



GROUNDTECH
CONSULTING

Job title: Albert's Norden, Edenfield

Report type: Preliminary Risk Assessment

Prepared for: Elle R Leisure Ltd

Date: 09 March 2022

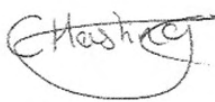
Document Control Form	
PROJECT	ALBERT'S NORDEN, EDENFIELD ROAD
REPORT NAME	PRELIMINARY RISK ASSESSMENT
REPORT REFERENCE	GRO-22065-3264
STATUS	FINAL
ISSUE DATE	09 MARCH 2022
REVISION	
CLIENT	ELLE R LEISURE LTD
CLIENT CONTACT	-
For and Behalf of Groundtech Consulting	
SIGNATURE	
AUTHOR	Connor Hastings BSc (Hons)
SIGNATURE	
CHECKED	Richard Wyatt MEng (Hons) FGS
SIGNATURE	
REVIEWED	James Doyle BSc (Hons) CGeol FGS

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	PROJECT OBJECTIVES	1
1.2	PROPOSED DEVELOPMENT	1
1.3	LIMITATIONS	1
2.0	SITE SETTING.....	3
2.1	LOCATION	3
2.2	SITE DESCRIPTION	3
3.0	ENVIRONMENTAL SETTING.....	5
3.1	SITE HISTORY	5
3.2	GEOLOGY	6
3.3	HYDROGEOLOGY	8
3.4	HYDROLOGY	8
3.5	ENVIRONMENTAL CONSULTATIONS.....	8
3.6	RADON	9
4.0	COAL MINING RISK ASSESMENT.....	10
4.1	COAL AUTHORITY REPORT	10
4.2	COAL AUTHORITY INTERACTIVE MAP.....	11
4.3	OUTLINE COAL MINING RISK ASSESSMENT.....	12
5.0	LAND QUALITY CONCEPTUAL SITE MODEL AND RISK ASSESSMENT	13
5.1	INTRODUCTION.....	13
5.2	POTENTIAL CONTAMINATION SOURCES	13
5.3	POLLUTION LINKAGES	14
5.4	RECEPTORS.....	15
5.5	PRELIMINARY CONCEPTUAL SITE MODEL (CSM)	15
6.0	GROUND ENGINEERING RECOMENDATIONS AND POTENTIAL LIMITATIONS	21
6.1	PRELIMINARY FOUNDATION ASSESSMENT	21
6.2	ADDITIONAL LIMITATIONS.....	21
7.0	CONCLUSIONS AND GROUND INVESTIGATION SCOPE RATIONALE	22
7.1	LAND QUALITY	22
7.2	GROUND ENGINEERING.....	22
7.3	OUTLINE COAL MINING RISK ASSESSMENT AND ADDITIONAL CONSIDERATIONS	22
7.4	RECOMMENDED GROUND INVESTIGATION SCOPE.....	22
	APPENDIX 1 - PLANS	
	APPENDIX 2 - PHOTOGRAPHS	
	APPENDIX 3 - HISTORICAL MAPS	
	APPENDIX 4 - GROUNDSURE REPORT	
	APPENDIX 5 - COAL AUTHORITY REPORT	
	APPENDIX 6 - RELEVANT CONTAMINATED LAND LEGISLATION	
	APPENDIX 7 - CIRIA RISK ASSESSMENT METHODOLOGY	
	APPENDIX 8 - LIMITATIONS	

Plans		
<i>Plan Reference</i>	<i>Revision</i>	<i>Title</i>
GRO-22065-P01	-	Project Location Plan
GRO-22065-P02	-	Preliminary Development Constraints Plan
GRO-22065-P03	-	Illustrative Preliminary CSM

1.0 INTRODUCTION

1.1 Project Objectives

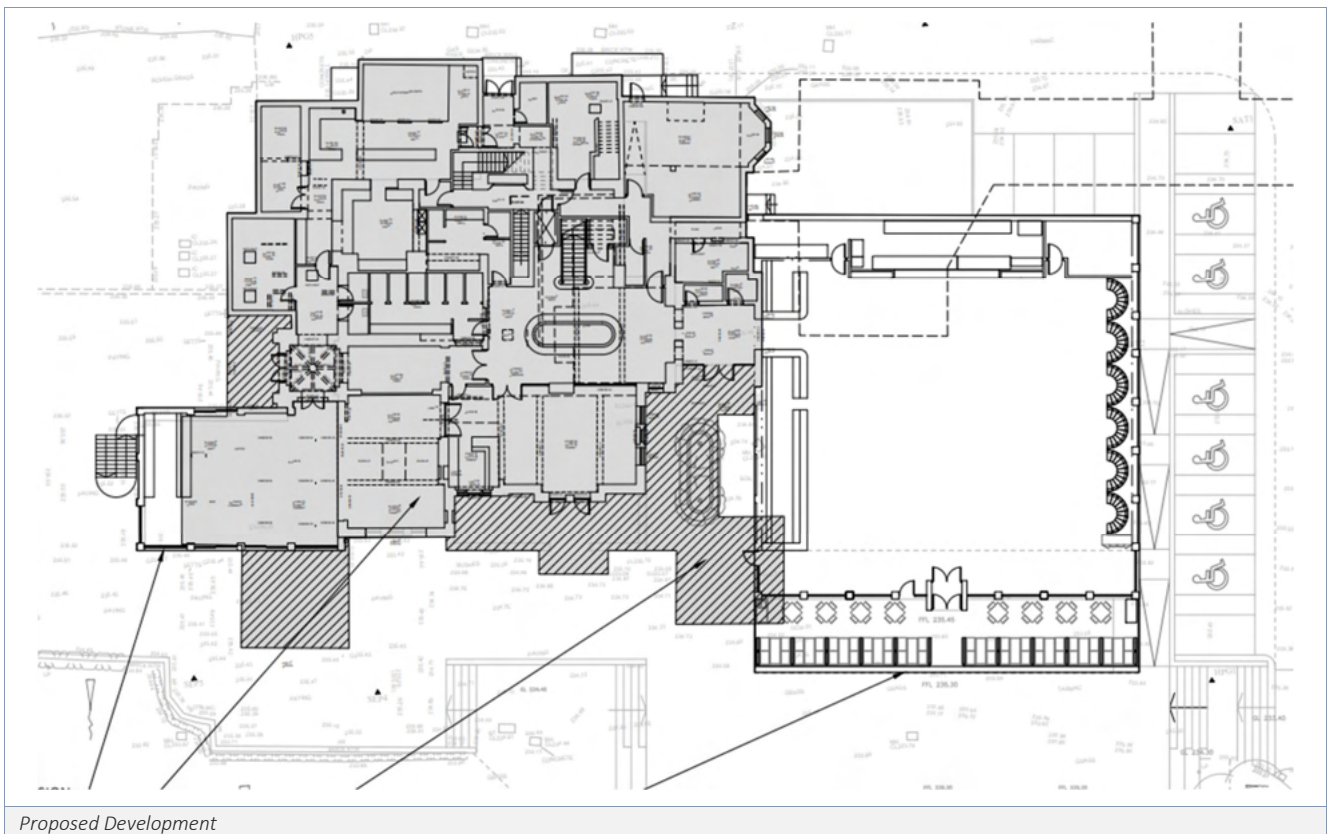
Groundtech Consulting Limited have been instructed by Brennan Consult to undertake a Preliminary Risk Assessment for a site at Edenfield Road in Rochdale.

The objectives of the Preliminary Risk Assessment were to establish the sites environmental and geotechnical background in order to generate a Conceptual Site Model to identify any potential constraints and linkages which may affect the redevelopment of the site.

The report has been undertaken to fulfil the requirements of a preliminary risk assessment in accordance with current Risk Assessment Guidance.

1.2 Proposed Development

The proposed development is commercial end use comprising the construction of an extension to the eastern and southern side of the existing restaurant buildings on site.



1.3 Limitations

This Preliminary Risk Assessment is based on information obtained from a number of sources, and the information is assumed to be correct.



Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report they rely on it at their own risk and Groundtech Consulting Limited will not be obliged to provide a duty of care.

2.0 SITE SETTING

2.1 Location

The site is located circa 3.5 miles north west of Rochdale Town Centre, as shown on the Project Location Plan GRO-22065-P01. The site is approximately centred on National Grid Reference 384845, 415043.



Access to the site is gained off Edenfield Road to the south of the site.

