – Garages and Filling Stations

⁹ DoE Industry Profile: Timber Treatment Works

Table 7: Preliminary Conceptual Model for the Site

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Human Health					
Contamination in Made Ground	Dermal contact and inhalation of dust from contaminated soils during works Contact with potential contamination in shallow soils in areas of soft landscaping.	Future Site Users	Medium	The Site and surrounding area have an extensive history of potentially contaminative land uses, including an on-site wool and cotton mill and industrial activities, gasholders and various works in the surrounding area. However, the majority of the ground consists of hard standing limiting the likelihood of exposure to any Made Ground. Ground investigation should be completed targeting soils and groundwater in the development areas to identify any potential contamination.	Low
Ground Gas and vapours	Accumulation in confined spaces, leading to inhalation.	Future Site Users	Medium	The Site is indicated to be underlain by Made Ground and landfills are present in the vicinity of the Site, both are potential sources of ground gas. Potential historic coal mining activity may have occurred beneath the Site, also representing a potential source for ground gas. The proposed ground investigation should include an assessment of soil and groundwater conditions, and the potential to generate ground gas or vapours. Ground gas or vapour monitoring should be undertaken. This should inform any mitigation or remediation measures necessary at the proposed development.	Low
Contamination in Made Ground and shallow soils.	Windborne, potentially contaminated construction dust. Runoff from stockpiled soils.	Off-Site Users	Medium	A Construction Environmental Monitoring Plan (CEMP) should be prepared for the works, including measures to minimise runoff from stockpiled soils, manage groundwater in excavations and suppress the generation of dust. Construction materials brought on-Site as part of works will be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching off-Site residents.	Low

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Contamination in Made Ground, shallow soils, and shallow groundwater.	Dermal contact and ingestion. Dust inhalation. Ground gas and vapour Accumulation in trenches and confined spaces, leading to inhalation followed by asphyxiation and risk of explosion.	Construction Workers	Medium	Construction workers will be provided with personal protective equipment (PPE) and respiratory protective equipment (RPE) where appropriate. Workers should be aware of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater, ground gas, vapours and dust inhalation. Works will be undertaken in accordance with the Control of Asbestos Regulations 2012.	Low
Property					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Site structures and services	Medium	Geotechnical investigation as part of design works for the development should include sampling and testing of soils to assess the risk posed by chemical attack. If required, appropriately designed buried concrete and barrier water supply pipes should be used at the development.	Low
Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Off-Site Structures	Low	Surrounding superstore and carpark has been built since 1992 according to historical mapping. It is therefore likely that contamination would have been considered at the time of development.	Low
Controlled Waters					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Migration through granular deposits and via sewer bedding materials to the River Roch.	River Roch	Low	The River Roch is a canalised structure in the vicinity of the Site as a result of the re-routing of the watercourse in the 1960s. The previous ground investigation identified relatively minor metals contamination in the River Roch and the shallow groundwater beneath the Site.	Low

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
	Runoff from stockpiled soils.			The risk of contamination in shallow groundwater reaching the surface water body is considered to be low.	
Construction materials stored on-Site as part of development works.	Spills to ground, and the River Roch.	River Roch	Medium	A CEMP should be prepared for the demolition and construction works on-Site, detailing measures to minimise the potential risk to controlled waters. Construction materials brought on-Site as part of works should be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching the River Calder.	Low
Contamination in Made Ground and shallow soils.	Remobilisation of contamination by rainfall infiltration following removal of hardstanding during construction works.	Secondary A aquifer in the Alluvium and Pennine Lower Coal Measures	Low	The CEMP should include measures to minimise rainwater infiltration to exposed ground, or the potential for construction spills during the demolition and construction works. The previous ground investigation identified relatively minor metals contamination in the River Roch and the shallow groundwater beneath the Site. Rainwater infiltration via soft landscaping is possible at the completed Development. However, this is likely to be limited as the majority of the Site will be covered by buildings and hardstanding.	Low

6. Conclusions

A Preliminary Environmental Risk Assessment has been prepared to inform a planning application for the construction of a new teaching facility at Rochdale Sixth Form College.

The historical mapping indicates most of the Site was in use until the 1960s as Sunny Bank Mills (Cotton and Woollen), at which point the former buildings were cleared. The Site has been used for car parking since at least 1999. Between mapping from 1890 to 1930 the northern most corner of the Site was occupied by a Town Mill Dye Works.

Within the surrounding area various industrial land uses were recorded including landfills, refuse heaps, engineering works, warehouses, iron works, mills and gas works.

The Site lies within a designated COMAH site, however, this is related to a historical NIHHS record. It is unclear why this designation covers the Site. It may be related to a former gas works approximately 250m south west of the Site, as the company is recorded as British Gas.

The geology underlying the Site is anticipated to comprise Made Ground underlain by Alluvium and Glacial Deposits. The solid geology is the Pennine Lower Coal Measures. The Site is in a Coal Mining Reporting area and on the edge of a Coal Authority Development High Risk Area, within which a formal Coal Mining Risk Assessment would be required. The property does not lie within the potential zone of influence of any recorded underground coal workings. However, the property is indicated to lie in an area where coal deposits have been worked at shallow depth in the past but for which no plan exists. No coal mine entries are recorded to lie within 20 metres of the property.

