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PHASE I GEO-ENVIRONMENTAL APPRAISAL AT SEAFIRE CLOSE, CLIFTON MOOR INDUSTRIAL ESTATE, YORK

For

IPIF CO FOX LLOYD JONES LIMITED

Project Reference JS/BAD/43366-Rp-002

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Signed

Date: 9th December 2019

Approved by **A. Borthwick, BSc (Hons) FGS IAEG**

Signed:

Date: 9th ber 2019

Issue	Revision	Revised by	Approved by	Revised Date
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For the avoidance of doubt, the parties confirm that these conditions of engagement shall not and the parties do not intend that these conditions of engagement shall confer on any party any rights to enforce any term of this Agreement pursuant of the Contracts (Rights of third Parties) Act 1999.
The Appointment of Alan Wood & Partners shall be governed by and construed in all respects in accordance with the laws of England & Wales and each party submits to the exclusive jurisdiction of the Courts of England & Wales.

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APPENDIX B:	EMAPSITE: GROUNDSURE ENVIROINSIGHT REPORT
APPENDIX C:	COAL AUTHORITY MINING REPORT
APPENDIX D:	EMAPSITE: HISTORICAL ORDNANCE SURVEY PLANS

EXECUTIVE SUMMARY

PHASE I ENVIRONMENTAL ASSESSMENT

Radon	The site lies within an area where no radon protective measures are required during construction.
Ground Gases	<p>It is considered possible that elevated concentrations of CO₂ and CH₄ may be present as a result of any potential made ground associated with the disused airfield and existing development on the site.</p> <p>A period of ground gas monitoring appropriate for the proposed end use of the site should be undertaken. Although it is considered that the likely generation potential for ground gas at the site will be low, the proposed development case indicates that 6 monitoring visits over a period of 3 months should be undertaken to determine the minimum level of protection required.</p>
Invasive Plant Species	Japanese Knotweed was not observed during the site walkover. It would be prudent however to undertake an invasive plant species survey to confirm this prior to redevelopment.
Sources of Potential Contamination	Although the likely sources of significant contamination are expected to be limited, there remains the potential for on-site soils to contain naturally elevated concentrations of metals and metalloids (e.g. arsenic), non-metal inorganics and organic contamination (e.g. PAH). Asbestos containing materials may also be present where historic made ground exists.
Remediation Requirements	At this stage it is not considered likely that significant remediation will be required. The need for remedial measures to mitigate risk associated with any contamination will be provided following the completion of laboratory analysis and risk assessment.
Groundwater	Perched water may be present within more granular horizons within the cohesive superficial deposits. True phreatic groundwater is anticipated at depth, within the underlying sandstone bedrock.
Potable Water Supplies	It is considered, at this stage, that some protective measures may be required where potable water supply pipes are to be laid. Confirmation of the need for protective measures will however be given following completion of the ground investigation and laboratory analysis.
Risk to End Users and Site Workers	At this stage the risk to end-users and site workers is considered to be low to moderate. The conceptual site model will be revised following the Phase II investigation.

PHASE I GEOTECHNICAL ASSESSMENT

Ground Treatment	None anticipated to be required.
Principal Bearing Strata	Glaciolacustrine Deposits of silt/clay
Influence from Trees and Volume Change Potential	There are some trees around the boundaries to the site. Precautions may be required should structures lie within influencing distance when in clay. In addition, precautions may be required where trees are to be removed or where new planting is proposed. All foundations should be constructed in accordance with current guidelines (e.g. NHBC Standards, Chapter 4.2). If foundations are built off competent bedrock, no precautions are likely to be required.
Buried Concrete	Sulphate protection is expected to be required in buried structures where made ground is present. Sulphate Class DS-2 will probably be suitable; however, this will need to be confirmed through laboratory testing.
Likely Foundation Types	The most appropriate foundation solution will be confirmed following completion of the ground investigation and receipt of finalised construction proposals/development layout.

	At this stage it is considered, where competent undisturbed natural strata is encountered at founding depth, that for 2-3 storey structures of typical construction traditional strip or trench-fill foundations should be suitable. A minimum footing depth of around 1000-1500mm in this instance will probably be adequate (for cohesive soils outside the zone of influence), although if bedrock exists within the near surface a shallower footing depth could be achieved. For more heavily loaded structures, deeper foundations such as piles may need to be used. Made ground soils of any type are not suitable founding stratum.
Likely Ground Slab	In situ suspended floor slabs are likely to be the most suitable for use at the site, particularly where in excess of 600mm of unsuitable material is present below floor slabs following site preparation/regrading. Should ground bearing slabs be suitable however, care must be taken to ensure that shallow strata do not become heavily disturbed by site clearance/construction activities (especially during inclement weather). Where this occurs, this could result in an increased requirement for suspended slabs. A suspended floor system incorporating a sub-floor void, such as beam and block, will be required for all structures where the foundations lie within the heave zone of trees as defined by NHBC Standards (Chapter 4.2), or where seasonally desiccated soils are present at the time of construction.
Mining	On the basis of available information risk associated with shallow coal mining subsidence is considered to be negligible.
Soakaways	It is considered, at this stage, that soakaways are likely to be unsuitable. Surface water will most probably therefore need to be taken to a suitable drainage system (possibly to any existing drains that cross/exit the site), subject to obtaining approvals from regulatory authorities.
Obstruction & Excavations	Obstructions to excavations should be expected due to the presence of existing buildings. Other currently unforeseen obstructions may also be present. The peckerling-out of obstructions for either foundations or other construction requirements should be allowed for. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.
Boundary Conditions	Where excavations are proposed close to site boundaries, properties and/or any other existing retaining structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability.
Roads	A preliminary CBR value of <2.5% is currently considered for road and pavement design. It is recommended that in-situ CBR testing is carried out as part of the Phase II investigation.

FURTHER WORKS

	<ul style="list-style-type: none"> • Ground investigation using windowless sampler; • Chemical analysis of soils followed by risk assessment so that the risk to human health can be established; • Geotechnical soils testing of the founding strata to assess its strength and determine suitable grades of buried concrete; • California Bearing Ratio testing to inform pavement design; • Invasive plant species survey (under separate assessment).
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1 INTRODUCTION

1.1 Details of Commission

- 1.1.1 Alan Wood & Partners were appointed by the IPIF Co Fox Lloyd Jones Limited (the 'Client') to undertake a Phase I Geo-Environmental Assessment. This report covers the proposed development area only.
- 1.1.2 This report provides geotechnical and environmental information in relation to the proposed redevelopment of the site off Seafire Close, assuming that the site is to be redeveloped with a new commercial unit with associated car parking and services, and that ground levels will remain similar to present. Interpretation and recommendations should not be assumed valid for adjacent areas of land, or for alternative land uses. Should the proposed site usage change, the recommendations and conclusions presented in this report may need to be re-assessed.
- 1.1.3 The assessment undertaken and presented in this report includes potential sources of historical ground contamination, likely impacts on sensitive receptors and, where necessary, the identification of any remediation and/or subsequent investigative works that may be required.
- 1.1.4 The report has been prepared for the sole use and reliance of the Client. No other third party may rely on, reproduce or redistribute any content of this report without the prior written consent of Alan Wood & Partners. Any unauthorised third parties using the information presented in this report do so entirely at their own risk and are duly excluded from any warranty, duty of care or skill.

1.2 Previous Reports

- 1.2.1 Alan Wood & Partners are not aware of any historical assessment or ground investigation reports, with respect to the site or neighbouring property, which may be used to facilitate the assessment presented herein.

1.3 Scope of Works

- 1.3.1 This report constitutes the findings of the Phase I Geo-Environmental Assessment for the site and is based on a review of available geological, hydrogeological and environmental records. The scope of works undertaken within the context of this report comprised:

-
- A site walkover;
 - A review of environmental site sensitivity and historical mapping data;
 - A review of available British Geological Survey (BGS) records and plans;
 - A review of BGS on-shore borehole records (where available);
 - A review of Environment Agency information; and the
 - Review of Coal Authority data.

1.3.2 The principal objectives of the Phase I assessment was to:

- Obtain information from accessible sources about the soil and groundwater conditions within the area of the site;
- Determine the possible ground related geotechnical and environmental hazards within the site boundaries that may affect the proposed development;
- Develop an initial Conceptual Site Model (CSM) of potential *source-pathway-receptor* contaminant linkages and undertake a preliminary Risk Assessment in accordance with the proposed development end use scenario;
- Outline preliminary development recommendations;
- Provide advice on any additional phases of work that need to be completed to satisfy the regulatory authorities.

2 ENVIRONMENTAL SETTING

2.1 Introduction

2.1.1 Published environmental, geological and historical data relating to the site area has been reviewed, in conjunction with a walkover survey undertaken on 22nd of November 2019, the findings of which are presented below. The principal considerations of immediate relevance are presented in the following sections.

2.2 Site Location & Description

2.2.1 The site is located to the east of Seafire Close, at the former Atlanta Gym, and is centred at National Grid Reference 459584mE, 455343mN (NGR). A site location plan is presented as Figure 43366/001.

2.2.2 The site area approximately 0.17ha and its shape in plan is generally rectangular in shape. A photographic record of the walkover is presented as Plates 1-8. Key site features are shown on Figure 43366/002.

2.2.3 The site topography is flat, and land-use comprises a mix of a single building, hardstanding and landscaped areas. A large grassed area is located to the rear of the building, with a car park at the front of the building. The car park was being used by vehicles of people working in the adjacent buildings.

2.2.4 The building to the north of the development comprises a catering company and an electrical store. To the south of the site is a builder's merchants comprising a warehouse building, office building and hardstanding where building materials are stored.

2.2.5 On the eastern boundary of the site is a small grassed bund. On the other side of this is open agricultural fields. To the west of the site is a royal mail building, where several vans are stored.

2.2.6 The site is fenced along the northern, eastern and southern boundaries, but is open on the western boundary where the site is accessed from Seafire Close.

2.2.7 No evidence of basements, previous earthworks, geotechnical features (cuttings, quarries, embankments, slopes) or significant changes in levels were noted during the site walkover.

2.2.8 No tanks, either above or below ground, were noted during the site walkover.

2.2.9 A number of tyres and stone balls were noted to the rear of the building, thought to have been used when the site was active as a gym.

3 GEO-ENVIRONMENTAL DATA

3.1 Anticipated Geology, Hydrogeology & Mining

3.1.1 A summary of the available published geological and hydrogeological information is provided in Table 3.1 below and overleaf. A review of the following information was undertaken:

- British Geological Survey 1:50,000 scale series, Sheet No. 63 York, Solid & Drift Edition;
- Coal Authority online ground stability database; and
- Emapsite Geolinsight Data Report Ref. EMS_578016_776030 (Appendix A) and Enviroinsight Report Ref. EMS_578016_776031 (Appendix B), 18th November 2019.

Table 3.1 - Geological Information

Made Ground and Surface Ground Workings	<p>Information presented in the Geolinsight report indicates that there are no areas of artificial/made ground within 500m of the site, however it is anticipated that some made ground will be present associated with the existing development on the site.</p> <p>There are no entries in the Geolinsight report that refer to historical surface ground working features within 250m of the site.</p>
Geology	<p>Superficial soils on site are shown to be laminated clays and silts of the Aine Glaciolacustrine Formation. Subordinate fine-grained sand beds are also recorded to be part of this formation.</p> <p>The solid geology underlying the site area is recorded as being orange, yellow, brown sandstone of the Sherwood Sandstone Formation. These soils typically weather within the near surface and are recovered as orange to pale brown sand, sometimes with conglomeratic lenses of quartzite, mudstone and siltstone gravel. Increasingly competent sandstone is usually present with only limited penetration.</p> <p>There are no BGS boreholes within 250m of the site boundary. A cluster of BGS boreholes are located between 250m and 500m to the north of the site, records of which have been reviewed. The closest borehole to the site (Ref: SE55NE189) indicates weathered sandstone bedrock present around 11.60m bgl.</p>
Discontinuities	<p>Information presented in the Geolinsight report indicates that there are no linear features within 500m of the site boundary.</p>

Hydrogeology	<p><u>Aquifer within Superficial Deposits:</u> 'Unproductive'. These are drift deposits with low permeability that have negligible significance for water supply or river base flow.</p> <p><u>Aquifer within Bedrock:</u> 'Principal'. Principal aquifers are rock or drift deposits with high intergranular and/or fracture permeability and can provide a high level of water storage. These deposits are capable of supporting water supply and/or base river flow on a strategic scale.</p> <p><u>Source Protection Zones:</u> There are no source protection zones within 500m of the site.</p> <p><u>Vulnerability & Leaching Potential:</u> The groundwater vulnerability and soil leaching potential for the site has not been identified within 500m of the study site.</p> <p>The site lies within a nitrate vulnerable zone.</p>
Hydrology	<p>There are no reported surface water features within 250m of the site. The nearest is an inland river that lies 317m to the north-east.</p>
Mining & Ground Stability	<p><u>Historic Underground Working Features</u></p> <p>Information presented in the Geolinsight report indicates that there are no historical underground working features within 1000m of the site.</p> <p><u>Current Ground Working Features</u></p> <p>There is one entry of ground working feature 763m south of the site boundary. This is associated with a ceased clay and shale pit called Green Lane Brick Field.</p> <p><u>Coal Mining</u></p> <p>Information presented on the Coal Authority website (www.coal.decc.gov.uk) indicates that the site does not lie within a Development High Risk or a Coal Mining Reporting area.</p> <p>There are no known mine entries within, or within 20m of, the boundary of the site and there are no reported areas of potential shallow mine workings on the Coal Authority database.</p> <p>On the basis of available information risk associated with shallow coal mining subsidence is considered to be negligible.</p>
Non-coal Mining	<p>Historical information indicates that there are no non-coal mining areas within 1000m of the site.</p>
Natural Cavities	<p>The GroundSure data indicates that there are no natural cavities recorded within 1000m of the study site.</p>
Radon, Landfill and Mine Gas	<p>The site lies within an area where no radon protective measures are required in construction. The site is not in a Radon Affected Area and less than 1% of properties are above the Action Level.</p> <p>Risk associated with mine gas emission requiring action by the Coal Authority or gas associated with landfill sites is not anticipated.</p>

3.2 Environmental Records

3.2.1 A summary of the available environmental information is presented in Table 3.2.

Table 3.2 - Environmental Data

Potentially Harmful Discharges (Red List) to Controlled Waters	There are no records of red list discharge consents reported to be within 500m of the site.
Licensed Discharge Consents	There are seven records of licensed discharge consents reported to be within 500m of the site. The closest is located 257m to the south-east, this refers to Brecks Farm sewage discharges (final/treated effluent).
EA Recorded Pollution Incidents to Controlled Waters	There are no EA recorded pollution incident within 500m of the site.
Landfill and Other Waste Sites	There are no Environment Agency historic landfill sites or BGS/DoE non-operational landfill sites within 1500m of the site. One historical 'refuse tip' is recorded 1279m west of the site and is detailed on 1963 and 1968 mapping. There are two licensed recorded waste sites within 500m of the site. These lie 131m north and date back to 1993 when the license expired for acceptance of household, commercial and industrial waste at York Hire and Sales Centre.
Flooding	The EnviroInsight report indicates that the site lies does not lie within 250m of an Environment Agency Zone 2 or Zone 3 floodplain. There are no British Geological Survey groundwater flooding susceptible areas identified within 50m of the site.
Abstractions	There are no groundwater, surface water or potable water abstractions located within 1km of the site.
Invasive Plant Species	Japanese Knotweed was not observed during the site walkover. It would be prudent however to undertake an invasive plant species survey to confirm this prior to redevelopment.
Public Register of Contaminated Land: Part 2A (EPA 1990)	There are no sites designated as contaminated land under, Section 78R of the EPA 1990, within 500m of the site.
Dangerous or Hazardous Sites	There are no NIHS or COMAH sites or high-pressure underground pipelines within 500m of the site. There is an obsolete petrol or fuel site lies 319m to the north-east, this is a JET being located at Wiggington Road, York, YO32 2RJ.
Potentially Contaminative Current Land Uses	There are a number of potentially contaminative industrial sites located within 250m of the site. These include, for example: Industrial products, motoring, hire services, consumer products, repair and services.