2.2 Site Description

The site is very irregular in shape and circa 2.77 hectares in area. the topography generally slopes downwards from north to south, there are a number of level areas present along this gradient, these include the carparking area and the manor/restaurant building, a suspected former tennis court, a smaller fielded area in the central eastern area

The entrance area to the site comprises an opening adjoining the road with a tarmac surfaced road way which links all previously mentioned level areas of the site.

The site is currently occupied generally by a former manor house which has been converted to a restaurant. Other features exist at the site, these include two grass surfaced fields, small areas of densely vegetated woodland and a roadway and carpark.

The central manor house/restaurant located within the central north western portion of the site is of early 1800s construction and has had multiple redevelopments, these are visible around the property as the building materials used are not of the original buildings design. The building is of varying construction comprising of brick, stone and breeze blocks. The main central building is of three storey construction, however some of the additional developments comprise of one and two storey designs. The building itself is an irregular shape due to the multiple developments and extensions on all faces of the building constructed off the generally square shaped original structure.

An area of hardstanding carparking is located to the east of the manor/restaurant building on site which has capacity for approx. 50 vehicles, this is connected to the roadway at the site which leads from the site entrance to the carpark via a meandering tarmac surfaced road.

Two fields are present at the site, the first is located within the central western area and comprises a grass surfaced field. The topography of this field follows a north to south gradient, however there is a large levelled area present which is suspected to be a former tennis court. The second field is located within the central eastern area, this field is generally flat with a circular concrete pad present in the centre, this field slopes downwards from north to south. Vegetation is present on both fields as well as mature to semi-mature trees.

There are some wooded areas at the site located within the central, eastern and northern areas. Within these areas, mature trees are present along with some small shrubbery and bushes.

An above ground gas tank is located to the rear of the buildings on site and an electrical substation is present in the south western area.

The site is surrounded by the following features/land uses:

- North - *Agricultural fields and a tip site.*
- East - *Agricultural fields.*
- South - *Edenfield road, some residential buildings and agricultural fields.*
- West - *Residential/barn buildings followed by agricultural land.*

Photographs are presented in *Appendix 2* and relevant features are recorded on the Preliminary Development Constraints Plan *GRO-22065-P02*.

3.0 ENVIRONMENTAL SETTING

3.1 Site History

Available historical maps have been obtained, a list of dates and scale are listed in the table below:

Scale	Date
1:1,250	2003
1:2,500	1890/91, 1910, 1929, 1962/63, 1969, 1992, 1992/93
1:10,000/10,560	1851, 1890/91, 1908, 1908/09, 1928, 1938, 1949, 1956, 1967/68, 1975/79, 1983/87, 1992, 2001, 2010, 2022

The plans were examined and potential issues have been identified and summarised in the table below:

Date	Site	Surrounding Area
1851	<i>The site is occupied by fields, a small building is located along the boundary of the north western corner labelled Wolstenholme Hall.</i>	<i>A Sandstone Quarry is located to the immediate north. Coal pits are located c.200m east and c.470m south east. A Cotton Mill is located c.90m and c.200m south. Collieries are located c.250m south east and c.240m west. Ponds/reservoirs located c.30m south and c.40m west. A number of cloughs are located 200m to c400m north west.</i>
1890/91	<i>Building in north western corner no longer present. Likely demolished. A larger Wolstenholme Hall building has been constructed in the north central area. A Reservoir is located in the eastern area. Cutting associated with quarry encroaches onto north of site.</i>	<i>The Sandstone Quarry is now labelled Old Quarry. Old Quarry c.130m north east. Cotton Mill c.90m south no longer present. Pond c.30m south appears to have been infilled. Colliery is located c.200m west. Wolstenholme Hall Farm c.10m west.</i>
1910	<i>South eastern area of the site developed with gardens and water features. A windpump located in the north eastern portion of the site.</i>	<i>Reservoir c.40m west infilled. Spring c.100m east. Tank c.50m south and c.200m south east. Old shaft (Clay) c.200m south east.</i>
1928	<i>Some smaller buildings established in the central western area. Fountain located in the south eastern area.</i>	<i>A reservoir is located c.480m south east and c.440m north east. A bleach and dye works is located c.460m north east.</i>
1938	<i>An elongate building has been constructed to east of Wolstenholme Hall labelled Hospital. A tennis court is located in the southern central area.</i>	<i>Filter beds immediately east.</i>
1962/63	<i>Reservoir in east appears to have been infilled.</i>	<i>Old Quarry c.130m north east now labelled Refuse tip.</i>
1967/68	<i>No Change.</i>	<i>Two springs located c.250m and 400m south east.</i>
1992	<i>The hospital on site demolished and original Wolstenholme Hall building remains, now labelled Manor. An electrical substation located in the southern area.</i>	<i>Quarry immediately north no longer labelled.</i>
2001	<i>No significant change.</i>	<i>No significant change.</i>

The historical plans are presented in *Appendix 3*.

3.2 Geology

The following British Geological Survey (BGS) records and other available information were inspected to accurately determine the geology underlying the site:

- *1:50,000 Scale Geological Sheet 76, Rochdale– Solid and Drift Edition.*
- *BGS Records.*
- *Sheet 76 memoir.*
- *80SE-Roch W-Lancs*

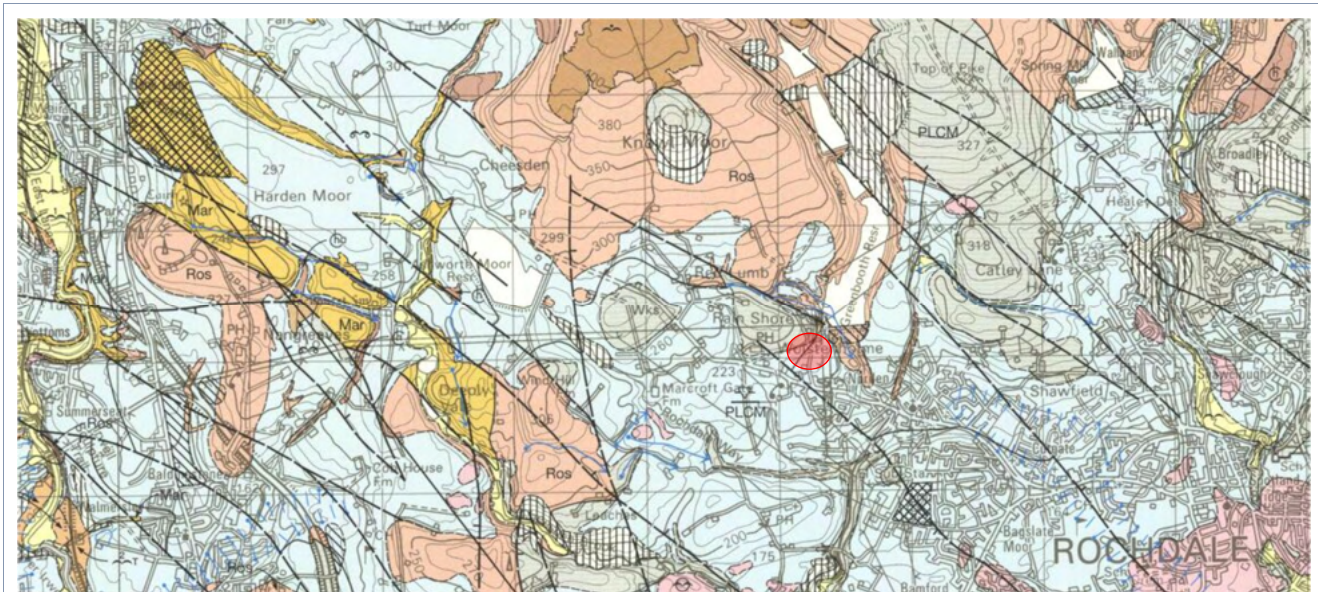
Made Ground

An area of Made Ground is shown in the Groundsure report in the east of the site in the area of the former reservoir.

Infilled ground is also indicated to be present in the north of the site in the vicinity of the former Sandstone quarry and in a small area in the north west of the site.