The majority of the Site lies within Flood Zone 3 and has flooded historically.

The Site is not located within a Source Protection Zone and there are no potable groundwater abstractions within 1km of the Site. The nearest surface water receptor to the Site is the River Roch, immediately to the east of the Site, although at this point the river is canalised.

The Site is considered to be a moderate risk for ground gas issues. Based on the proposed end-use, ground gas monitoring is recommended as part of a ground investigation at the Site.

The Preliminary Conceptual Site Model indicates that the highest risk estimated for potential pollutant linkages was Medium. This rating was given to six of nine potential pollutant linkages. It is considered that the overall risk rating for the proposed development is Medium.

The recommendations of this report outline preliminary remedial and mitigation measures that require confirmation through additional works. However, once successfully implemented the risks are anticipated to be Low. Therefore, the NPPF requirement that on completion the Site can no longer be captured under the Part IIA regime is expected to be met.

7. Recommendations

The following actions are recommended to address the potentially unacceptable risks identified:

- Given the proximity of the Site to a Coal Authority Development High Risk Area, it is recommended that a Coal Mining Risk Assessment is undertaken to assess the potential risks to the development and inform the scope of proposed ground investigation;
- A detailed ground investigation, as defined by BS 10175:2011+A2:2017, should be completed targeting soils and groundwater and including ground gas and vapour monitoring. The investigation should target the following features:
 - potential on-site migration of ground gas and contamination from the historical landfill to the west of the Site;
 - the areas formerly occupied by Sunny Bank Mills and Town Mill Dye Works;
 - proposed building footprints and soft landscaping areas; and,
 - investigation of any mining related features identified in the recommended Coal Mining Risk Assessment.
- Geotechnical investigation as part of design works for the development should include sampling and testing of soils to assess the risk posed by chemical attack;
- The gas protection measures installed in the adjacent Rochdale 6th Form College building should be confirmed with the assessment included in the White Young Green ground investigation report not matching the information provided by Rochdale Borough Council Building Control. If necessary, mitigation measures to protect the Site from ground gas or vapour ingress should be included in the final development design;
- An environmental watching brief should be undertaken throughout groundworks for the proposed development, with additional environmental sampling undertaken where visual or olfactory contamination is suspected within the Made Ground, Alluvium, or Glacial Deposits;
- A Construction Environmental Management Plan (CEMP) should be developed for the Site, detailing measures to minimise the potential risk to the River Roch and shallow Secondary A aquifer during the development works;
- During the development works, appropriate measures for managing materials, chemicals and waste should be utilised. Measures should also be taken to prevent run-off from stockpiled soils reaching the River Roch, and to suppress the generation of dust;
- Construction workers should be provided with and use personal protective equipment (PPE), respiratory protective equipment (RPE) and informed of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater or ground gas / vapours;
- Concrete used in construction, and any new water pipes installed as part of the redevelopment works should be appropriately protected against chemical attack from potential contamination in Made Ground, shallow soils and shallow groundwater underlying the Site;
- Should significant contamination be identified at the Site and piled foundations be proposed to be founded in Pennine Lower Coal Measures Formation, a Foundation Works Risk Assessment (FWRA) should be prepared to assess risks to the Secondary A Aquifer in the Pennine Lower Coal Measures Formation and identify an appropriate piling methodology which prevents downward vertical migration of contamination;

- Potential re-use of excavated soils should be explored. Any re-use should be done in accordance with the CL:AIRE Definition of Waste: Code of Practice (DoWCoP), subject to environmental risk assessment, and a materials management plan prepared. Alternatively, a waste exemption could be registered to facilitate its re-use; and,
- Soft landscaping at the development should be planted using an appropriate thickness of certified clean cover material.

GLOSSARY

For the purpose of this report, the following terms and definitions apply (see BS 10175:2001).

Accuracy	Level of agreement between true value and observed value.
Conceptual Exposure model	Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. Note 1: The conceptual exposure model is initially derived from the information obtained by the preliminary investigation. This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model.
Contamination	Presence of a substance which is in, on or under land, and which has <u>the potential</u> to cause significant harm or to cause significant pollution of controlled water. Note 1: There is no assumption in this definition that harm results from the presence of the contamination. Note 2: Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. Note 3: Contamination may relate to soils, groundwater or ground gas.
Controlled water	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters. Note 1: See Section 104 of The Water Resources Act 1991.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property.
Hazard	Inherently dangerous quality of a substance, procedure or event.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
Precision	Level of agreement within a series of measurements of a parameter.
Receptor	Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).
Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
Soil	Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter. Note 1: In accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms.
Source	Location from which contamination is, or was, derived. Note 1: This could be the location of the highest soil or groundwater concentration of the contaminant(s).
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

UK and Ireland Office Locations