3.3 Historical Land Use

- 3.3.1 A study of historical Ordnance Survey maps has been undertaken to identify any potentially contaminative former land-uses at the site. The main historical features of the site and surrounding area are summarised in the following table, whilst a copy of the historical maps is presented in Appendix D.
- 3.3.2 Ordnance Survey map editions may not however be complete, and it is possible, therefore, that additional land uses to those presented in the plans have occurred. Alan Wood & Partners have tried to ascertain the complete record of the site's history, but the possibility that other potentially significant land uses may have taken place cannot be ignored.
- 3.3.3 A summary of the historical land use and surrounding area is presented in Table 3.3 and Table 3.4.

Table 3.3 - Summary of Principal Historical Features (On Site)

Year	Scale(s)	Principal Features
1853-1854	1:10,560	The site appears as an open undeveloped parcel of land.
1891-1893	1:10,560	No significant changes.
1893	1:2,500	
1907-1909	1:10,560	
1909	1:2,500	
1930	1:2,500	
1928-1932	1:10,560	
1938	1:2,500	Parcel of land situated within the Aerodrome.
1950	1:10,560	
1958	1:10,560	Aerodrome appears as disused.
1966	1:2,500	No significant changes.
1967	1:2,500	
1969	1:10,560	
1969-1972	1:10,000	
1981	1:10,000	
1980-1983	1:10,000	
1988	1:2,500	Commercial structure on site.
1990	1:2,500	
1992	1:1,250	No significant changes.
1987-1992	1:10,000	
1993	1:1,250	

2001	1:10,000	
2003	1:1,250	
2010	1:10,000	
2019	1:10,000	

Table 3.4 - Summary of Principal Historical Features (Off Site)

Year	Scale(s)	Principal Features
1853-1854	1:10,560	A cluster of structures located 300m to the west, the name of the structure is unreadable.
1891-1893	1:10,560	The structure to the west is now referred to as an inn. Kettlestring farm located approximately 500m to north-east. Rawcliffe Plantation between 550m to 700m to the west.
1893	1:2,500	No significant changes.
1907-1909	1:10,560	Rawcliffe Plantation extends closer to site, within 400m to the west. Bumper Plantation located between 400m and 500m north-west of the site. Bumper Castle Inn 300m to west.
1909	1:2,500	No significant changes.
1930	1:2,500	
1928-1932	1:10,560	Moor Farm 750m to the south
1938	1:2,500	No significant changes.
1950	1:10,560	Rawcliffe and Bumper Plantations have disappeared. Aerodrome runways appear on site and extend to >1000m to the west.
1958	1:10,560	Aerodrome now appears as disused. Site of roman camps 500m to the south-east.
1966	1:2,500	Filling station located 300m to the north-east. Settling tank 250m to south-east.
1967	1:2,500	No significant changes.
1969	1:10,560	
1969-1972	1:10,000	
1981	1:10,000	
1980-1983	1:10,000	
1988	1:2,500	North York Trading Estate appears directly adjoining the site and extends to around 300m to the south.
1990	1:2,500	North York Trading Estate extends from the site north 250m.
1992	1:1,250	Development and expansion of the commercial estate, 150m to the west.

1987-1992	1:10,000	Further expansion of the North York Trading Estate to the west, 600m from the site. Large structures located between 400m and 750m to the north-west.
1993	1:1,250	No significant changes.
2001	1:10,000	The commercial/industrial development between 500m and 750m to the west is now referred to as Pioneer Business Park.
2003	1:1,250	No significant changes.
2010	1:10,000	North York Trading Estate and Pioneer Business Park are now referred to as Clifton Moor Industrial Estate
2019	1:10,000	Large structures located between 400m and 750m to the north-west are now referred to as Clifton Moor Retail Park.

* No mapping detail/part mapping detail shown

3.3.4 In summary, the site appeared as an undeveloped open parcel of land from the earliest publication in 1853 to 1938. From 1938 to the 1988 map, the site was situated within the area of a disused aerodrome. Following this, the 1990 to 2019 publications showed a commercial structure on site, likely to be the former Atlanta Gym.

4 PHASE I GEOTECHNICAL APPRAISAL

4.1 Made Ground

- 4.1.1 Made ground is not shown on published geological mapping, however it is anticipated some made ground will be present on site associated with previous development.
- 4.1.2 The presence, type and extent of any on-site made ground soils will need to be established through ground investigation.

4.2 Natural Strata

- 4.2.1 Superficial deposits are recorded on site and comprise glaciolacustrine deposits comprised of clay and silt.
- 4.2.2 The underlying bedrock is recorded as being fine to coarse grained sandstone of the Sherwood Sandstone Formation.
- 4.2.3 There are no BGS boreholes within 250m of the site boundary.

4.3 Groundwater

- 4.3.1 Shallow groundwater is not considered due to the low permeability nature of the cohesive superficial deposits. Perched water may be present within more granular horizons within the cohesive superficial deposits. True phreatic groundwater is anticipated at depth, within the underlying sandstone bedrock.

4.4 Foundations

- 4.4.1 The most appropriate foundation solution will be confirmed following completion of the ground investigation and receipt of finalised construction proposals/development layout.
- 4.4.2 At this stage it is considered, where competent undisturbed natural strata is encountered at founding depth, that for 2-3 storey structures of typical construction traditional strip or trench-fill foundations should be suitable. A minimum footing depth of around 1000mm in this instance will probably be adequate (for cohesive soils outside the zone of influence), although if bedrock exists within the near surface a shallower footing depth could be achieved. For more heavily loaded structures, deeper foundations such as piles may need to be used. Made ground soils of any type are not suitable founding stratum.

4.4.3 There are some trees around the boundaries to the site, so precautions may be required should structures lie within influencing distance when in clay. In addition, precautions may be required where trees are to be removed or where new planting is proposed. All foundations should be constructed in accordance with current guidelines (e.g. NHBC Standards, Chapter 4.2). If foundations are built off competent bedrock, no precautions are likely to be required.

4.4.4 The widening, strengthening and reinforcement of foundations in accordance with current guidelines would be required where footings are found to straddle strata of different type (e.g. clay and rock) or where soft and/or where locally unstable ground is encountered at founding depth. With respect to buried sub-structures, it is anticipated that these will need to be grubbed-out and backfilled in a controlled manner; site-won made ground materials could possibly be used in this instance if the material is of suitable engineering grade and type (subject to testing and design specification).

4.4.5 A rafted foundation solution may potentially be required if areas of deep fill are present on site, subject to the presence of an even thickness of uniform soil type being provided. Specific information with respect to foundation design and any earthworks required to facilitate construction will need to be given in a remedial strategy.

4.5 Coal Mining Induced Subsidence

4.5.1 It is considered, on the basis of available information, that foundations will not need to be reinforced/strengthened to accommodate any potential movement associated with historic coal mining activity and any ground instability that may occur post development. Should further information become available this assessment may need to be revised.

4.6 Floor Slabs

4.6.1 *In situ* suspended floor slabs are likely to be the most suitable for use at the site, particularly where in excess of 600mm of unsuitable material is present below floor slabs following site preparation/regrading. Should ground bearing slabs be suitable however, care must be taken to ensure that shallow strata do not become heavily disturbed by site clearance/construction activities (especially during inclement weather). Where this occurs, this could result in an increased requirement for suspended slabs.

4.6.2 Old substructures should be removed to at least 1.00m below any new floor slabs to prevent the formation of 'hard spots', subject to agreement with your warranty provider.

4.6.3 A suspended floor system incorporating a sub-floor void, such as beam and block, will be required for all structures where the foundations lie within the heave zone of trees as defined by NHBC Standards (Chapter 4.2), or where seasonally desiccated soils are present at the time of construction.

4.7 Non-Coal Mining

4.7.1 There is no evidence to suggest that mineral extraction has occurred on site. Should evidence of quarrying be encountered during redevelopment this should be brought to the attention of Alan Wood and Partners. Where this is found to affect construction, appropriate precautions may need to be incorporated in to the design (e.g. deepened foundations, reinforced superstructure).

4.8 Excavation Conditions

4.8.1 Obstructions to excavations should be expected due to the presence of existing buildings, historical information indicating buildings once stood on the central portion of the site. Other currently unforeseen obstructions may also be present. The breaking-out of obstructions for either foundations or other construction requirements should be allowed for. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.

4.8.2 It is likely that excavations should be relatively stable in the short term. However, some materials such as granular soils and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 97 (1983) should be made to establish suitable means of support, or battering of excavation sides.

4.8.3 It is considered unlikely that dewatering will be required for shallow short-term excavations. Anticipated groundwater conditions suggest that simple dewatering techniques (e.g. sump pumping) are unlikely to be needed to control water ingress on a routine basis. However, it is recommended that provision for the drainage of surface water is allowed for to prevent surface water ponding or collection both during and post construction, as this may lead to deterioration of the founding stratum.

4.9 Stability Issues & Retaining Structures

- 4.9.1 The site is relatively flat and level and the area surrounding the site is similar. No particular risk in relation to slope instability should occur on site. Where excavations are proposed close to site boundaries, properties and/or any other existing retaining structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability.
- 4.9.2 Where changes in gradient exist across the site these will be adjusted by minor earthworks. It is anticipated that future ground profiles are unlikely to require earth retaining structures; if this changes, further advice may be required when more information is available.
- 4.9.3 With respect to natural ground subsidence, the site has been classified as having a 'Negligible' risk rating for ground dissolution hazards and running sands, 'Very Low' risk rating for landslides and collapsible deposits, a 'Low' risk rating for shrink/swell clay and a 'Moderate' risk rating for compressible deposits.

4.10 Surface Water Drainage

- 4.10.1 It is considered, at this stage, that soakaways are likely to be unsuitable. Surface water will most probably therefore need to be taken to a suitable drainage system (possibly to any existing drains that cross/exit the site), subject to obtaining approvals from regulatory authorities.

4.11 Roads and Pavement

- 4.11.1 A preliminary CBR value of <2.5% is currently considered for road and pavement design. It is recommended that *in-situ* CBR testing is carried out. Highways Agency document HD25 Interim Advice Note 73/06 Revision 1 (2009) states that where a subgrade has a CBR lower than 2.5%, it is considered unsuitable support for a pavement foundation since it would tend to deform under construction traffic and must be improved.
- 4.11.2 All road design should be discussed with the local authority if highways are to be subject to a Section 38 agreement.

4.12 Concrete

- 4.12.1 Sulphate protection is expected to the required in buried structures where made ground is present. Sulphate Class DS-2 will probably be suitable; however, this will need to be confirmed through laboratory testing.

5 PHASE I ENVIRONMENTAL APPRAISAL

5.1 Introduction

- 5.1.1 The following section summarises the Preliminary Phase I Conceptual Site Model (CSM), which has been produced following the review of available pertinent desk study and third-party information. The CSM summarises the understanding of surface and sub-surface features, the potential sources of contamination, pathways and receptors in order to support the identification and assessment of plausible contaminant linkages.

5.2 Initial Conceptual Site Model & Risk Assessment

- 5.2.1 The risk assessment has been carried out to assess the likelihood of risk to human health and the wider environment, on the basis of information reviewed. The risk assessment is a qualitative source-pathway-receptor assessment and its function is to assess the likelihood that each possible linkage exists and to decide whether they pose potentially unacceptable risks to identified receptors (i.e. people, structures, water bodies or ecosystems) that may be harmed.
- 5.2.2 Risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is dependent on-site use, as well as environmental conditions: **if no contaminant linkage(s) can be proven, then the risk(s) may be discounted.**

5.3 Site Summary & Environmental Sensitivity

- 5.3.1 A review of available desk study information indicates that the proposed development area and the adjacent land was commercial use prior to it being occupied by an undeveloped site. More recently the site is understood to have been the site of a former Atlanta Gym.
- 5.3.2 Some significant amounts of made ground soils are expected on site, although the extent of such material would need to be confirmed through ground investigation.
- 5.3.3 The underlying geology is indicated to comprise superficial deposits of glaciolacustrine clay and silts. This overlies the bedrock geology comprising of Sherwood Sandstone Formation.

- 5.3.4 Some perched/shallow groundwater may be present within the near surface deposits where granular deposits are present, but this is likely to be localised.
- 5.3.5 It is considered that elevated concentrations of CO₂ and CH₄ are likely to be present due to potential made ground associated with the disused Airfield and the existing development on site (see BS 8576:2013, 'Guidance on Investigations for Ground Gas - Permanent Gases and Volatile Organic Compounds').
- 5.3.6 Although the likely sources of significant contamination are expected to be limited, there remains the potential for on-site soils to contain naturally elevated concentrations of metals and metalloids (e.g. arsenic), non-metal inorganics and organic contamination (e.g. PAH). Asbestos containing materials may also be present where historic made ground exists.
- 5.3.7 The potential leaching of mobile contaminants of concern to the underlying sandstone aquifer is considered to be negligible given the reported low leaching potential of soils within the vicinity to the site.
- 5.3.8 In summary, given the site history, the anticipated contaminant load within the on-site soils, its underlying geology, gassing potential and the nature of controlled waters receptors, sensitivity of the site is considered, at this stage, to be low to moderate. The nature and concentration of any contamination will need to be confirmed through testing.

5.4 Potential Sources

- 5.4.1 A potential source is defined as 'a contaminant which is in, or under the land and has the potential to cause harm to human health or to cause pollution of controlled waters'.
- 5.4.2 The following potential contaminants that may be associated with the site are summarised in Table 5.1 below.

Table 5.1 - Summary of Potential Contaminant Sources

Potential Sources	Associated Potential Contaminants (<i>not limited to</i>)	
	<i>Metals, Inorganics and other contaminants</i>	<i>Organics</i>
Potentially contaminated made ground soils originating from previous and current developments, underlying natural strata / perched groundwater	Heavy metals/ metalloids, sulphate and asbestos	PAH
	Fugitive Ground Gases - CO ₂ and CH ₄	

* Invasive plant species to be assessed separately if encountered.

5.5 Potential Receptors

- 5.5.1 A receptor is the potential target of the source contaminant, to which either significant harm or deterioration in quality may be caused.
- 5.5.2 The potential sensitive receptors with respect to the potential contamination hazards identified above are considered in Table 5.2 below.