Superficial Deposits

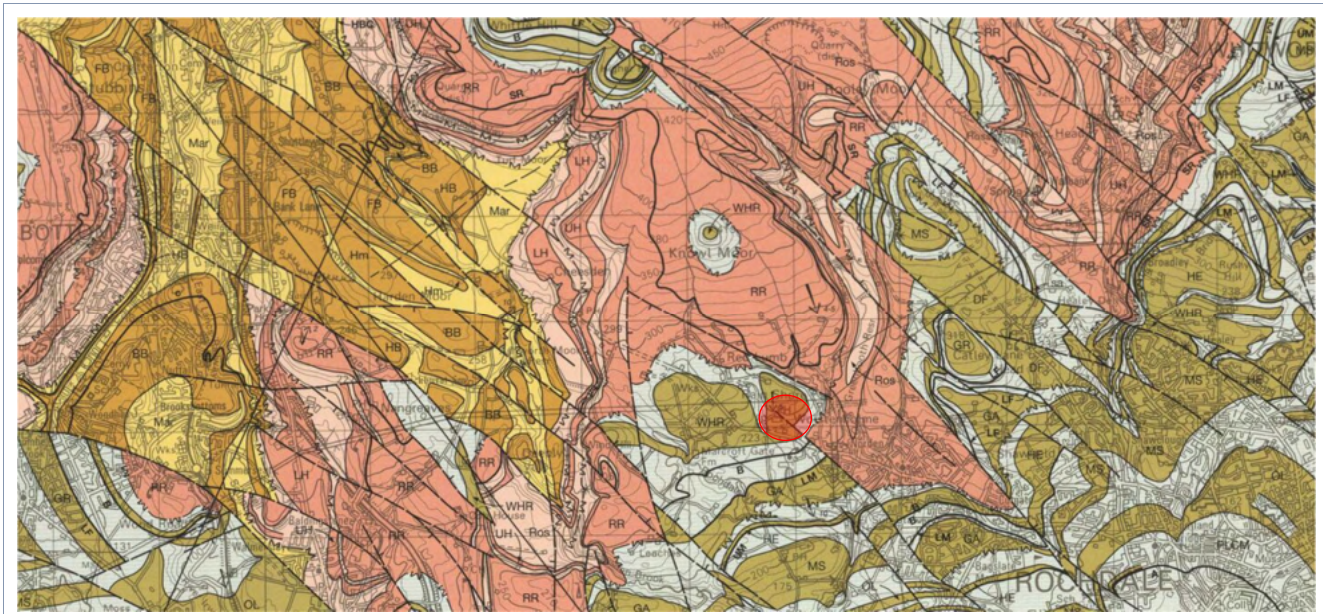
The site is indicated to be underlain by Glacial Till and Diamicton, this strata characteristically comprises of clay, sand and gravel, no superficial deposits are indicated to be present adjacent to the eastern site boundary.



Geological Map – Superficial Deposits

Solid Geology

The site is indicated to be underlain by the Woodhead Hill Rock formation (Sandstone) dipping 5° to the south. This formation forms part of the Pennine Lower Coal Measures formation.



Geological Map – Solid Geology

A fault is indicated to be present within the north eastern corner of the site orientated south east to north west, downthrown to the south west.

A Marine band is indicated to the east of the site, this can comprises of shelly bands within the strata, due to the organic nature of these materials there is potential for coal to form.

The Lower Mountain Mine (1ft 8 inches) coal seam is indicated to be subcropping beneath the south eastern area of the site, striking south west to north east. This seam rests on top of the Ganister Rock and is one of the principal seams of the Lower Coal Measures and has been extensively worked. Within the region of Rochdale the seam varies from 18 to 27 inches in thickness with a valuable bed of fireclay beneath it and has been worked in many places. The extensive outcropping of the seams has naturally led to the adit method of mining and the tracing of these outcrops offers little difficulty in consequence. Within the region of Walmersley and Shuttleworth circa 2.5 miles north west of the site wherever the Lower Mountain Mine occurs in the area, it has been extensively mined, in many places it has been entirely worked out to its crop. Within the Norden district approximately 0.9 miles southeast of the site it is practically worked out.

The Lower Foot Mine subcrops to the north west of the site and also dips beneath the site, it dips at 6° and subcrops 150m north west, it is estimated to be circa 16m below the surface of the bedrock beneath the site. It is a comparatively thin seam but maintains remarkably uniform character and thickness through out the area of Rochdale. This coal is invariably of excellent quality so that despite it never exceeds 1ft in thickness. Within districts of south west Todmorden and Brown Wardle Hill this seam has been proved at a uniform thickness of 9 to 10 inches. A highly interesting section of the Lower Foot Mine is seen in the cliffs on the south side of the Cheesden Brook approximately 1.4m south west of the site, here it can be seen that the estuarine band previously mentioned can be seen overlying the Lower Foot Mine. The CA interactive map for the site does not indicate probable workings within the vicinity of this seam this is suspected to be due to weathering associated with the topography of the region affecting the shallow nature of this seam.

BGS Records

No BGS records are present within 250m of the site.

3.3 Hydrogeology

The superficial deposits in this area are classified by the Environment Agency as a 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).

The bedrock is classified as a 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).

The site is not indicated to lie within 2000m of a Source Protection Zone.

There are 20 Groundwater abstractions within 2000m of the site, the nearest of these is located 336m north east from the site and is associated with drinking, cooking, sanitary and washing. The nearest active Groundwater abstraction is located 1578m west of the site and is associated with general usage.

3.4 Hydrology

The nearest watercourse is an unnamed river located 41m south west.

Environment Agency information indicates that the site is outside a flood risk zone and is not at risk of flooding from rivers and seas.

There are 13 Surface water abstractions within 2000m of the site, the nearest of these is a historical one located 336m north east from the site and is associated with process water. The nearest active license is located 370m east of the site and is associated with a direct potable water supply.

3.5 Environmental Consultations

A request has been submitted to the Contaminated Land Officer at Rochdale Borough Council for information pertaining to the site, this information will be forwarded upon receipt.

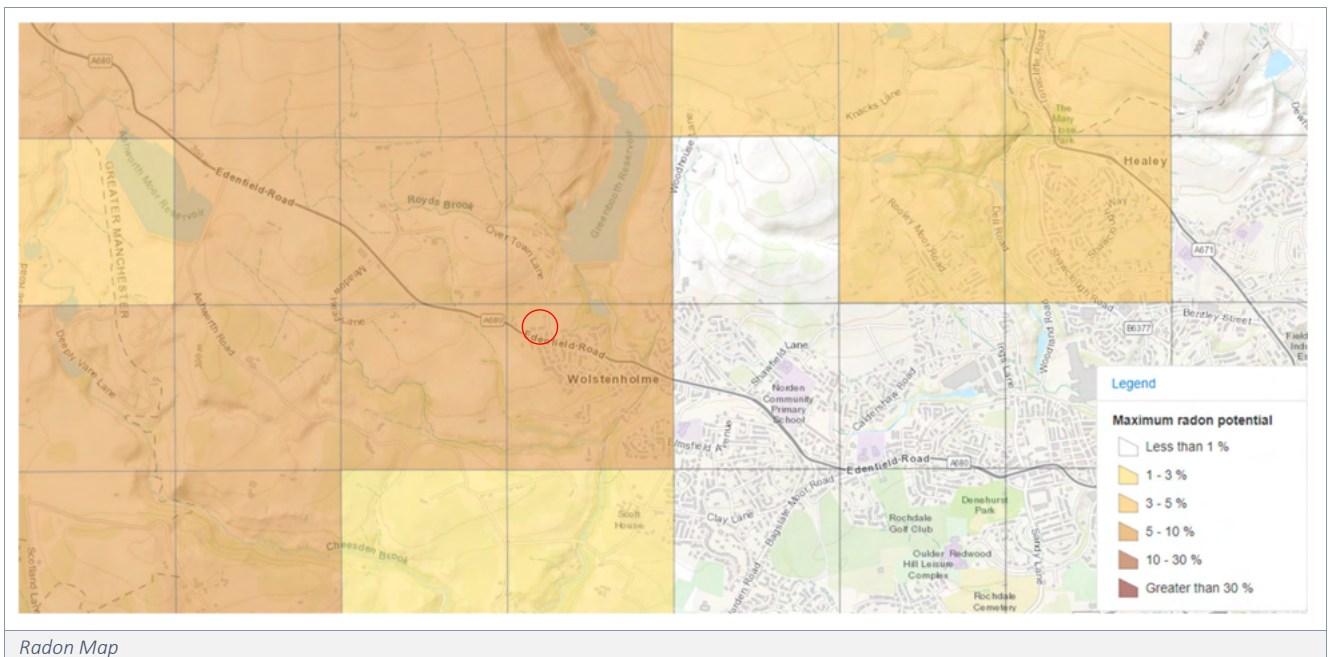
An environmental search has been conducted through Groundsure, which accesses British Geological Survey and Environment Agency databases. The complete Groundsure Report can be found in *Appendix 4*, a summary of the more relevant points are presented in the table below.

Record	<250m	250 – 500m	Description
<i>Authorised Processes</i>	-	-	-
<i>Pollution Incidents</i>	-	1	<i>One incident located 458m north east of the site related to oils and fuels had a significant land impact category 2.</i>
<i>Landfill and Waste Treatment</i>	2	13	<i>Refuse Tip located 147m north east, following landfills are also associated with refuse tips. Licensed Waste Site located 317m north associated with landfill and other general waste. Nearest waste exemption located 330m east associated with treating waste for non-agricultural screening and blending of waste.</i>
<i>Discharge Consents</i>	-	1	<i>Located 478m north west of the site associated with sewage discharge.</i>
<i>Petrol Filling Stations</i>	-	-	-

Record	<250m	250 – 500m	Description
Current industrial Uses	1	1	Electrical substation located on site, a wind turbine is located 136m west.

3.6 Radon

Map 13 Northern Welsh Marches and Liverpool from BRE 211 and HPA were examined which defines areas which require radon protective measures. The probability is 5-10% and Edenfield Road is an area requiring basic radon precautions in foundations in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2015 Edition.



The radon data in the Groundsure report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland, and confirms the recommendations of radon maps. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supersede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square.

4.0 COAL MINING RISK ASSESMENT

4.1 Coal Authority Report

The site lies in an area where the Law Society and Coal Authority recommends a mining search is undertaken due to past or current mining possible affecting the site.

A search was carried out with the Coal Authority, the report is presented in *Appendix 5*, the main findings are outlined below.

Past Mining

The property is in a surface area that could be affected by underground mining in 1 seam of coal at 80m to 100m depth, and last worked in 1900.

Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.

In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. Your attention is drawn to the Professional opinion sections of the report.

Present Mining

The site is not within the zone of influence of any present underground coal workings.

Future Mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining. However, reserves of coal exist in the local area which could be worked at some time in the future.

Mine Entries

There are no recorded coal mine entries known to the Coal Authority within, or within 20 metres, of the boundary of the property.

This information is based on the information that the Coal Authority has at the time of this enquiry.

Based on the Coal Authority's knowledge of the mining circumstances at the time of this enquiry, there may be unrecorded mine entries in the local area that do not appear on Coal Authority records

Coal Mining Geology

The Authority is not aware of any damage arising to geological faults or lines of weakness that have been affected by coal mining.

Opencast Coal Mining

The property is not in an area affected by past or present coal mining extracted by opencast methods. The property is also not in an area affected by a proposed opencast coal mine.

Subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine Gas

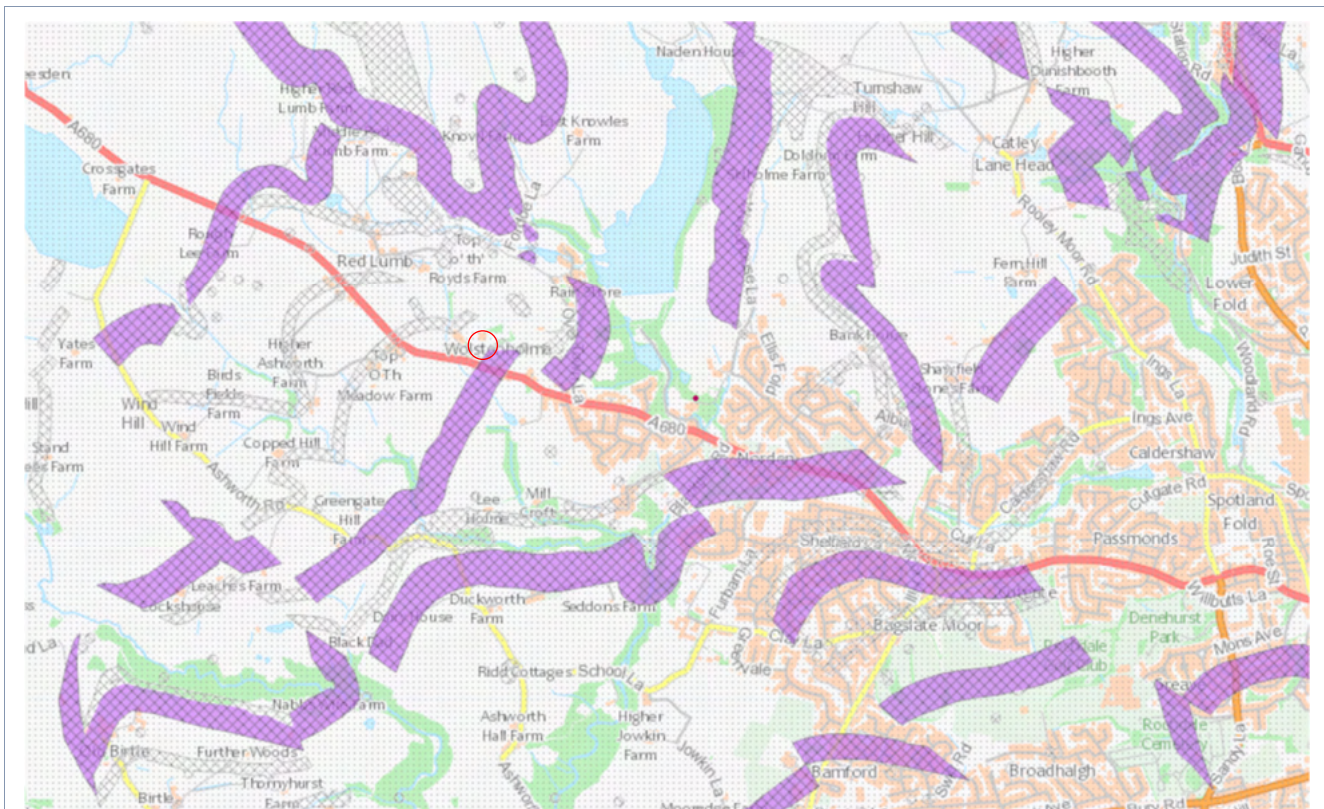
There is no record of mine gas emission requiring action by the Coal Authority within the boundary of the property.

Withdrawal of Support

The property is not in an area which notice of entitlement to withdraw support has been published.

4.2 Coal Authority Interactive Map

From the Coal Authority Interactive Map it can be observed that the south eastern corner of the site is within a Development High Risk Area due to Probable Workings.



Coal Authority Interactive Map

4.3 Outline Coal Mining Risk Assessment

The below revised table summarises the coal mining risks based on the desk-based consultations.

Coal Mining Risks	Potential Risk Y/N	Risk Classification
<i>Recorded Coal Working</i>	<i>N</i>	<i>Very Low</i>
<i>Recorded Mine Entries</i>	<i>N</i>	<i>Very Low</i>
<i>Unrecorded Coal Workings</i>	<i>N</i>	<i>Moderate</i>
<i>Unrecorded Mine Entries</i>	<i>N</i>	<i>Moderate</i>
<i>Surface Mining (opencast workings)</i>	<i>N</i>	<i>Very Low</i>

Recorded Mine Workings

The Coal Authority Report indicated that the site is in a surface area that could be affected by underground mining in 1 seam of coal at 80m to 100m depth last worked in the 1900's, any movement within the ground due to these potential workings should have stopped by now so the risk from recorded workings is *Very Low*.

Recorded Mine Entries

There are no recorded mine entries onsite or within 20m of the boundary of the site and the risk is *Very Low*.

Unrecorded Mine Workings

The online Coal Authority interactive map shows that there are probable shallow mine workings in the south eastern corner of the site, and therefore this area is in a Development High Risk Area. The seam outcrop is indicated to be to the south east of the proposed development and dips away to the south east. This seam is the Lower Mountain Mine it is suggested that within the surrounding regions of the site this seam has been extensively worked. The accuracy of the subcrop on the geological maps cannot be guaranteed and the seam may be beneath the proposed extension, therefore unrecorded mine workings are potentially present and the risk is *Moderate*.

No records of subsidence or preventative works relating to coal mining are recorded beneath or within the vicinity of the site. The Manor house building located within the central area has been present on site since circa 1890/91 and based on evidence from the site reconnaissance no evidence of subsidence was observed. The original building is however situated further from the postulated coal subcrop.

Unrecorded Mine Entries

The Lower Mountain Mine is the main coal seam to subcrop beneath the site, it is suggested that within the surrounding regions of the site this seam has been extensively worked and unrecorded mine entries are potentially present beneath the site. This would likely be subject to bell pitting as this seam is relatively close to the surface or adits as stated in the memoir. There is a potential risk from unrecorded workings and therefore from unrecorded mine entries - the risk is *Moderate*.