Table 5.2 - Summary of Potential Receptors

Potential Receptor	Comment
Human Health	Site end-users
	Site operatives (during construction phase only)
Construction	Potable water supply pipes
	Foundations
Underlying natural strata	Near surface soils and/or any perched groundwater

5.6 Plausible Pathways

- 5.6.1 Migration pathways are routes by which contaminant sources may come into contact with receptors. Potential pathways for different types of contaminants vary depending on the properties of the contaminant, the mechanism of its release and the nature of the receptor. The principal potential pollution pathways by which receptors might become exposed to potential contamination at the site are summarised as follows in Table 5.3 below.

Table 5.3 - Summary of Plausible Pathways

Potential Source	Pathway
Potentially contaminated made ground soils, underlying natural strata / perched groundwater	Direct ingestion, dermal contact, dust and/or vapour inhalation
	Direct ingestion and/or dermal contact with liquid contaminants
	Leaching and direct contact with foundations and potable water supply pipes. Lateral migration of contaminants through preferential pathways
Ground gases	Migration of gases and/or accumulation in void spaces via transport through service conduit, any permeable made ground and/or underlying permeable natural strata

5.7 Risk Assessment

5.7.1 The potential contaminant linkages listed above are based on available data and the features noted during the 'walkover'. Therefore, the linkages identified are tentative in nature and are subject to the following uncertainties (to be followed up through ground investigation):

- Nature and extent of the made ground at the site;
- Nature of the underlying natural strata at the site;
- The actual distribution of contaminants within the made ground and underlying natural soils;
- The hydrogeological regime beneath the site.

5.7.2 The assessment presented herein assumes that the site end-use is to be *commercial*. The assessment is not valid for other land uses. Should the proposed end-use of the site change, the assessment contained herein would need to be revised to accommodate this.

5.7.3 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The risk classification has been estimated in accordance with those methods prescribed in CIRIA publication C552 '*Contaminated Land Risk Assessment: A Guide to Good Practice*', 2001.

5.7.4 Risk is regarded as a combination of the likelihood of an 'event' occurring and its severity: both elements must be taken into account when assessing risk. The method for risk assessment, or evaluation, is purely qualitative. As defined in CIRIA

C552:2001, the magnitude of the potential 'severity' of risk occurring may be assessed against:

- **Severe:** short term risk to human health likely to result in significant harm as defined under EPA 1990, Part IIA. Short term risk of pollution to sensitive water receptor;
- **Medium:** significant harm to human health, pollution of sensitive water resource or significant change to an ecosystem or specific organism;
- **Mild:** pollution of non-sensitive water resource but significant damage to crops, buildings, structures and services or the environment;
- **Minor:** harm, which may result in financial loss, or expenditure to resolve. Non-permanent effects to human health. Easily repairable effects of damage to buildings, structures and services.

5.7.5 Similarly, the classification of the magnitude of the 'probability' of the risk occurring may be assessed against:

- **High Likelihood:** a contaminant linkage exists and an event appears very likely in the short term, or almost inevitable in the long term, or pollution is causing harm at the receptor;
- **Likely:** a contaminant linkage exists and it is probable that an event will occur. An event may not occur, but it is possible in the short term and likely over the long term;
- **Low Likelihood:** a contaminant linkage exists and it is possible that an event will occur. It is not certain that an event will occur over time but it is less likely in the short term;
- **Unlikely:** a contaminant linkage exists but it is not possible to say if an event will occur even over a very long time.

5.7.6 Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each contaminant linkage presents: this can only be undertaken where there is a possibility of there being an active contaminant linkage.

5.7.7 The risk categories which can be assigned are presented in Table 5.4 overleaf and range between 'very high risk' to 'very low risk'. *NB - it is not possible to classify an identified risk as 'no-risk'.*

Table 5.4 - Risk Categories

		Consequence			
		Severe	Medium	Mild	Minor
Probability	Highly Likely	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Reproduced from Table 6.5, CIRIA C552/2001.

- **Very High** – severe harm could arise to a designated receptor or that severe harm is occurring. Urgent investigation and remediation is likely to be required;
- **High** – harm could occur to a designated receptor and that urgent investigation and remediation may be needed in the short term, but are likely over the longer term;
- **Moderate** – harm could occur. It is unlikely to be severe, most probably relatively mild. Investigation is normally required to clarify the risk with some remedial works being required in the longer term;
- **Low** – possible that harm could occur, but if it did, at worst it would be mild;
- **Very Low** – low possibility of harm arising, and that if it does it is not likely to be severe.

5.7.8 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The resulting contaminant linkages are presented in Table 5.5.

Table 5.5 - Summary of Phase I Conceptual Site Model & Risk Assessment

Potential Source	Potential Receptor	Plausible Pathway	Probability	Severity	Initial Risk Rating	Solution
Potentially contaminated made ground, near surface natural strata / perched groundwater	<u>Human Health</u> Site end-users, i.e. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	Low likelihood	Medium	Moderate/Low	Soil capping or removal of contaminated soils where necessary
		Direct ingestion and/or dermal contact with liquid contaminants	Unlikely	Mild	Very Low	
		Direct ingestion and/or inhalation of asbestos fibres	Low likelihood	Severe	Moderate	Appropriate removal and disposal, burial at depth or soil capping where necessary
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	Low likelihood	Mild	Low	Upgraded water pipes/clean backfill material where necessary
	Construction (Foundations)	Direct contact/leaching	Low likelihood	Mild	Low	Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	Unlikely	Mild	Very Low	No risk anticipated due to low soil leaching potential
Ground gases associated with made ground from previous development	<u>Human Health</u>	Inhalation (via ingress and accumulation)	Low likelihood	Medium	Moderate/Low	Gas monitoring with necessary precautions appropriate to proposed site and use

5.7.9 The preliminary conceptual site model (CSM) presented above has indicated that several contaminant linkages may exist on-site.

5.7.10 In order to investigate any unacceptable risk presented by these, intrusive investigation is required. The intrusive works will provide information on actual contaminants present on-site and plausible pathways to potentially sensitive receptors.

5.7.11 The need for remedial measures to mitigate risk associated with any contamination will be provided following the completion of laboratory analysis and risk assessment. There appears to be some topsoil materials on site to the rear of the existing building. Soil and/or other capping materials brought to site will need to be certified as clean with the EHO/NHBC prior to importation.

5.7.12 Fugitive ground gases associated with the historic made ground may present a risk to the development on the basis of available information. In accordance with BS8485:2007, BS8576:2013, NHBC (2007) and CIRIA C665 (2007), a period of ground gas monitoring appropriate for the proposed end use of the site should be undertaken. Although it is considered that the likely generation potential for ground gas at the site will be low, the proposed development case indicates that 6 monitoring visits over a period of 3 months should be undertaken to determine the minimum level of protection required. A minimum of 3 boreholes should be installed. It may be prudent, at this stage, to allow for the provision of gas precautions to Characteristic Situation 2 until proven otherwise. Basic radon precautions are not required in construction.

5.7.13 It is considered, at this stage, that some protective measures may be required where potable water supply pipes are to be laid. Confirmation of the need for protective measures will however be given following completion of the ground investigation and laboratory analysis. Analytical work may need to be carried out in accordance with those guidelines prescribed in UKWIR (2010) (Ref. 10/WM/03/21). If the concentrations of contaminants within the soils are found to be below the acceptable levels listed in the UKWIR guidelines, standard PE/PVC pipes should be suitable for the development, these being placed in a clean backfill surround where made ground soils are present. The local utility provider should be contacted however to determine its exact requirements in respect of the levels of contamination encountered.

5.7.14 Sulphate protection is expected to be required in buried structures where made ground is present. In accordance with Special Digest 1:2005, Sulphate Design class DS2 will most probably be suitable, although this will need to be confirmed by chemical testing.

5.7.15 Other currently unforeseen areas of contaminated soil may be present.

5.7.16 Any materials to be removed from site should be undertaken in accordance with the Duty of Care Regulations 1991. There will also be a requirement to classify the waste in accordance with the European Waste Catalogue, in which case the waste should be subject to Waste Acceptance Criteria (WAC) testing. In light of the new regulations it is recommended that discussion with landfill operators takes place at an early stage if this is to occur.

6 RATIONALE FOR PHASE II GROUND INVESTIGATION

6.1 Introduction

- 6.1.1 The overall objective of this study is to contribute towards the understanding of the ground conditions underlying the proposed commercial development at the site at the former Atlanta Gym, to the east of Seafire Close, Clifton Moor, York. Research into the history and evolution of the site up to the present day has been undertaken which allows a fair assessment of the risks posed to the development to be made.
- 6.1.2 The study has provided sufficient background data in terms of the land uses of the site and its surroundings together with details of the general geology, mining and hydrogeology.
- 6.1.3 The preliminary risk assessment, when considered within the context of proposed end-use, indicates that some on-site contaminant linkages may present an unacceptable risk to human health and/or the wider environment and need to be assessed further.
- 6.1.4 It is proposed that a Phase II geo-environmental investigation will be required so that site-specific data can be obtained with respect to any potential soil contamination, ground gas (should monitoring be required), sulphate precautions etc, so that risks can be quantified in relation to the *source-pathway-receptor* scenarios and plausible contaminant linkages postulated in the initial conceptual model above.

6.2 Scope of Works

- 6.2.1 The intrusive investigation will provide information to establish the nature, type and condition of the near-surface soils and underlying bedrock, thus obtaining an initial understanding of the contamination status and geotechnical properties of the on-site soil and rock conditions across the site area. As such, the following should be carried out:
- Ground investigation by windowless sampler boreholes to facilitate the collection of samples from within the on-site made ground and the underlying near surface natural strata for chemical and geotechnical laboratory testing;
 - Assess the risk to human health from the identified levels of contamination;
 - Assessment of the thickness and nature of the made ground soils;

- Assessment of the geotechnical properties of the underlying natural strata for foundation design purposes;
- Report on the presence of likely development abnormalities (e.g. shallow bedrock, buried obstructions, soft ground, deep made ground etc), where encountered;
- Establish the presence of fugitive ground gases over the period of monitoring as outlined above. A minimum of 3 No. ground gas/groundwater monitoring installations would be required;
- CBR Testing to establish values for pavement design;
- Invasive plant species survey (to be commissioned under separate agreement if necessary).

6.2.2 All ground investigation works and soil descriptions will be undertaken in general accordance with BS EN ISO 14688-1 'Geotechnical Investigation and Testing – Identification and Classification of Soil' (2002), BS10175 (2011), BS 5930 (2010) and/or BS EN 1997-2/2007 (EC7 Part 2).

6.3 Analytical Strategy

6.3.1 The analytical strategy to be adopted for the investigations shall be designed to provide an overall assessment of potential contaminants thought to be associated with the potential contaminant sources identified, once full and proper access to the site is achievable.

6.3.2 Whilst no specific contaminants of concern are anticipated in significant concentrations, it is anticipated that the following analytes should be tested for:

- Heavy metals suite (including As, Cd, Cr(III), Cr(VI), Cu, Hg, Se, Pb, Ni, Zn);
- Speciated Polycyclic Aromatic Hydrocarbons;
- Cyanide (Free and Total);
- Total phenol;
- Sulphates (Total and Water Soluble);
- Sulphide;
- pH;
- TOC;
- Asbestos fibres.

-
- 6.3.3 Sampling will be undertaken in accordance with those guidelines prescribed in Sections 8.3.2 and 8.6 of BS 10175:2011, whilst the basic engineering properties of soils encountered will be recorded through visual observation.

7 REGULATORY APPROVAL

- 7.1.1** The conclusions and recommendations presented in this report are considered reasonable on the basis of available Information and the assessment of the site as carried out by Alan Wood & Partners.
- 7.1.2** It should be noted however that the works undertaken cannot be guaranteed to gain approval by the Regulatory Authorities and your Warranty Provider, so copies of this report should be made available to the relevant organisations (as appropriate) for their comment and approval, prior to undertaking any Irrecoverable works associated with the site.

8 INFORMATION SOURCES

In addition to the specific references cited in the text, the following references have been referred to in the production of this report, where relevant to the defined project objectives.

- 1 BRE BR211 (2015) *Radon: guidance on protective measures for new dwellings*;
- 2 British Geological Survey Sheet No. 063 York (1:50,000 scale, solid & drift edition)
- 3 BS5930 (2015), *Code of practice for site investigations*;
- 4 BS:8576 (2013), *Guidance on Investigations for Ground Gas - Permanent Gases and Volatile Organic Compounds (VOCs)*;
- 5 BSEN 1997-2 (2007), *Geotechnical Design Part 2 – Ground investigation and testing*;
- 6 BSEN 1997-1 (2004), *Geotechnical Design Part 1 – General Rules*;
- 7 Chartered Institute of Environmental Health (CIEH): *Professional Practice Note: Reviewing human health risk assessment reports invoking contaminant oral bioavailability measurements or estimates* (2009);
- 8 CIRIA C665 (2007), *Assessing risks posed by hazardous ground gases to buildings*;
- 9 CIRIA C552 (2001), *Contaminated Land Risk Assessment, A Guide to Good Practice*;
- 10 CIRIA SP32 (1984): *Construction over Abandoned Mine Workings*.
- 11 CL:AIRE / EIC / AGS: *Soil Generic Assessment Criteria for Human Health Risk Assessment* (updated January 2010 version);
- 12 Coal Authority, www.coal.decc.gov.uk;
- 13 DEFRA SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document*, December 2014;
- 14 DETR Circular 02/2000 (2000). *Environmental Protection Act 1990 Part IIA. Contaminated Land*. Department of the Environment, Transport and the Regions, Circular 02/2000, Dated 20th March 2000;
- 15 Emapalte GroundSure / GeoInsight Report (Ref: EMS_578016_776030) & EnviroInsight Report (Ref: (Ref: EMS_578016_776031), dated 18th November 2019;
- 16 Land Quality Management / CIEH: *The LQM/CIEH S4UL's for Human Health Risk Assessment*, Land Quality Press, Nottingham, 2015. Publication Number S4UL3286;
- 17 NHBC Chapter 4.2 (2019), *Building near trees*, NHBC Publication, 2019.

9 LIMITATIONS OF STUDY

- 9.1.1** This document has been prepared by Alan Wood & Partners for the titled project and should not be relied upon or used for any other project without prior written authorization being obtained. Alan Wood & Partners can accept no responsibility or liability for the consequences of the use of this document, wholly or in part, for any other purpose than that for which it was commissioned.

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- 9.1.2** The findings and opinions provided in this document are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described in this report. Factual information, including, where stated, a visual inspection of the site, has been obtained from a variety of sources. Alan Wood & Partners assumes the third-party data to be reliable but has not independently confirmed this. The validity and accuracy of this information is outside the control of Alan Wood & Partners. No guarantee can therefore be given as to the completeness of the information gathered during the study and no responsibility is accepted for errors or omissions in the third-party information used to produce this report. Alan Wood & Partners' professional judgement and experience is however used to ensure that uncertainties are reduced to a level appropriate to the site conditions, the purpose of the investigation and the resources devoted to it by the Client.