Proposed Action

An intrusive mining investigation is recommended to quantify the risk from unrecorded workings and determine if there is a requirement for stabilisation works.

A watching brief will be maintained for evidence of coal mining features in this area as a part of the groundworks.

5.0 LAND QUALITY CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

5.1 Introduction

The potential level of risk posed by contaminants in soil and/or groundwater will be influenced by the type and concentration of the contamination at source, the likelihood of exposure occurring, the potential pollution linkages and the likely chronic or acute effects on the receptors.

A contaminant is defined as a substance that has the potential to cause harm, a risk is considered to exist if such a substance is present at sufficient concentrations to cause harm and if a pathway is present a receptor could be exposed to the contaminant.

Section 4.0 compiles the information from the previous sections to assemble a Conceptual Site Model to inform the risk assessment process. The potential sources identified on the site and off the site that are within influencing distance are assessed to determine if pollution linkages exist and an unacceptable risk is posed to human health and controlled waters. The assessment has been carried out on a qualitative basis and aims to produce a complete and comprehensive Preliminary Conceptual Site Model, the potential pollution linkages are displayed on GRO-22065-P03 Illustrative Preliminary CSM.

Three potential types of impacts exist for a site and all three need to be considered in the qualitative preliminary risk assessment:

- *Impacts from sources on the subject site.*
- *Impacts to the surrounding area from the subject site.*
- *Impacts to the subject site from the surrounding area.*

5.2 Potential Contamination Sources

Onsite Sources and Associated Contaminants of Concern (CoC)

From the information obtained during the preliminary risk assessment there are a number of onsite sources which may affect the redevelopment of the site for commercial end use.

A reservoir was located within the eastern extent of the site, this has been infilled and dependant on the material used this could be a source of ground gasses as well as heavy metals, asbestos and speciated Polycyclic Aromatic Hydrocarbons (PAHs). The cutting associated with the quarry to the immediate north of the site is also a potential source of ground gas depending on the backfilling of this quarry.

There is an electricity substation located in the southern extent of the site. Associated contaminants of concern include Polychlorinated Biphenyls (PCBs). Historically, they were used in power generation and transmission equipment, commonly found in coolants and the insulating fluids of electrical components.

Differing layouts existed at the site and buildings have been demolished, Made Ground may exist and may be a source of ground gases as well as heavy metals, asbestos and speciated Polycyclic Aromatic Hydrocarbons (PAHs).

Shallow mine workings related to coal mining at the site if present may be a source of mine gases.

Basic radon precautions are required as the site falls within the 5-10% radon potential zone.

Finally the tennis court previously located within the central area of the site is a potential source of ash which was typically used as drainage during construction.

Offsite Sources and Associated Contaminants of Concern (CoC)

A range of potential contaminative sources have been identified within 250m of the site which may affect the redevelopment of the site for commercial end use:

- *Quarries to the immediate north and c.30m south.*
- *Coal Pits c.200m east and 470m south east.*
- *Reservoirs to the immediate south west and c.480m south, c.440m north east and c.250m east.*
- *Mills c.30m, 90m and 200m south.*
- *Old Shaft c.80m south west.*
- *Bleach and dye works c.460m north east.*
- *Refuse tip c.120m north east.*
- *Tank c.50m south and c.200m south east.*
- *Wolstenholme Farm c.10m west.*
- *Filter beds immediately east.*

The electrical substation is a potential source of Polychlorinated Biphenyls (PCBs) which are used as cooling agents in the transformers.

The unspecified tanks identified could be a source of a number of contaminants dependant on what they were used to store. This could include fuels, oils or other chemicals.

The refuse pit and backfilled quarries could be a source of ground gases dependant on the nature of any backfilled material.

The Cotton Mills located around the site are a potential source of a number of contaminants including oils or other chemicals, heavy metals, asbestos and solvents/dyes.

The ponds and reservoirs located within the vicinity of the site have been infilled and dependant on the material used this could be a source of ground gases as well as heavy metals, asbestos and speciated Polycyclic Aromatic Hydrocarbons (PAHs).

The farm located to the west of the site could be a source of heavy metals, oils/chemicals, speciated Polycyclic Aromatic Hydrocarbons (PAHs), asbestos and fertilisers/pesticides.

5.3 Pollution Linkages

The definition of a pollution linkage is a medium which allows a contaminant to impact a receptor. Potential pollution linkages have been recognized for the commercial development from the identified contamination sources that exist.

At this stage the contaminants identified above are considered to potentially pose an unacceptable risk human health and controlled waters through the following pollution linkages:

- *Direct soil and dust ingestion.*
- *Dermal contact with soil both indoors and outdoors.*
- *Indoor air inhalation from soil and vapour.*
- *Outdoor inhalation of soil and vapour.*
- *Migration and accumulation of ground gas into internal spaces.*

- *Impaction of groundwater from soil contamination (diffuse and point).*
- *Impaction of groundwater from groundwater plume.*
- *Migration of soil and groundwater contamination impacting surface waters.*

5.4 Receptors

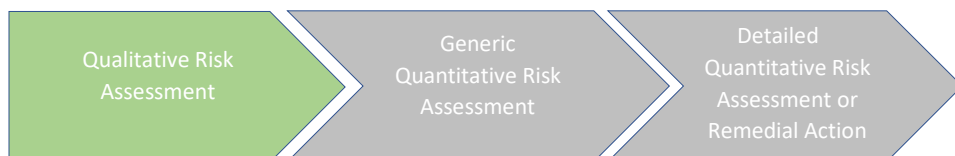
Receptors generally fall into the categories of human health or controlled waters within the river basin system. The recognized receptors are listed below:

- *Site end users.*
- *An unnamed water course 41m south west.*
- *Clean potable water supply pipe.*
- *Secondary Undifferentiated Principal Aquifers and the Secondary A Bedrock Aquifers.*

5.5 Preliminary Conceptual Site Model (CSM)

The factual information obtained from the consultations and summarised in Section 2.0 and 3.0 has been used to compile a Preliminary CSM. Using Source-Pathway-Receptor assessment criteria that is applicable in the UK, a risk assessment has been completed to determine if a plausible pollution linkage exists between the identified contaminants and receptors. The risk classification has been estimated in accordance with the CIRIA C552 assessment criteria outlined in *Appendix 7*.

Human Health Pollution Linkage Assessment



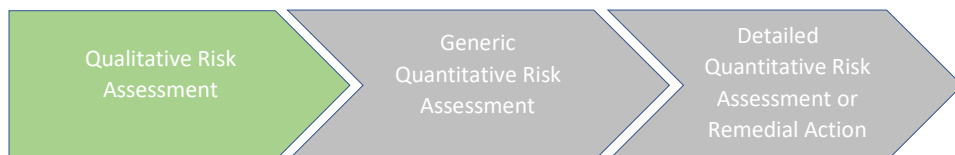
- The table below represents the first stage in the land quality risk assessment process - **the Qualitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model					Qualitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
PL1	Contaminated Soils	Ingestion of soil and dust. Dermal contact with soil.	Unlikely	Medium	Low	<i>Pollution Linkage 1 refers to proposed site users coming into contact with contaminated soils on the site.</i> <i>The site is currently utilised as a restaurant with associated carparking areas and soft landscaped areas to the south. The wider site is largely to remain unchanged, with the exception of extensions to the existing building.</i> <i>Made Ground is likely to be present beneath the site due to the previous use as a hospital as well as other features present on the site such as a reservoir and tennis court. Demolition materials associated with the former hospital may be present and associated CoC include metals, speciated PAHs and asbestos.</i> <i>Depending on the age of the electricity substation located in the south west area of the site, PCBs may have been used as a cooling agent within the transformers. Due to the relative immobility of PCBs and the small volume used, any impaction would be localised. However as the substation is after 1981, the risk from this is greatly reduced as PCBs had been banned.</i>

Conceptual Site Model					Qualitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
						The potential sources of contamination are all at distances where they are unlikely to have any notable impact to the subject site due the migration distances involved and the nature of the CoC involved the topography at the site indicates that some attenuation from the north of the site is a possibility as the site is downgradient of a former quarry. The proposed development is to extending the current building in two directions to provide extra dining space, hardstanding and the building will effectively remove the pollution linkage to site end users. Soft landscaped areas are to remain unchanged.
PL2	Contaminated Soils	Inhalation of vapour.	Unlikely	Medium	Low	No volatile contamination is anticipated as no sources have been identified and no realistic pollution linkage exists.
PL3	Contaminated Soils	Inhalation of soil dust by adjacent site users.	Unlikely	Medium	Low	Pollution Linkage 3 relates to contamination on the subject site affecting adjacent site users. No mobile contamination is anticipated to be present at the site and no pollution linkage has been identified.
PL4	Contaminated Soils	Attacking potable water supply pipe.	Likely	Medium	Low	Pollution Linkage 4 refers to the possible contaminants permeating potable water pipes and consumption by the future site end users of the tainted water supply. Made Ground may be present at installation depth, in the footprint of the proposed

Conceptual Site Model					Qualitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
						extensions, however organic contamination is considered unlikely. In addition, existing supply pipes may be utilised. A local water company risk assessment is recommended prior to construction to advise on the level of protection required for the potable water supply.
PL5	Ground Gas	Migration and accumulation of ground gas in internal spaces.	Likely	Medium to Severe	Moderate to High	Made Ground is potentially present beneath areas of the site in the vicinity of the former reservoir, fountain and within the former quarry to the north of the site. Depending on the composition of any backfilled material ground gases may be generated. Offsite sources of Ground Gases include the quarries to the immediate north and c.30m south, the reservoirs to the immediate south west and the refuse tips c. 140m north east. Due the potential sources identified, an intrusive investigation including the installation and monitoring of ground gas wells will be required. The site is within an area requiring basic radon precautions within foundations.

Controlled Waters Pollution Linkage Assessment



- The table below represents the first stage in the land quality risk assessment process – **Qualitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model					Qualitative Risk Assessment	
PL	Potential source	Pollution linkage	Likelihood	Severity	Level of risk	Rationale
PL6	Contaminated Soils	Impaction of groundwater from soil contamination (diffuse and point). Impaction of groundwater from groundwater plume.	Unlikely	Medium	Low	Made Ground is likely to be present beneath the site in the vicinity of the infilled reservoir, demolition material and quarry. However, it is unlikely that gross mobile contamination is present. Geological maps indicate that the site is underlain by Glacial Till comprising of Clay, Sand and Gravel. The bedrock underlying the site is the Woodhead Hill rock (sandstone). Natural Clay deposits will restrict downward migration of any potential contaminants into the Secondary A Aquifer. The site is not within 2000m of a SPZ and is not considered a sensitive resource, the nearest potable groundwater abstraction is 1578m west of the site which is sufficient to allow considerable attenuation. Furthermore, the proposed development will increase the hardsurfacing coverage and a new drainage system installed. This will considerably reduce infiltration and leaching potential of contaminants. A realistic pollution linkage is not considered to exist.

Conceptual Site Model					Qualitative Risk Assessment	
PL	Potential source	Pollution linkage	Likelihood	Severity	Level of risk	Rationale
PL7	Contaminated Soils	Migration of soil and groundwater contamination impacting surface waters.	Unlikely	Medium	Low	Pollution Linkage 7 refers to the impaction of an unnamed river 41m south of the site from contaminated soils and groundwater. No significant source of mobile contamination has been identified and no plausible pollution linkage exists.

6.0 GROUND ENGINEERING RECOMENDATIONS AND POTENTIAL LIMITATIONS

6.1 Preliminary Foundation Assessment

The site has formerly been occupied by a number of buildings including a manor house, hospital and other unnamed residential dwellings. The majority of the buildings have been demolished at the site and the current manor building within the central area remains. Made Ground is anticipated to be present beneath the site including within the footprint of the proposed extension.

Traditional strip and pad foundations may be a suitable option for the proposed extension depending on the depth of Made Ground and engineering properties of the Glacial Till. If deeper Made Ground and or low strength Clay is present, an alternative foundation solution will be required and could include reinforced strip foundations constructed in vibro treated ground or piled foundations. It is prudent to reinforce foundations within 25m of the fault line indicated on the geological records.

Due to the likely presence of cohesive Glacial Till deposits being present beneath the site, foundation depths will need adjusting in accordance with NHBC Chapter 4.2 'Building Near Trees'.

The above preliminary foundation recommendations are based on desk based information and should be confirmed by a Ground Investigation in accordance with current guidance.

6.2 Additional Limitations

Glacial Till comprising natural impermeable soils are present beneath the site, therefore a SuDS drainage system is unlikely to be a feasible option for the proposed development.

Due to the extensive topography changes at the site, and the overall north to south gradient, there are possible requirements for retaining walls or a slope stability assessment to ensure overall stability requirements are met.

7.0 CONCLUSIONS AND GROUND INVESTIGATION SCOPE RATIONALE

7.1 Land Quality

The proposed development area has previously been occupied by a number of buildings including a hospital, manor house and suspected farm buildings. The majority of the buildings have been demolished at the site and the current manor building within the central area remains, due to this Made Ground is anticipated to be present beneath the site.

It is proposed to extend the existing building to the east and southern areas. Based on the history of the site, the risk to human health is considered to be *Low* as hardsurfacing will break the pollution linkage.

Mobile contamination is not anticipated to be present beneath the site, the risk to controlled waters is considered to be *Low*.

Potential onsite and offsite sources of permanent ground gases have been identified at the site in the form of the former infilled reservoirs and quarries that are located on and around the site, therefore the risk is considered to be *Moderate to High* at this stage. Basic radon precautions are required within the proposed development as a minimum.

7.2 Ground Engineering

It is anticipated that traditional shallow strip and pad foundations will be a suitable option for the proposed development where Made Ground is shallow. Where deeper Made Ground is identified, alternative solutions include reinforced strip foundations over vibro treated ground or pile foundations.

As cohesive deposits are likely to be present beneath the site, foundations should be designed in accordance with NHBC Chapter 4.2 'Building Near Trees'.

The site is underlain by Glacial Till and the use of a SuDS drainage system is not considered to be feasible for the proposed development.

7.3 Outline Coal Mining Risk Assessment and Additional Considerations

The risk from recorded mine workings and mine entries is *Low* based on information provided by the Coal Authority.

The Coal Authority Interactive Map shows that there are probable shallow workings in the south east of the site. This area of the site is in a Development High Risk Area and relates to the Lower Mountain Mine which has been identified as been significantly worked within the vicinity of the site. Therefore, there is a potential for unrecorded shallow and mine entries and the risk is *Moderate*.

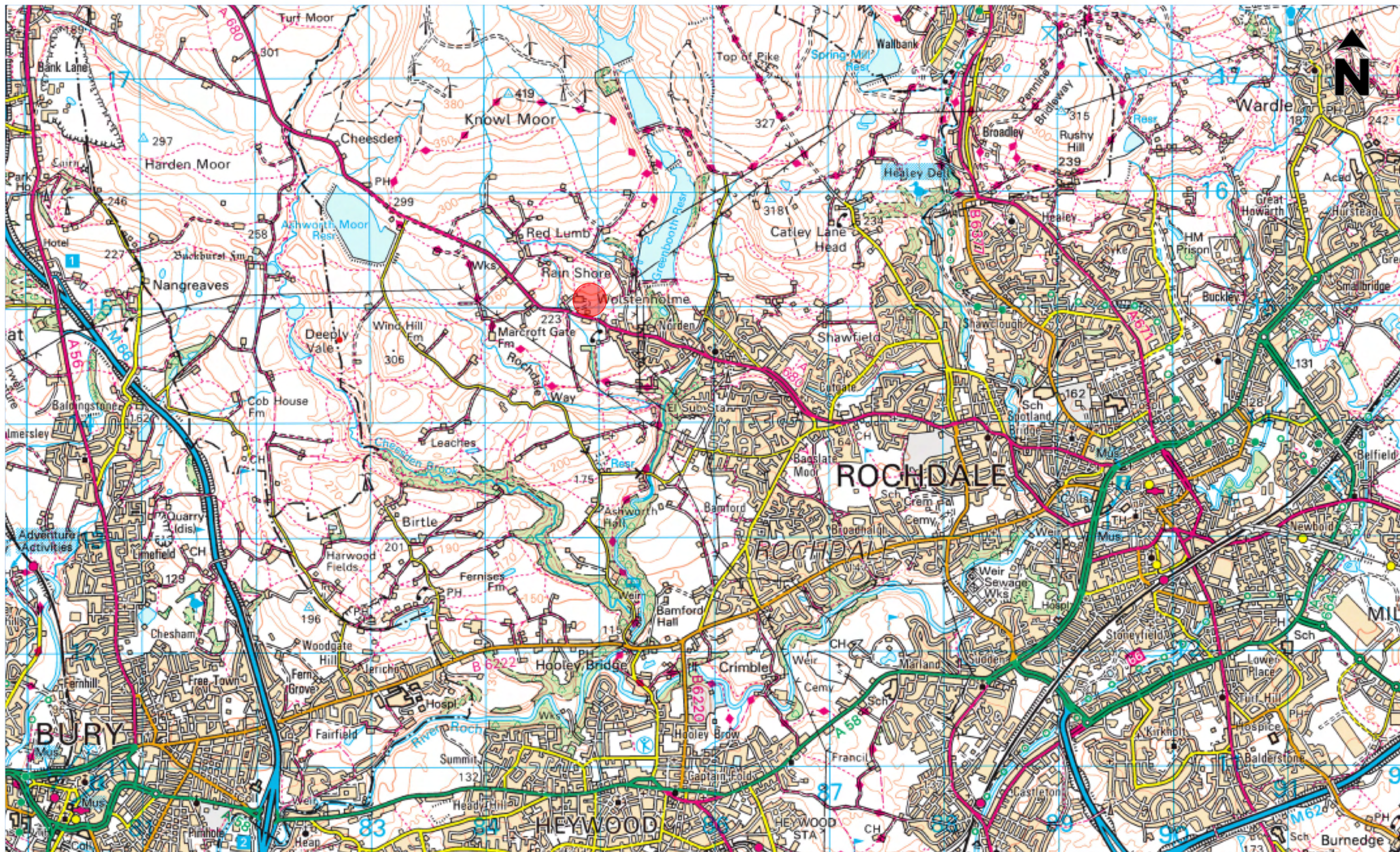
7.4 Recommended Ground Investigation Scope