- 9.1.3** The findings and opinions presented in this report are relevant to the dates when the assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date.

- 9.1.4** This report provides an assessment of the potential contamination status of the ground below the site, being based only upon information available for review. Where the report refers to the potential presence of invasive plants (such as Japanese Knotweed) or asbestos-containing materials, such observations are for information only and should be verified by a suitably qualified expert.

- 9.1.5 Whilst every effort has been made to carry out an assessment that enables a realistic initial characterisation of the geotechnical and environmental parameters to be identified, the possibility of significant variation in actual ground and groundwater conditions existing cannot be discounted. Further information, ground investigation, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of this report. Where such information might impact upon stated opinions, Alan Wood & Partners reserve the right to modify the opinions expressed in this report. Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by Alan Wood & Partners for the effects of any future changes to such guidelines and legislation. New information of improved practices and changes in legislation may require reinterpretation of the report as a whole, or in part.
- 9.1.6 The conclusions and recommendations presented in this report are based on site-specific information obtained during the desk study. They are however limited to those that could be reasonably made at the time the assessment was undertaken. Alan Wood & Partners reserve the right to retract either conclusions or recommendations in light of any further information that may become available.
- 9.1.7 Interpretation and recommendations should not be assumed valid for adjacent areas of land, or for alternate land uses. Where the proposed site usage changes, the findings of this report should be re-assessed to accommodate the change in proposed end-use.
- 9.1.8 The limitations of liability of Alan Wood & Partners for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

FIGURES



DO NOT SCALE



Approximate Site Boundary



Client:
IPIF Co Fox Lloyd Jones Limited

Project: **Seafire Close, Clifton Moor, York**

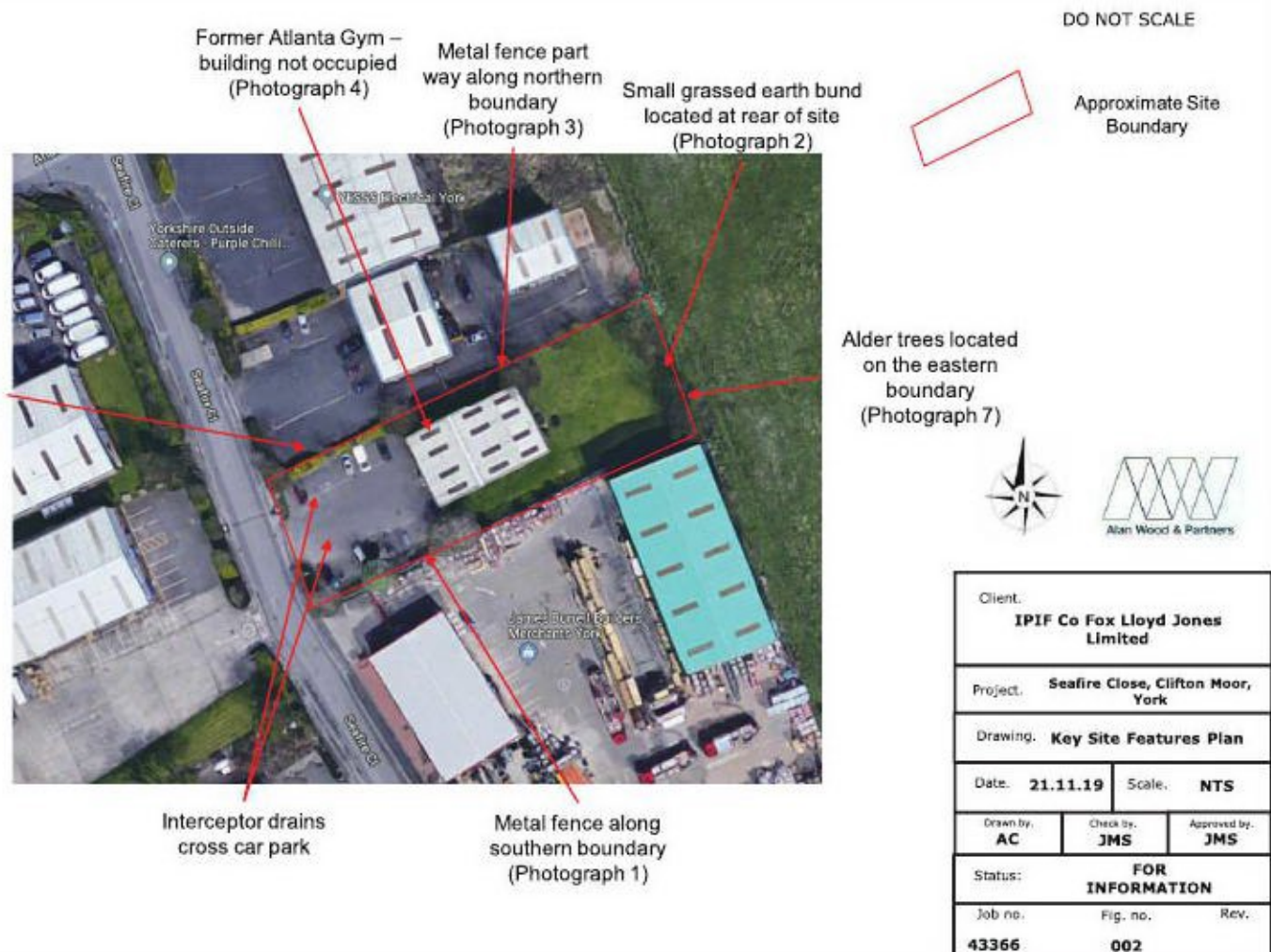
Drawing: **Site Location Plan**

Date: **21.11.19** Scale: **NTS**

Drawn by: **AC** Check by: **JMS** Approved by: **JMS**

Status: **FOR INFORMATION**

Job no. **43366** Fig. no. **001** Rev.



Plates

Photographs 1- 8



Photograph No. 1

Metal fence located down southern boundary of site. View to the west.



Photograph No. 2

To the rear of the building is a small bund. View to the north-east.



Photograph No. 3

Metal fence down northern boundary of site. Stops adjacent to the front of the building (former Atlanta Gym). View to the north.



Photograph No. 4

Disused building on the site is a former Atlanta Gym. View to the east.



Photograph No. 5

Hedge down the northern boundary of the site. A number of cars park on the car park. View to the north-west.



Photograph No. 6

View down the northern side of the building.



Photograph No. 7

Large Alder tree in the south-eastern corner of the site. View to the east.



Photograph No. 8

Rear of the building. View to the west.

APPENDIX A

Emapsite: Groundsure Geolnsight Report



emapsite

Building A2 Office 1052 Cody Technology Park,
Old Ively Road,
Farnborough, GU14 0LX

Report Reference: EMS-578016_776030

Your Reference: EMS_578016_776030

Report Date 18 Nov 2019

Report Delivery Email - pdf
Method:

Geo Insight

Address: Former Atlanta Gym Seafire Lane, Seafire Lane, Clifton Moor Industrial Estate, York, YO30 4UU,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you would like further assistance regarding this report then please contact the emapsite customer services team on 0118 9736883 quoting the above report reference number.

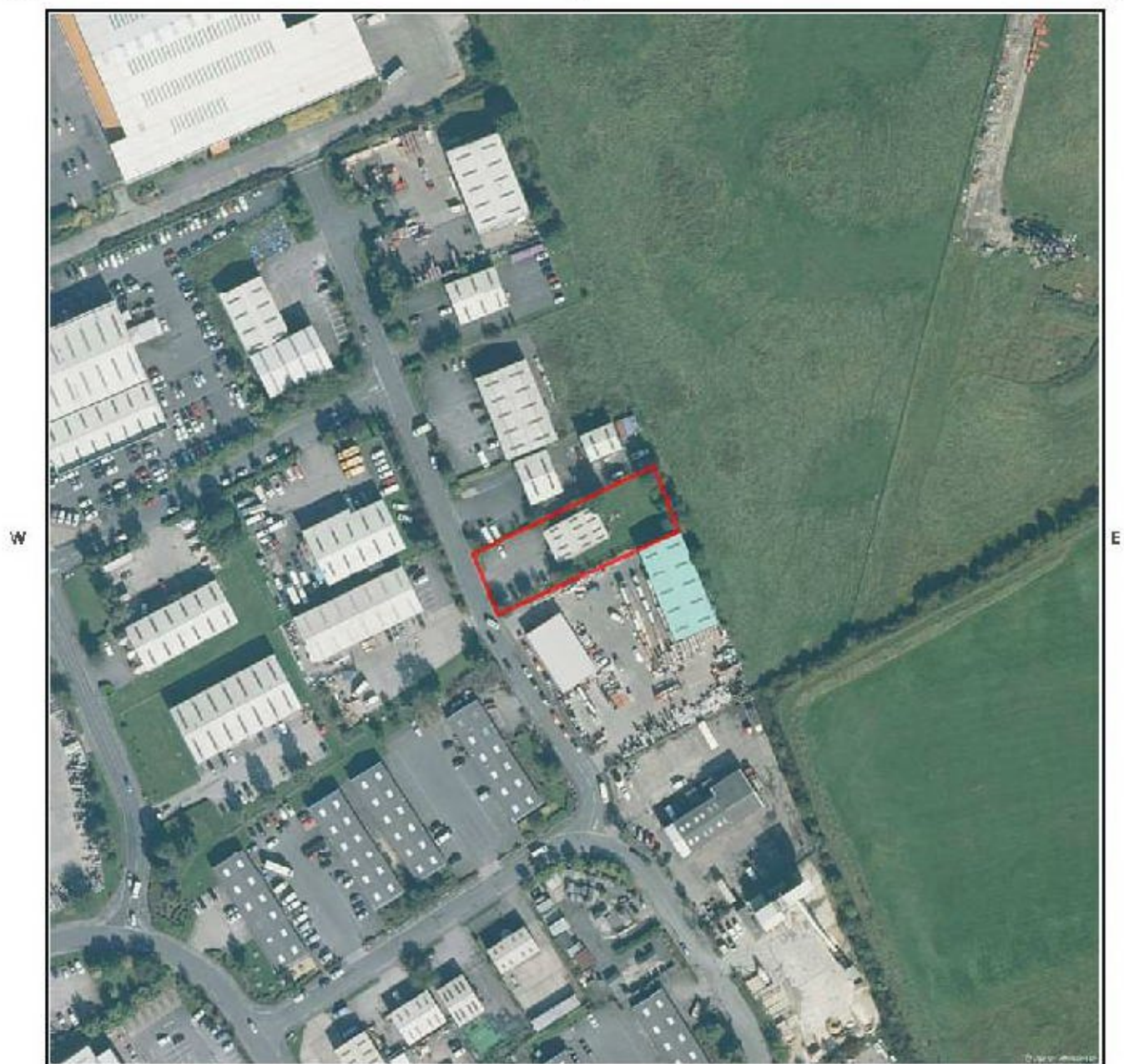
Yours faithfully,

emapsite customer services team

Enc.
Groundsure Geo Insight

Address: Former Atlanta Gym Seafire Lane, Seafire Lane, Clifton Moor Industrial Estate, York, YO30 4UU,
Date: 18 Nov 2019
Reference: EMS-578016_776030
Client: emapsite

NW N NE



SW S SE

Aerial Photograph Capture date: 19-Sep-2017
Grid Reference: 459584,455343
Site Size: 0.1707 ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale

1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslide within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale

2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslide within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?

Yes

2.3.3 Are there any records of linear features within 500m of the study site boundary?

No

Section 3: Radon

3. Radon

3.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 Radon Protection

No radon protective measures are necessary.

Section 4: Ground Workings

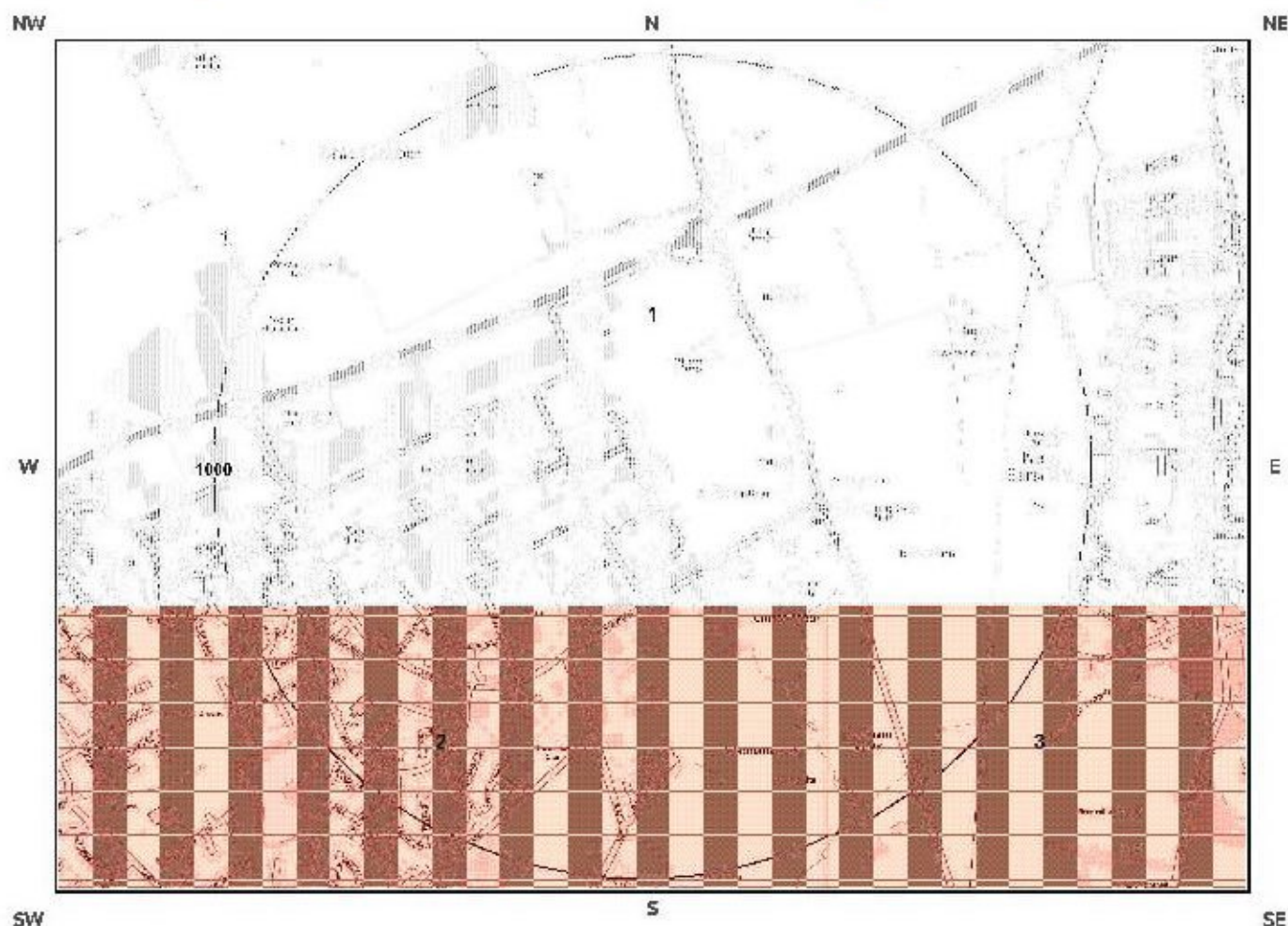
	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	0	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	0	0	0	0	0
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Cornwall and Devon Metalliferous Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Low				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Moderate				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Negligible				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	0	0	0		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	1	1	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched	
9.3 Historical Railways	0	0	0	Not Searched	
9.4 Active Railways	0	0	0	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage
2	317.0	Some deposits are mapped	Partial	Full	No coverage
3	514.0	Some deposits are mapped	Partial	Full	No coverage

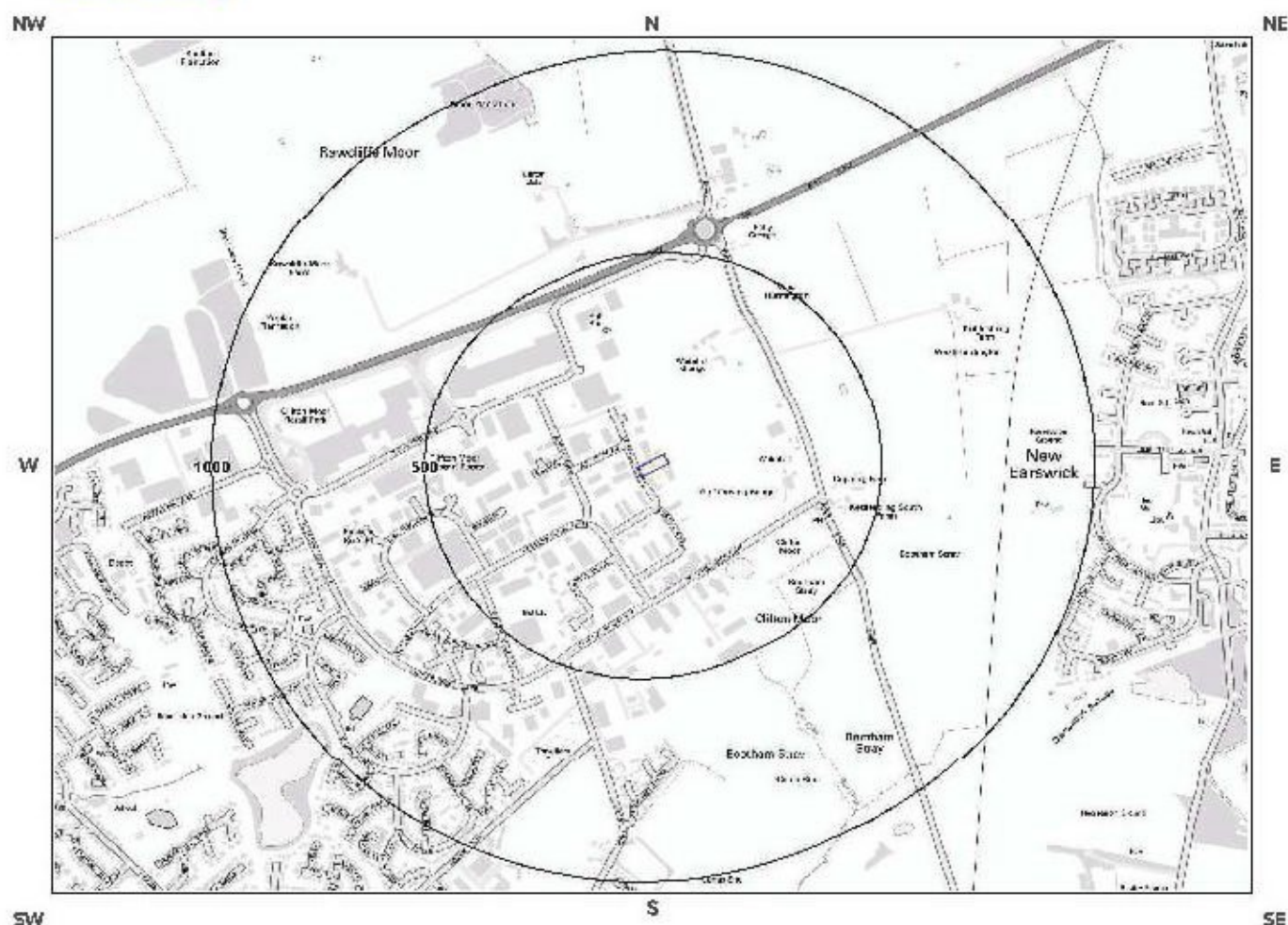
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage




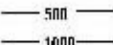




1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)



Artificial Ground Legend

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	Site Outline		Made Ground (undivided)		Disturbed Ground (undivided)
	Search Buffers (m)		Worked Ground (undivided)		Landscaped Ground (undivided)
			Infilled Ground		Reclaimed Ground

1. Geology 1:10,000 scale

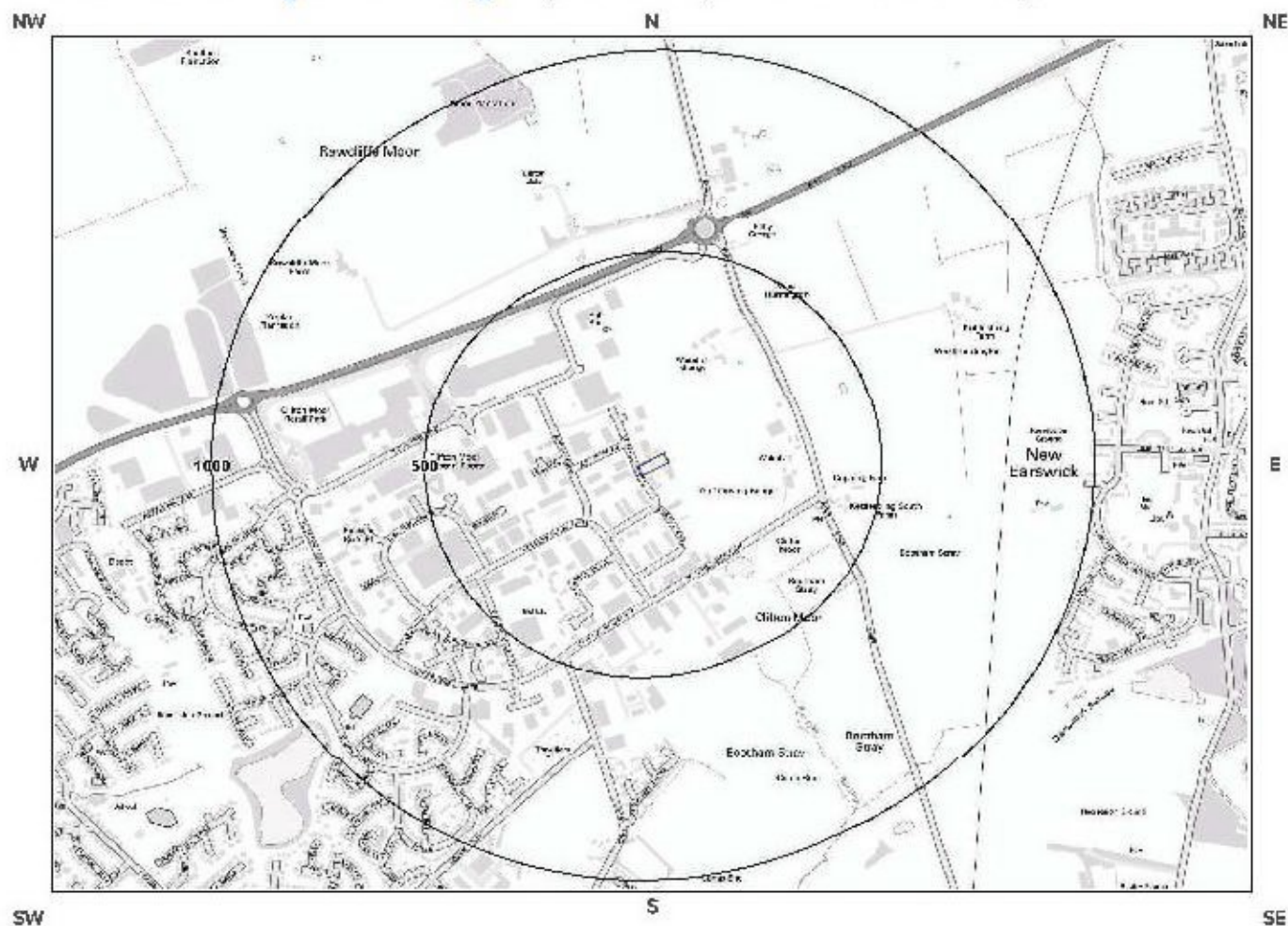
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

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-  Site Outline
-  Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

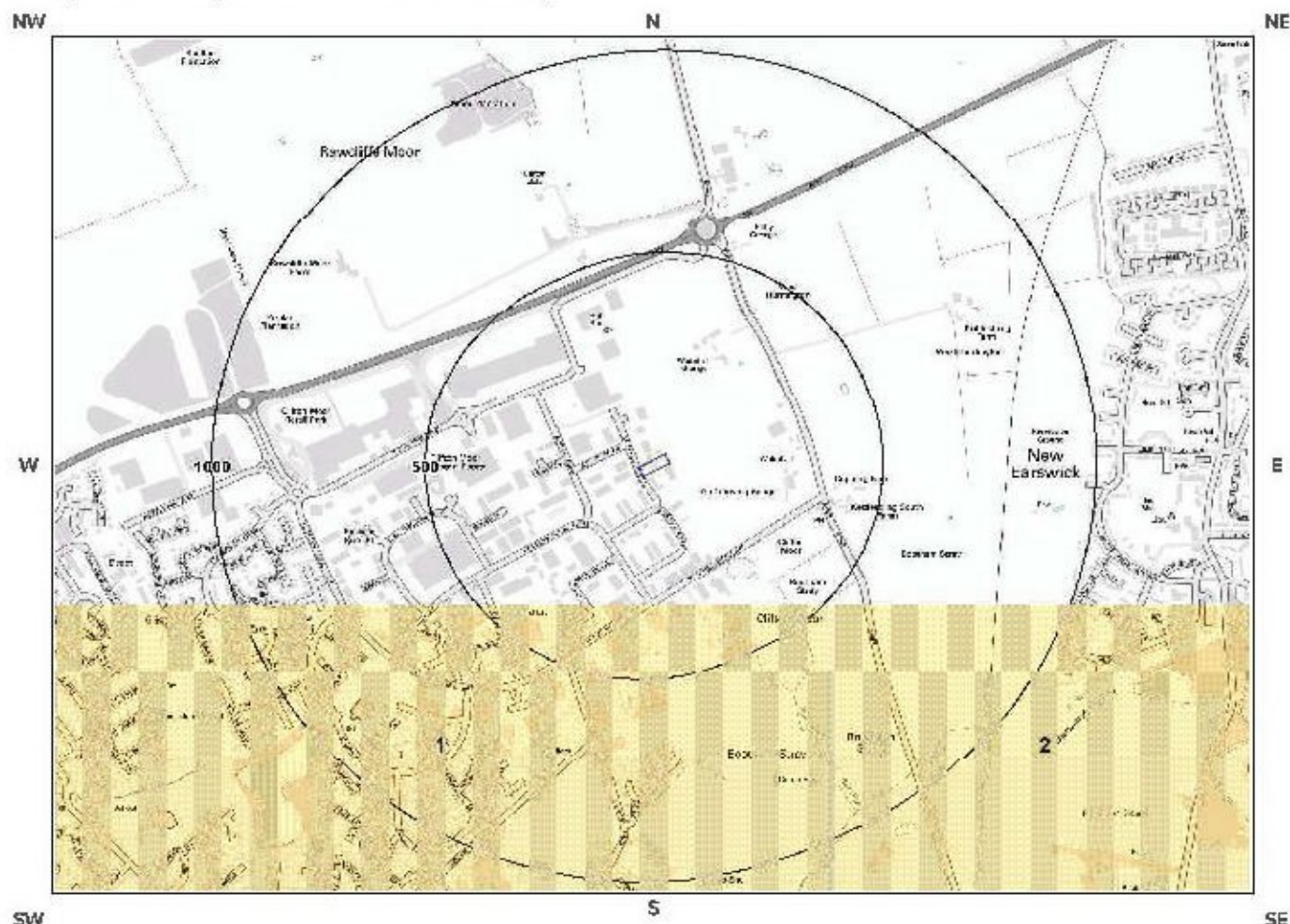
Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)



Bedrock and linear features Legend

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-  Site Outline
-  Search Buffers (m)

1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	317.0	S	SSG-SDST	Sherwood Sandstone Group - Sandstone	Ladinian Age - Late Permian Epoch [Obsolete name]

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

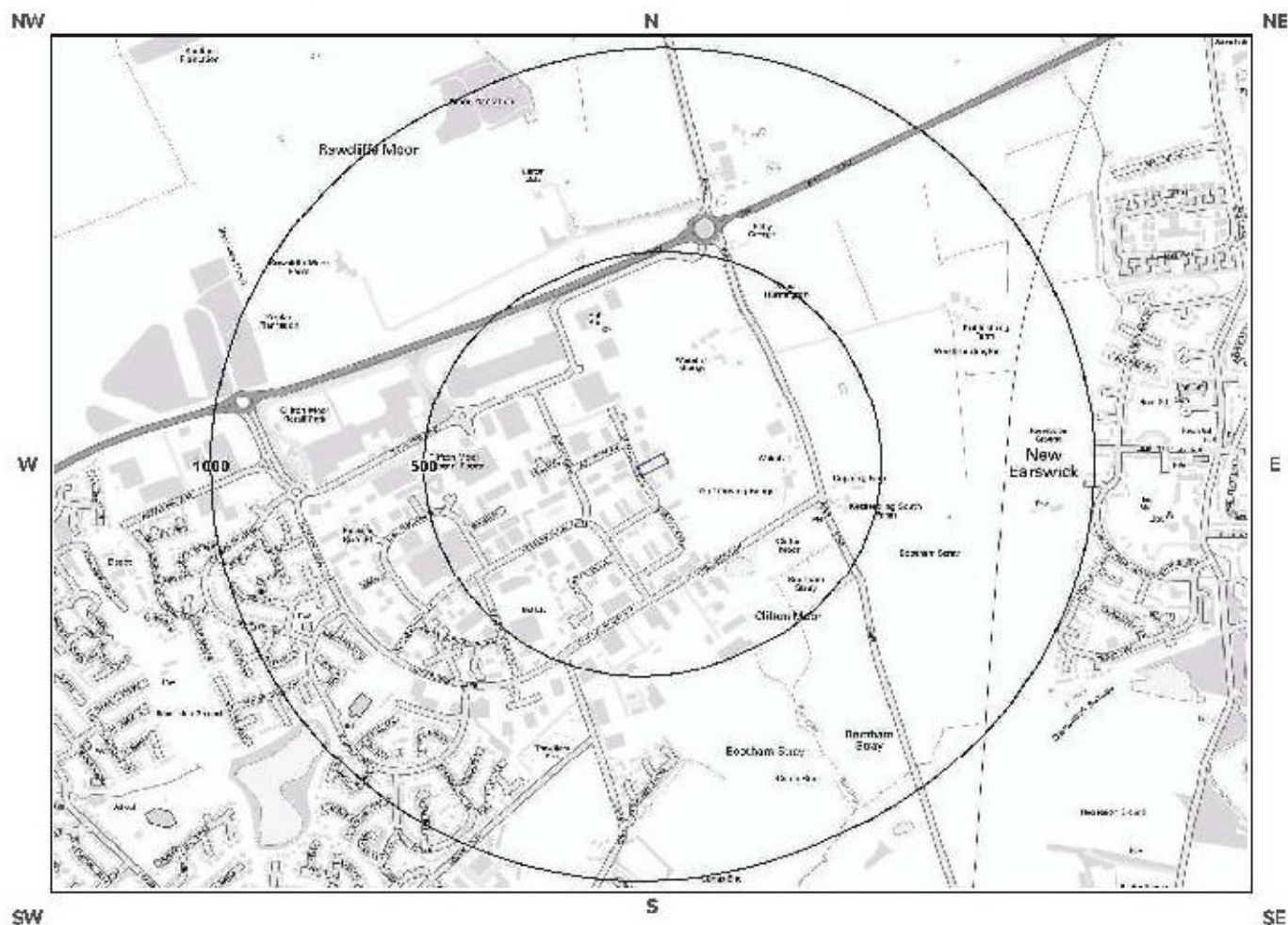
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

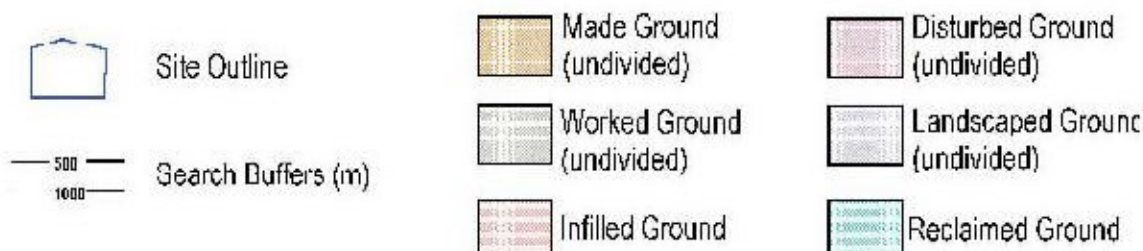
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



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2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 063

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

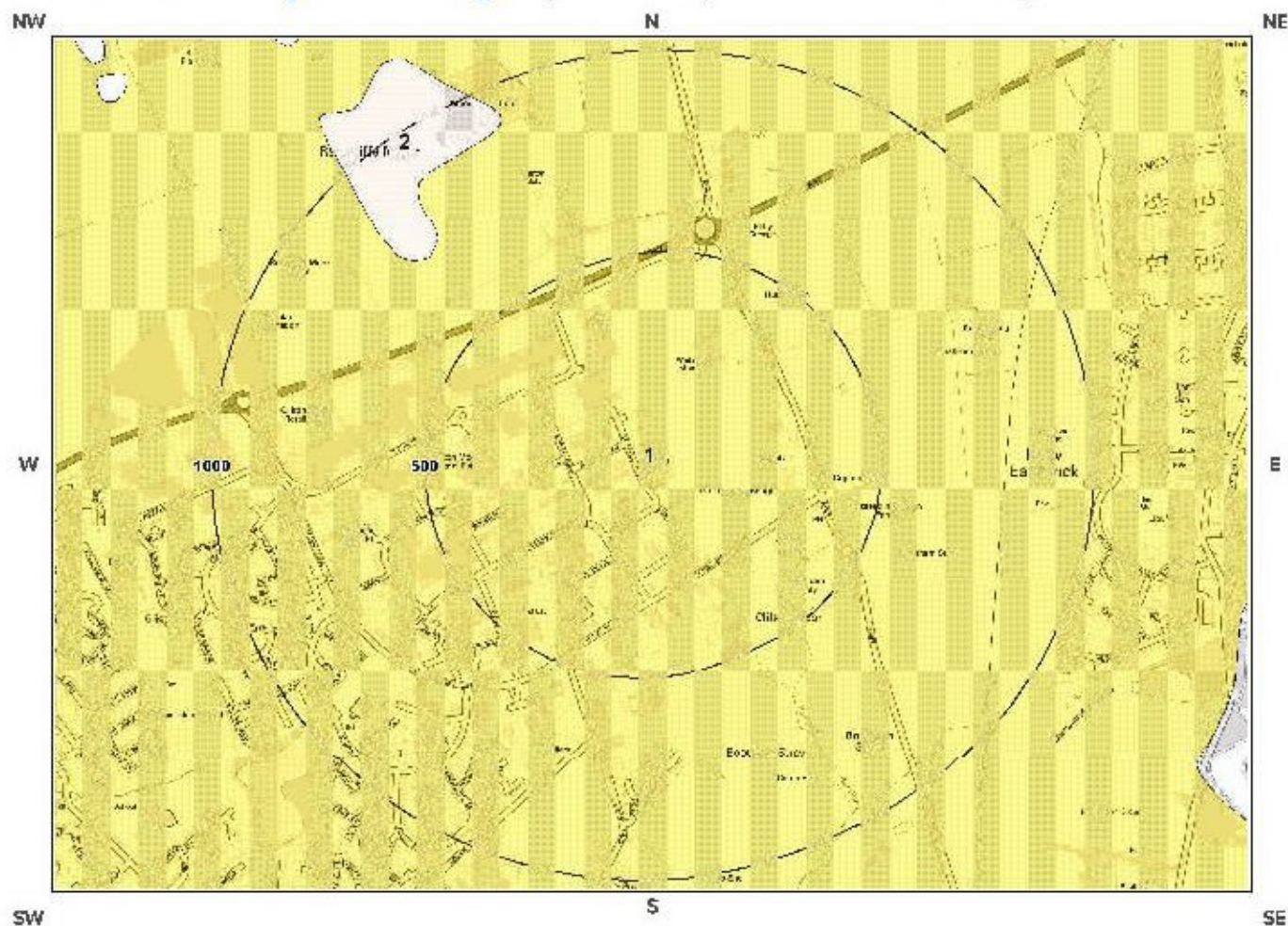
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	ALNE-CZ	ALNE GLACIOLACUSTRINE FORMATION	CLAY, SILTY

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Low	Very Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

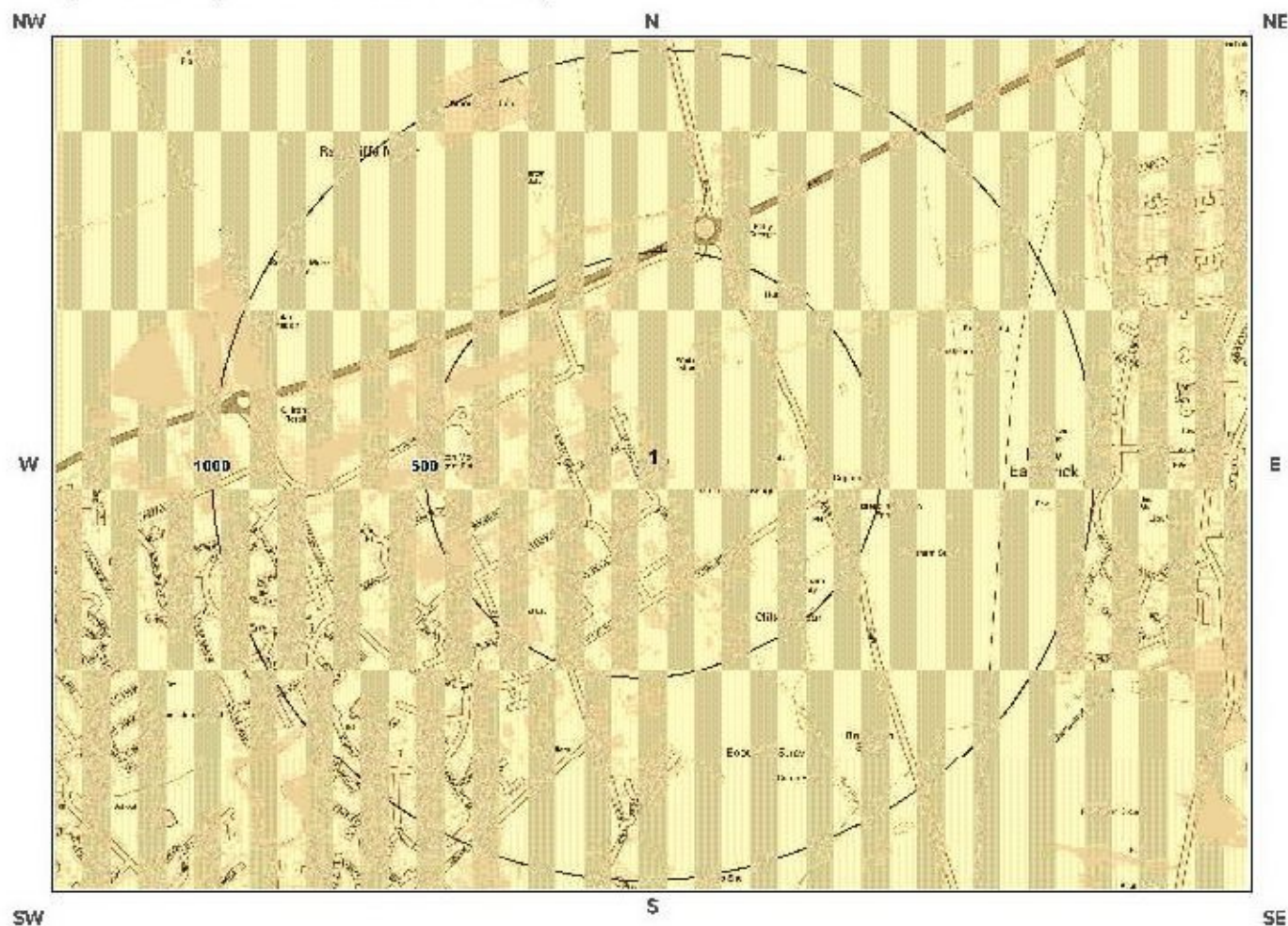
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and linear features map (1:50,000 scale)



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2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 063

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	SSG-SDST	SHERWOOD SANDSTONE GROUP - SANDSTONE	-

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	High

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

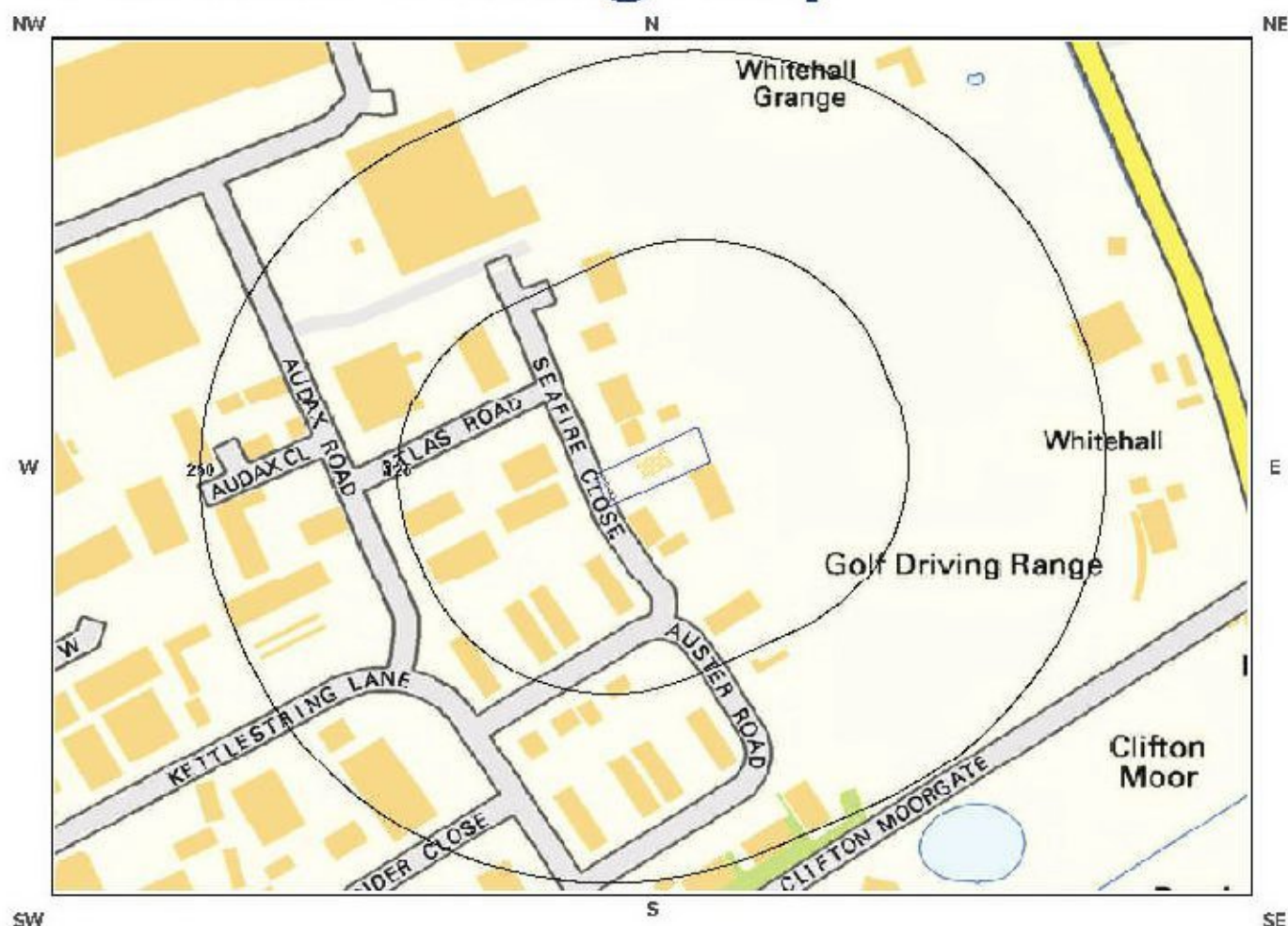
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. 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 supercede 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. As such, the radon atlas is considered Indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection



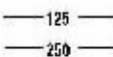


Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings map



Ground Workings Legend

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- | | | | |
|---|--------------------|---|----------------------------------|
|  | Site Outline |  | Historic Surface Ground Workings |
|  | Search Buffers (m) |  | Historic Underground Workings |
| | |  | Current Ground Workings |

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? No

Database searched and no data found.

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

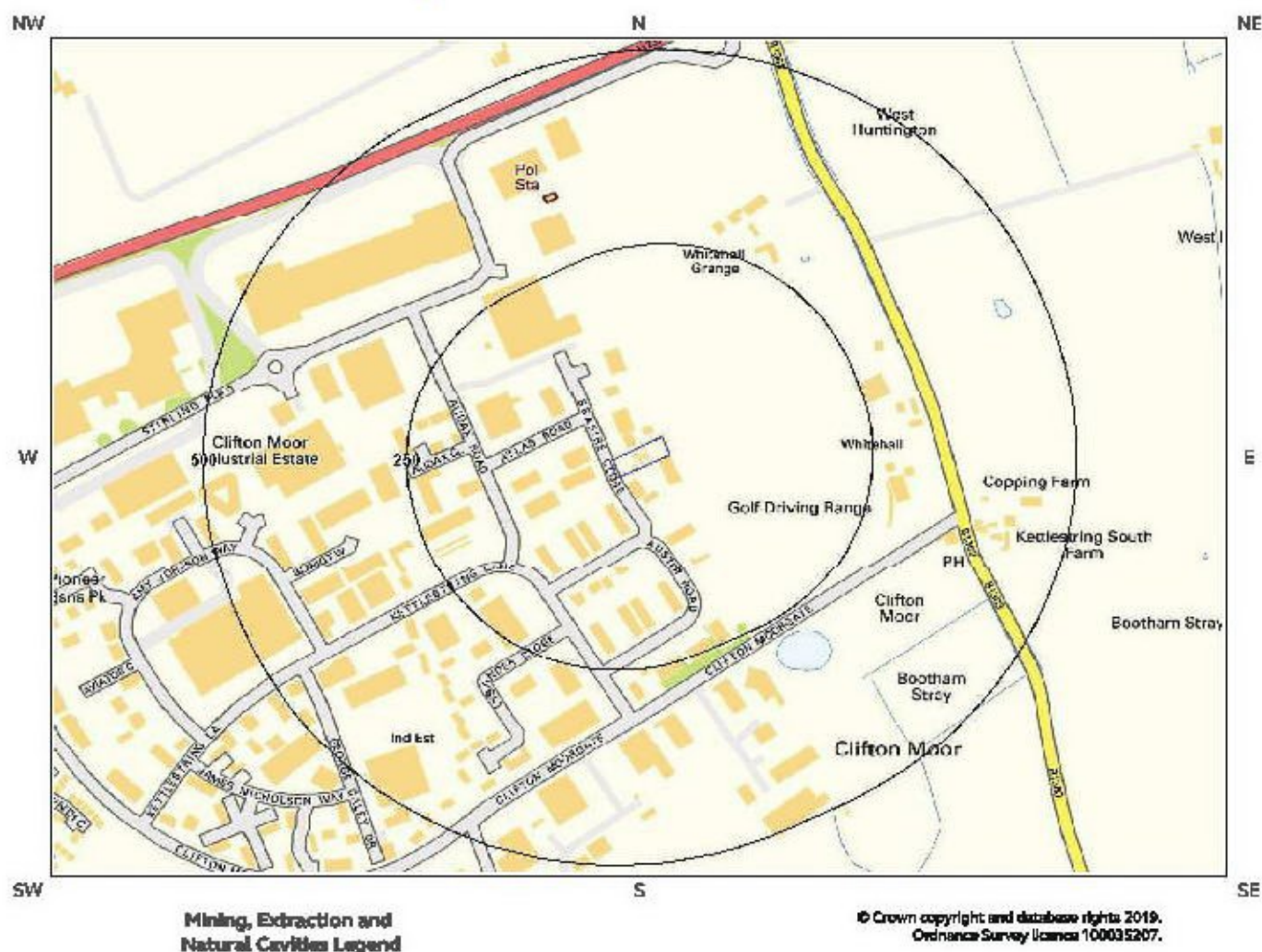
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	763.0	S	459313 454593	Clay & Shale	Green Lane Brick Field	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities map



5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Cornwall and Devon Metalliferous Mining

This dataset provides information on metalliferous mining areas in Cornwall/Devon and is derived from records held by Mining Searches UK.

Are there any Cornwall and Devon Metalliferous Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

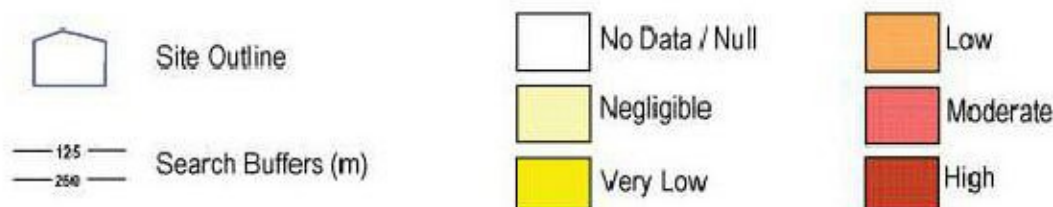
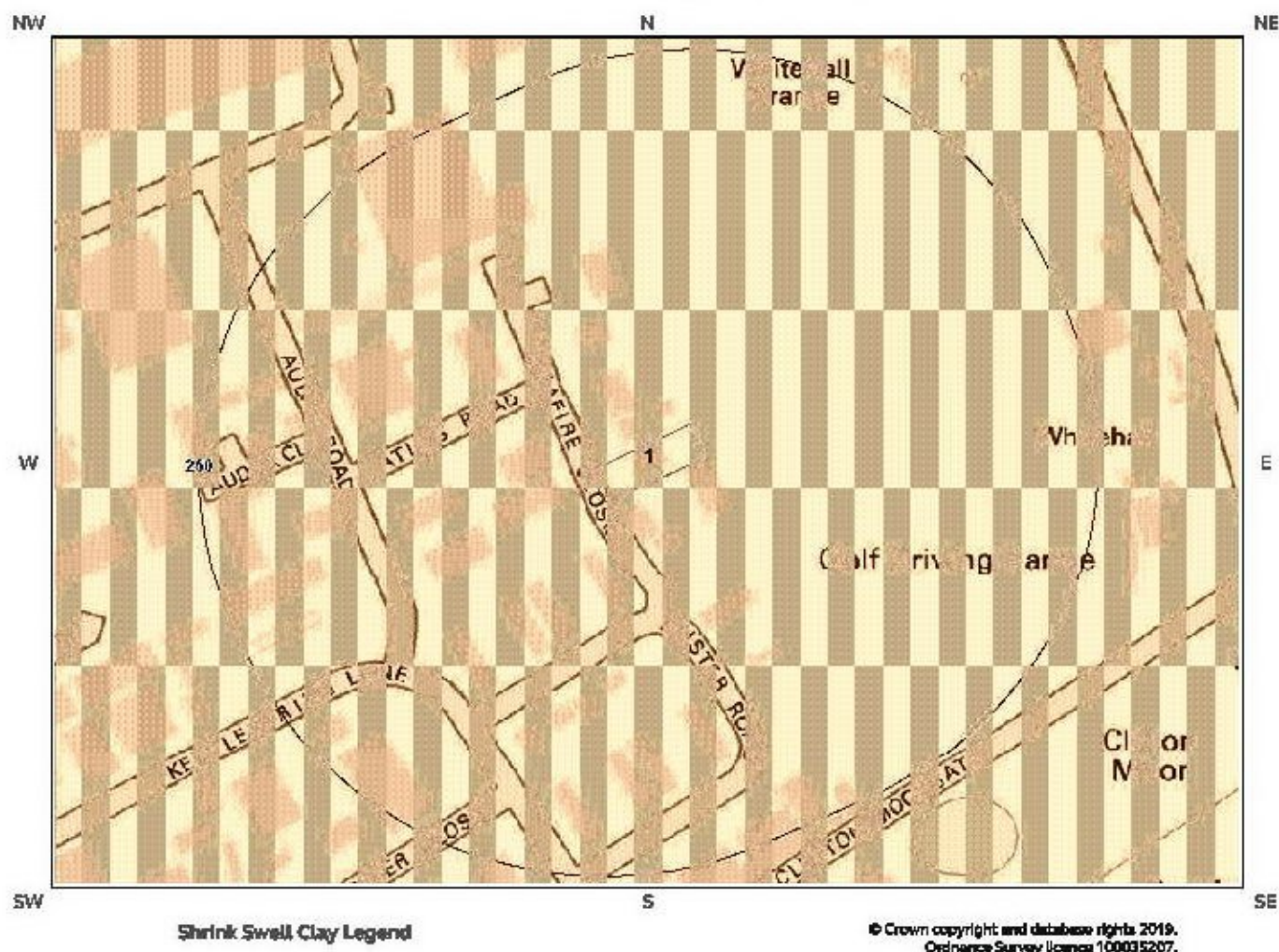
Are there any Clay Mining areas within 1000m of the study site boundary?

No

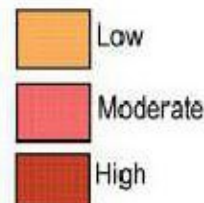
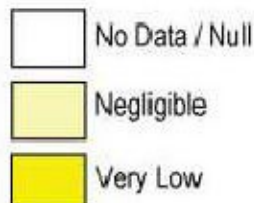
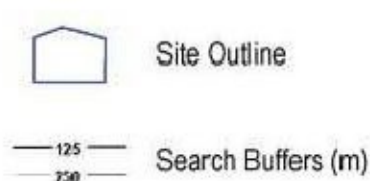
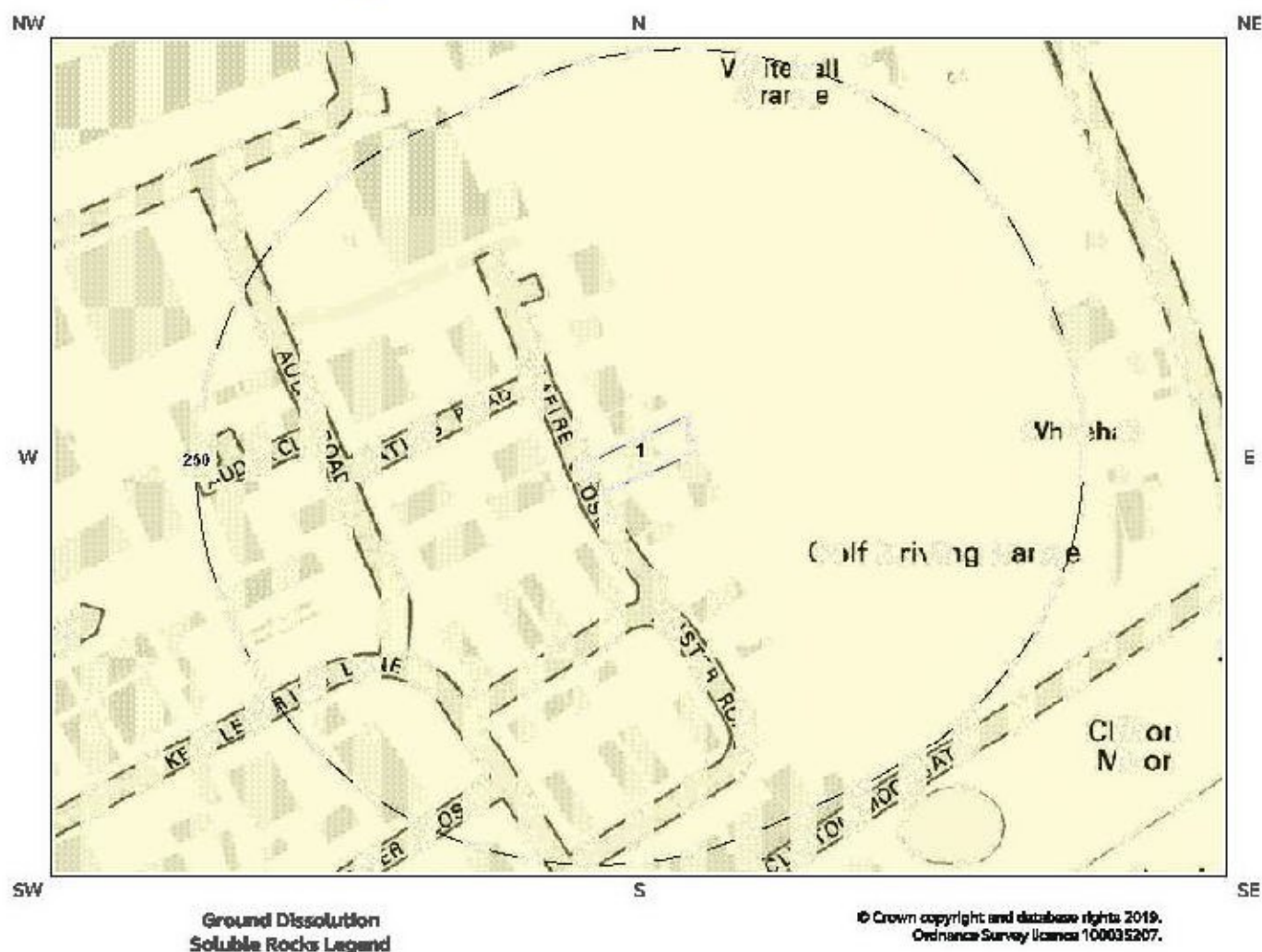
Database searched and no data found.

6 Natural Ground Subsidence

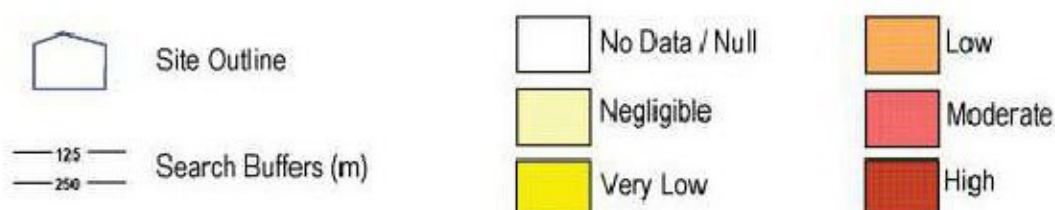
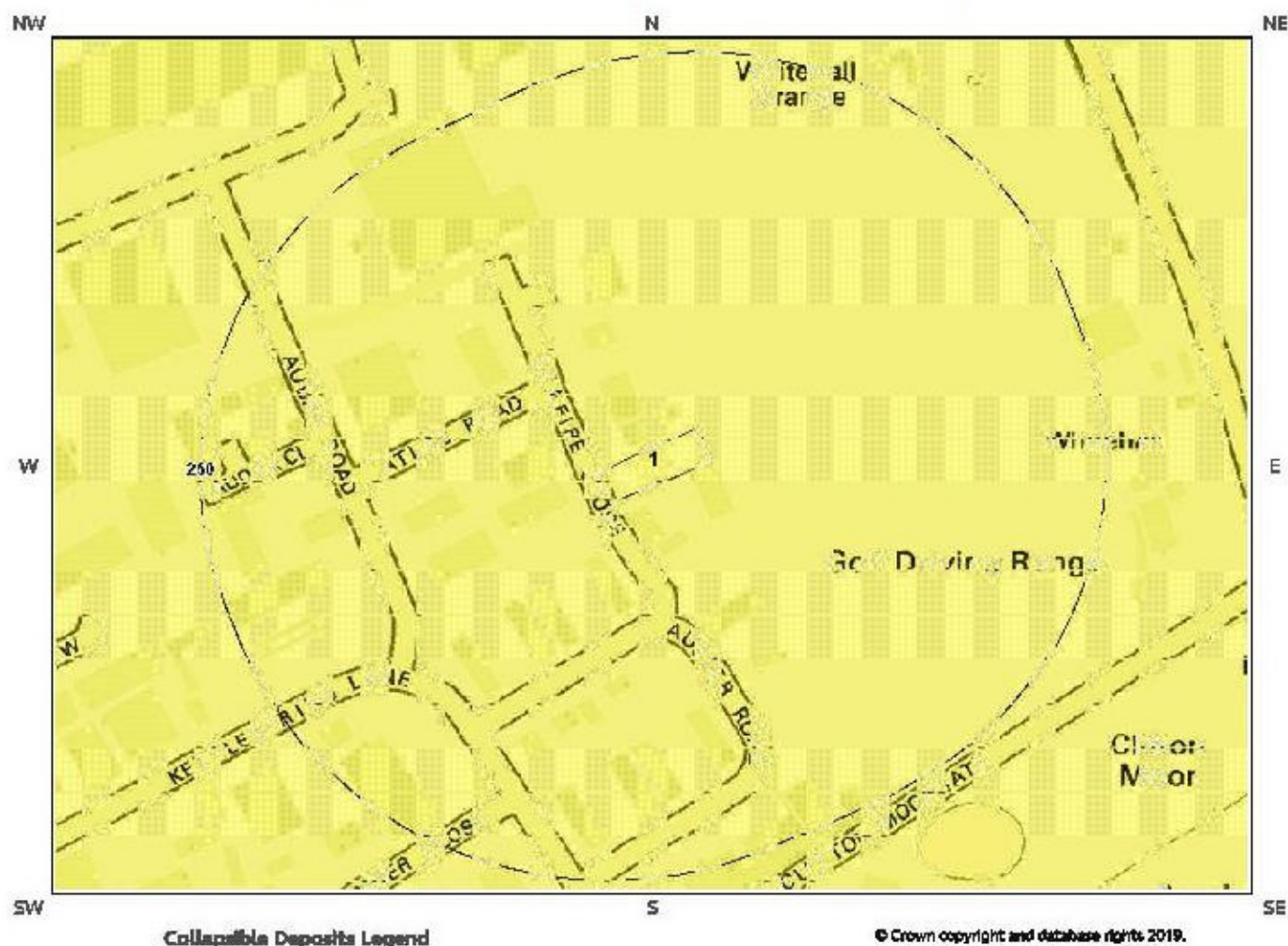
6.1 Shrink-Swell Clay map



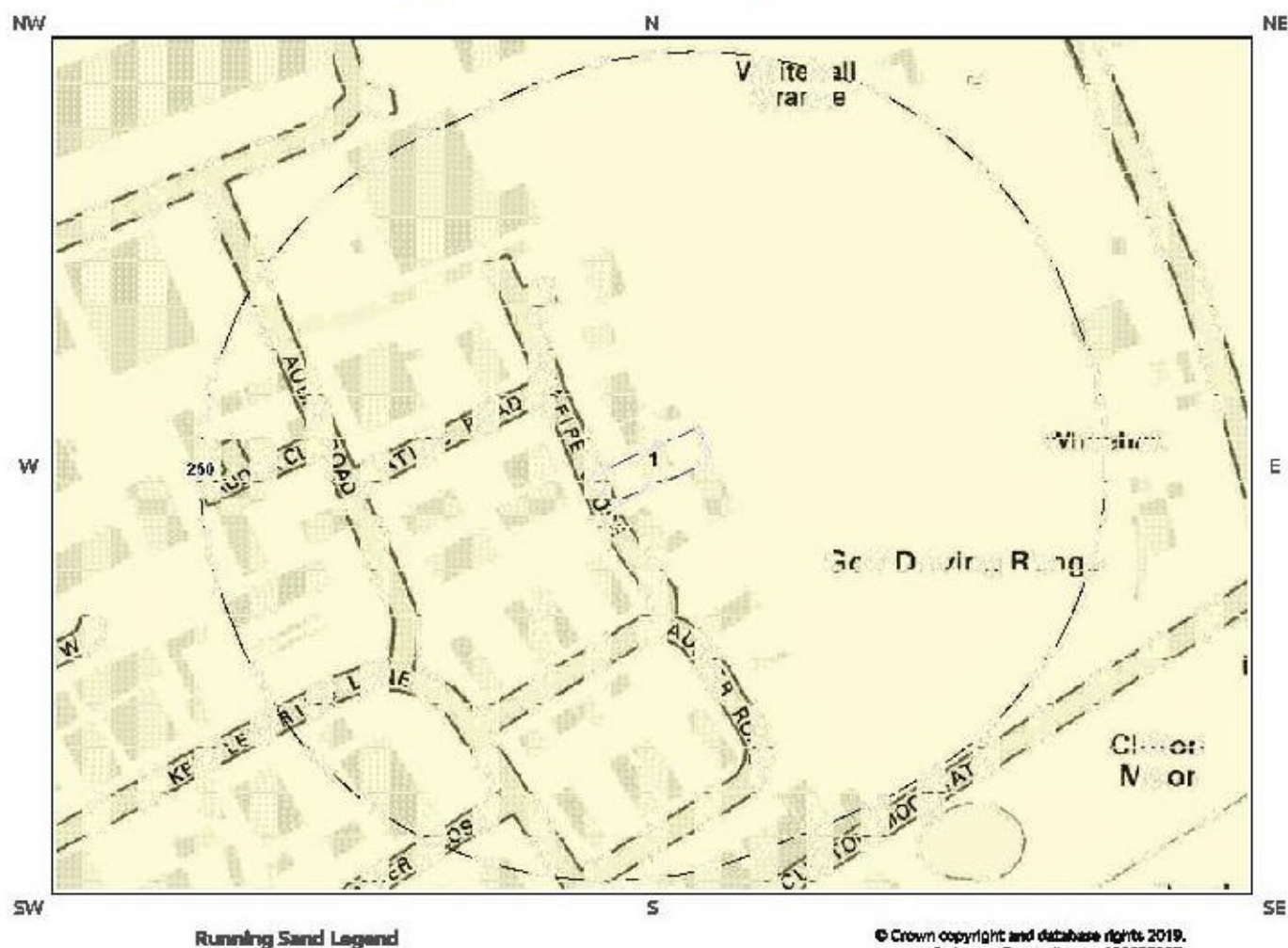
6.3 Ground Dissolution of Soluble Rocks map



6.5 Collapsible Deposits map

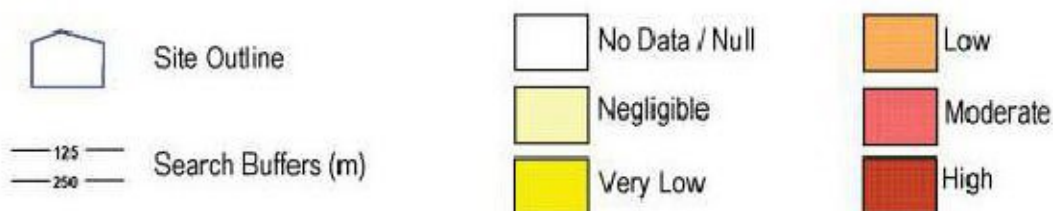


6.6 Running Sand map



Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site* boundary? **Moderate**

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

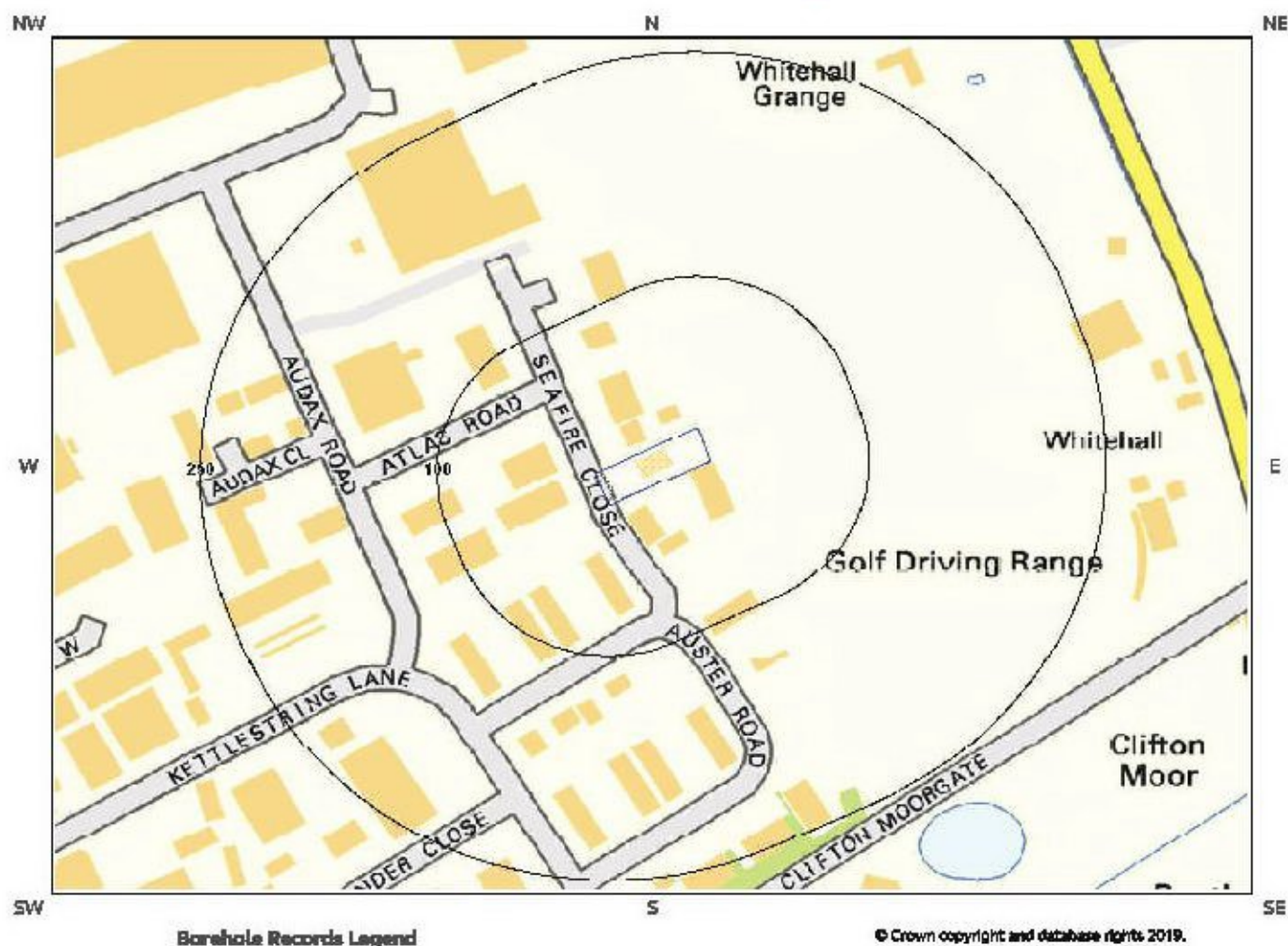
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records map



7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary:

0

Database searched and no data found.

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary:

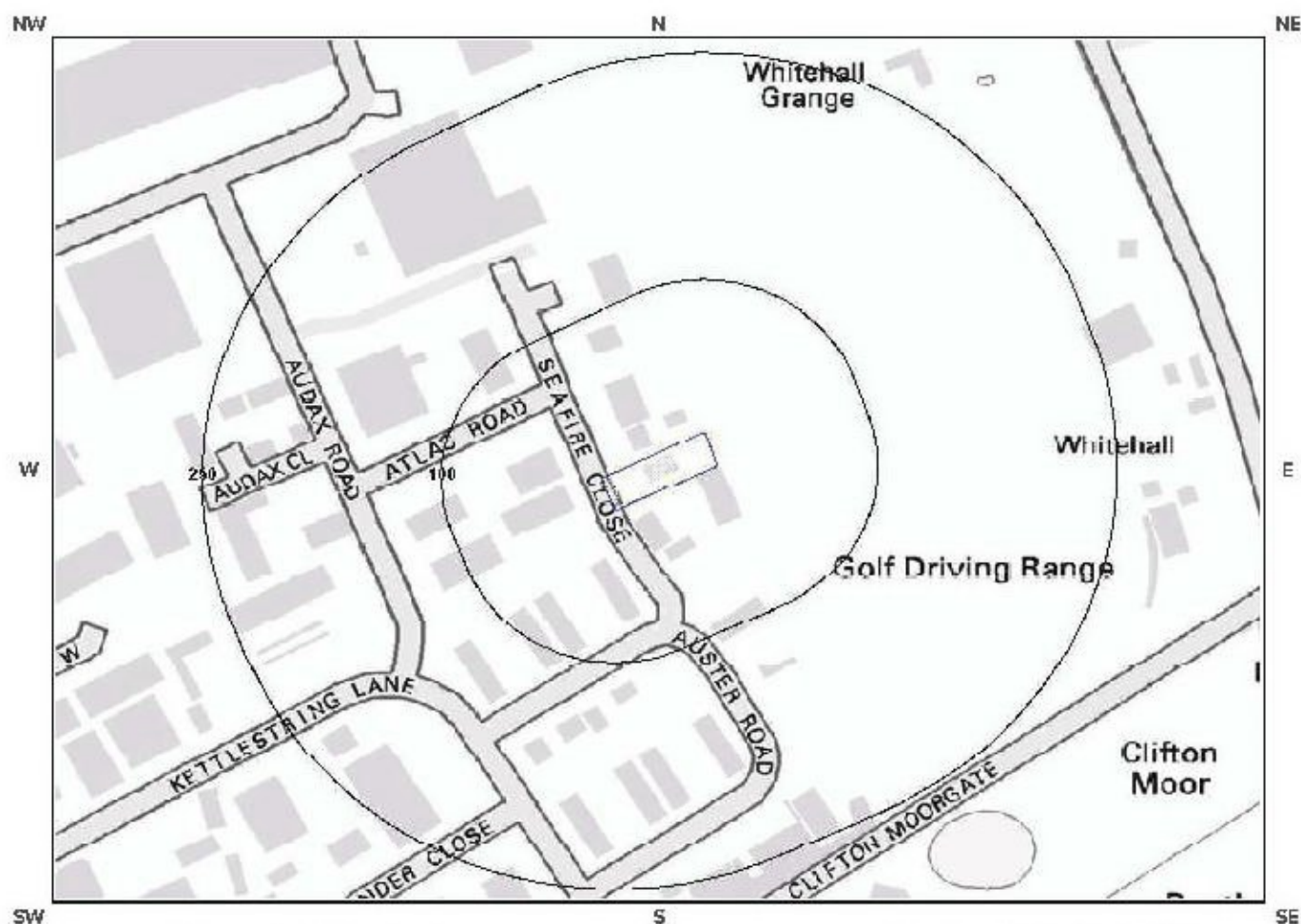
2

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	100 - 200 mg/kg
47.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	100 - 200 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels map



Railways and Tunnels Legend

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	Site Outline		Underground or Partially Underground Railway / Subway System		Railway Track (OpenStreetMap)
	Search Buffers (m)		Railway Tunnel (OS Mapping)		High Speed 2
	250		Abandoned or Dismantled Railway (OpenStreetMap)		High Speed 2 (Strategic Proposed Route)
	500		Railway Track (OS Mapping)		Crossrail 1
					Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1.

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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APPENDIX B

Emapsite: Groundsure EnviroInsight Report