Based on the information in this report we consider a main investigation is required in accordance with BS 10175:2017 and Eurocode 7. The following scope of works is recommended based on the Preliminary CSM compiled, additional works may be required as the result of planning conditions for the proposed development:

Method of Investigation	G / E
6 No. windowless sample boreholes to 3m to 4m bgl.	G/E
2 No. trial pits to determine the geometrics of existing foundations.	G/E
3 No. dynamic sample/rotary boreholes for pile design and to determine the presence of shallow workings.	G
Shallow monitoring installations	E
Geo-environmental laboratory testing including metals, speciated PAHs and asbestos.	E
Geotechnical Laboratory Testing including aggressivity, classification, strength and stiffness.	G
Groundwater level and ground gas monitoring.	E

Note **Environmental (E) / Geotechnical (G)**

APPENDIX 1 - Plans



GROUNDTECH
CONSULTING



CLIENT

ELLE R LEISURE LTD

PROJECT TITLE

ALBERT'S NORDEN, EDENFIELD ROAD

PLAN TITLE

PROJECT LOCATION PLAN

DATE

FEBRUARY 2022

SCALE

NTS

PLAN NUMBER

GRO-22065-P01

Rev.

Details

Date

Status

Preliminary

Draft

Issued

For Comment

Approved

Notes



SITE LOCATION



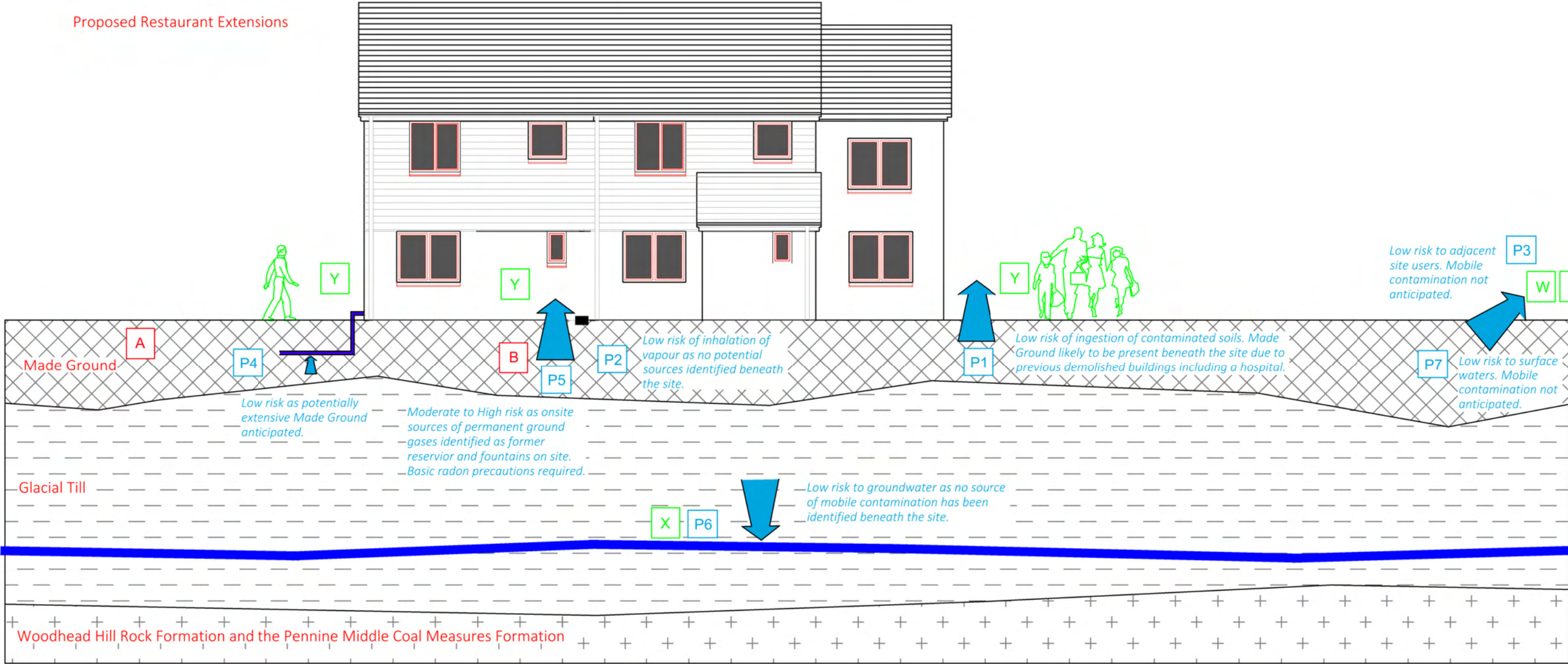


	CLIENT	DATE			Status		Notes
	ELLE R LEISURE LTD	FEBRUARY 2022			Preliminary		
	PROJECT TITLE	SCALE			Draft		
	ALBERT'S NORDEN, EDENFIELD ROAD	NTS			Issued	●	
	PLAN TITLE	PLAN NUMBER			For Comment		● PRELIMINARY DEVELOPMENT CONSTRAINTS — SITE BOUNDARY — APPROX. HIGH RISK DEVELOPMENT AREA ■ PROPOSED DEVELOPMENT AREA — LOWER MOUNTAIN MINE COAL
	PRELIMINARY DEVELOPMENT AND CONSTRAINTS PLAN	GRO-22065-P02	Rev.	Details	Date	Approved	

SOURCES
A. Contaminated soils / Made Ground.
B. Ground gas.

POLLUTION LINKAGES
P1. Ingestion of soil and dust.
P2. Inhalation of vapour.
P3. Inhalation of soil dust by adjacent site users.
P4. Attacking of potable water supply pipe.
P5. Migration and accumulation of ground gas in internal places.
P6. Impaction of groundwater from soil contamination.
P7. Migration of soil and groundwater contamination impacting surface waters.

RECEPTORS
W. Unnamed watercourse 41m south west.
X. Groundwater within the underlying Secondary Undifferentiated superficial and Secondary A Bedrock Aquifers.
Y. Site end users.
Z. Adjacent site users.



GROUNDTECH CONSULTING 	CLIENT	DATE			Status		Notes
	ELLE R LEISURE LTD	FEBRUARY 2022			Preliminary		
	PROJECT TITLE	SCALE			Draft		
	ALBERT'S NORDEN, EDENFIELD ROAD	NTS			Issued		
	PLAN TITLE	PLAN NUMBER			For Comment		
	ILLUSTRATIVE PRELIMINARY CSM	GRO-22065-P03	Rev.	Details	Date	Approved	



APPENDIX 2 - Photographs



Photograph 1 - Central Field



Photograph 2 - Western Field (Suspected Former Fountain).



Photograph 3 – Gas Tank located to the west of the building on site.



Photograph 4 - Building located on site.



Photograph 5 - Northern former quarry (offsite).



Photograph 6 - Carparking Area.



Photograph 7 - Suspected former tennis court.



Photograph 8 - Electrical Substation.

APPENDIX 3 - Historical Maps

Site Details:

Client Ref: EMS_759288_983333
Report Ref: EMS-759288_983333
Grid Ref: 384840, 415026

Map Name: County Series

Map date: 1890-1891

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1891
Revised 1891
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1890
Revised 1890
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com

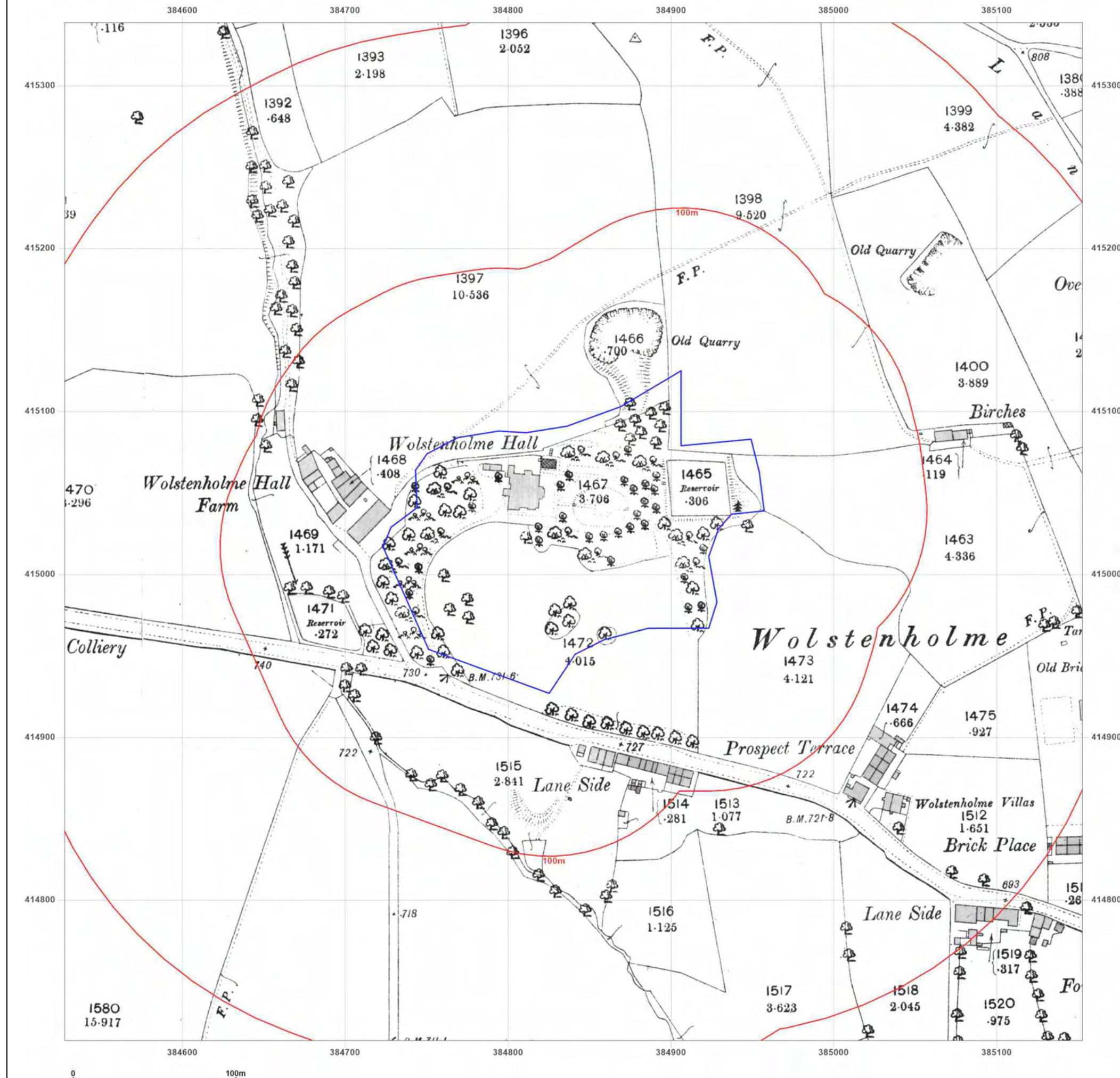


Supplied by:
www.emapsite.com
sales@emapsite.com

© Crown copyright and database rights 2019 Ordnance Survey 100035207

Production date: 14 February 2022

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Site Details:

Client Ref: EMS_759288_983333
Report Ref: EMS-759288_983333
Grid Ref: 384840, 415026

Map Name: County Series

Map date: 1910

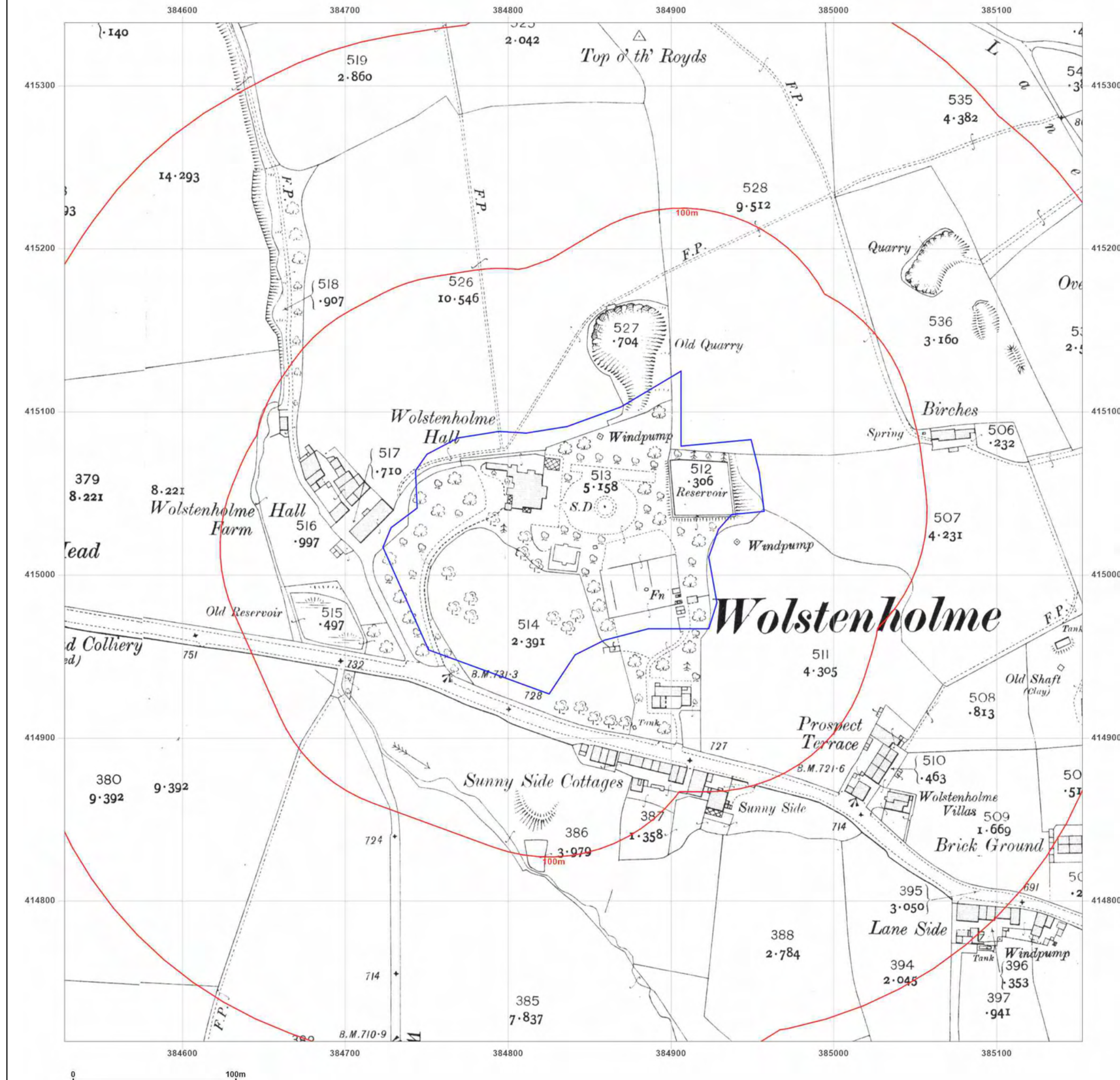
Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1910
Revised 1910
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1910
Revised 1910
Edition N/A
Copyright N/A
Levelled N/A



Produced by
Groundsure Insights
www.groundsure.com



Supplied by:
www.emapsite.com
sales@emapsite.com

© Crown copyright and database rights 2019 Ordnance Survey 100035207

Production date: 14 February 2022

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf