

**Alan Wood & Partners**

**PHASE I & II GEO-ENVIRONMENTAL  
ASSESSMENT REPORT**

**LAND OFF LIMESTONE ROAD,  
BURNISTON, SCARBOROUGH**



**FOR  
THE GASCOINE GROUP**



**PROJECT REF:-  
JS/AHB/35267-Rp001**

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## **LAND OFF LIMESTONE ROAD, BURNISTON, YO13 0DG COMBINED PHASE I/II GEO-ENVIRONMENTAL ASSESSMENT**

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Issue	Revision	Revised by	Approved by	Revised Date

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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## EXECUTIVE SUMMARY

This presents the salient points of the report and should not be referred to in isolation. All recommendations are subject to approval by the Regulatory Authorities.

<b>Site Location, Description &amp; History</b>	<p><b>Location and Description:</b> The site is located off Limestone Road, Burniston and is centred at approximate National Grid Reference (NGR), 500411mE 493353mN.</p> <p>The area investigated comprises grassed open land with a dilapidated derelict brick, pitch roofed dwelling in the southern portion of the site. Also, a brick building is noted in this area with, what appeared to be, an asbestos cement sheet roof. This building was being used to shelter livestock. The storage of chemicals or above and below ground storage tanks were not observed on site. Ponding surface water was noted to occupy a large area of the northern portion of the site. The ground surface was noted to dip steeply from the southwest to the northeast at a gradient of about 1:4.2 (14<sup>0</sup>) and from the south to the north by a gradient of approximately 1:13 (5<sup>0</sup>).</p> <p><b>Historical Land Use:</b> Historical OS plans dating back to 1854 show the site to be open land. <i>Circa</i> 1950, buildings were constructed in the south-western corner of the site. The site remains in this configuration to the present. The surrounding land was open land until 1926 when it was developed for residential purposes.</p>
<b>Geology, Mining, Ground Stability, Hydrogeology, Hydrology &amp; Floodplains</b>	<p><b>Geology, Mining &amp; Ground Stability:</b> Available information indicates that the superficial soils/drift geology at the site comprise glacial till (Diamicton) of the Devensian. These soils typically comprise interbedded layers of clay, silt, sand and gravel with boulders and cobbles of mixed lithology.</p> <p>The solid geology underlying the southern and central portion of the site is indicated to comprise sandstone of the Moor Grit Member and mudstone, sandstone and limestone of the Scarborough Formation. The northern portion of the site is noted to be underlain by sandstone, siltstone and mudstone of the Gristhorpe Member.</p> <p>The site is not located in or within 1000m of an area that has been subject to below ground coal mining activities.</p> <p>Risk associated with historic mine workings, on the basis of available information, is considered to be low.</p> <p>There are no geological faults recorded as being within 500m of the proposed development area.</p> <p><b>Hydrogeology:</b> The superficial soils are indicated to be 'Unproductive', these being of low permeability and having negligible significance for water supply or river base flow.</p> <p>The underlying bedrock is indicated to be a 'Secondary A' aquifer. These soils are capable of supporting water supplied at a local, rather than strategic scale, and in some cases form an important source of baseflow to rivers.</p> <p>There are no source protection zones within 500m of the site.</p> <p><b>Hydrology:</b> The nearest surface water feature to the site is indicated to</p>

	<p>be an unnamed stream being located 47m to the north-west. This is culverted 77m to the northwest. The Quarry Beck lies 176m to the northeast of the site.</p> <p>There is no available information with respect to river quality data.</p> <p><b>Floodplains:</b> Available information indicates that the site lies within 250m of an Environment Agency indicative Zone 2 and Zone 3 floodplain.</p> <p>There are reported groundwater (superficial deposits) flooding susceptible areas within 50m of the site.</p>
<b>Geotechnical Assessment</b>	<p>The exploratory site works were carried out on 14<sup>th</sup> March 2014, with the ground investigation comprising 9 No. mechanically excavated trial pits (TP1 – TP9).</p> <p><b>Topsoil:</b> This material was noted to comprise soft brown slightly sandy slightly gravelly clay. The gravel fraction comprised angular fragments of sandstone. During the intrusive ground investigation, it was noted that the JCB 3CX excavator sank to its axles in numerous locations on the site. Samples of the topsoil have been scheduled for a targeted programme of laboratory analysis for its suitability within proposed gardens.</p> <p>No made ground soils were encountered within any of the exploratory holes. However, access to the south-western corner of the site was not achievable due to the instable nature of the former dwelling and the storage of livestock.</p> <p><b>Glacial Till (Diamicton):</b> This was encountered within all of the trial pits at shallow depth, below the topsoil. The glacial deposits were noted to comprise firm becoming stiff red/brown mottled grey slightly sandy gravelly clay. The gravel fraction comprises angular to rounded sandstone, siltstone and coal with local inclusions of rounded quartzite. In situ shear vane testing gave a shear strength of between 60kN/m<sup>2</sup> and 120kN/m<sup>2</sup> confirming its firm to stiff nature. The base of the glacial deposits was not encountered within any of the exploratory holes.</p> <p>No groundwater was encountered in any of the exploratory holes.</p> <p>With respect to both development areas, risk associated with shrink swell hazards, landslide, compressible ground, collapsible rocks and/or running sand are indicated in the GroundSure report to be very low to negligible.</p>
<b>Environmental Records Assessment</b>	<p><b>Pollution Incidents:</b> There are no EA recorded pollution incidents within 500m of the site.</p> <p><b>Waste Management:</b> There are no Environment Agency recorded landfill sites, Local Authority sites, waste treatment, transfer and/or disposal sites within 500m of the site.</p> <p><b>Discharge Consents:</b> There are no recorded licenced discharge consents within 1000m of the site.</p> <p><b>Radon:</b> No radon protective measures are required.</p> <p><b>Abstractions:</b> There are no records relating to the abstraction of groundwater, surface water and/or potable water within 2km of the site.</p>
<b>Preliminary Development &amp; Construction</b>	<p><b>Site Preparation:</b> Subject to confirmation of proposed levels, it is envisaged that the bulk of the enabling works for the site will be associated with the demolition and breaking-out of existing buildings, floor-slabs,</p>

<p><b>Proposals</b></p>	<p>foundations and areas of hardstanding. These works will need to be integrated into any additional works where excavation is required to reduce and/or re-grade site levels given the elevation differences that exist locally across the proposed development area.</p> <p>Given the steeply inclined nature of the site current topography, finished site levels will need to be established by creating suitably designed and engineered development platforms and access roads. This may require a cut and fill operation during the initial site enabling works. Designed and engineered temporary/permanent earth retaining structures may be required to accommodate finished site ground levels.</p> <p>Any materials 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. The waste should also 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.</p> <p><b>Foundations:</b> Made ground soils, where present, are unsuitable founding material due to their lateral and vertical variation. These soils are considered to have insufficient allowable safe bearing capacity to support traditional shallow foundations, without the likelihood of foundation shear failure and/or unacceptable total and differential settlements.</p> <p>Ground conditions indicate that traditional strip or trench fill foundations will be suitable for use within the farm site development area, these being taken through the upper soil and loam surface and into the underlying clay at a probable depth of between 750-900mm. Consideration will need to be given to the placement of the proposed plots in relation to any planned earth retaining structures, to achieve finished ground levels, in order to ensure their continued stability.</p> <p>Where traditional foundations are suitable, care will need to be taken where they are found to straddle strata of different type, or where soft or locally unstable ground is encountered at founding depth. Where this occurs foundations may need to be widened, deepened and/or strengthened to prevent differential settlement.</p> <p><b>Precautions Near Trees:</b> Precautions may be required when in clay given the presence of trees along the edges of the site. The on-site soils have been proven to have a low Volume Change Potential.</p> <p><b>Floor Slabs:</b> It is anticipated that ground floor slabs will be suspended where proposed plots are located within the vicinity of existing or removed trees. Otherwise, ground bearing slabs may however be adopted.</p> <p><b>Concrete Design:</b> The Design Sulphate Class is anticipated to be DS-1, the Aggressive Chemical Environment for Concrete (ACEC) Class, AC1s.</p> <p><b>Drainage:</b> Soakaways will not be suitable for use at the site.</p> <p>Surface water will need to be taken to a suitable drainage system (possibly to an existing drains that cross/exit the site), subject to obtaining approvals from regulatory authorities.</p>
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	<p><b>Roads and Car Parks:</b> A preliminary CBR value of 2.0% is suggested for the natural soils at the site. <i>In situ</i> testing should be carried out if required.</p> <p><b>Potable Water Supply:</b> Whilst risk to potable water supply pipes is considered to be low, it may be that protective measures may be required. Consultation should also be undertaken with the local water authority with respect to any precautions they may require, prior to construction.</p> <p><b>Stability:</b> On the basis of available information, risk associated with shallow mine workings is not anticipated.</p> <p>Given the steeply inclined ground surface and the very soft nature of the topsoil, instability of proposed site plant is to be anticipated. Therefore, designed and engineered platforms and temporary road ways will be required for the site plant to operate from. Further assessment should be undertaken.</p> <p>It is possible that some localised instability of excavations may be encountered during construction, particularly during periods of wet weather. Instability should therefore be anticipated, particularly where deep service trenches are excavated.</p> <p>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.</p> <p><b>Outline Remediation and Environmental Management:</b> An elevated concentration of arsenic has been measured within a single sample of the shallow on-site soils. It is proposed that this will be removed during the initial site enabling works to remove the current topsoil. Further investigation and testing is required within the inaccessible areas in the northern and south-western areas of the site. At this stage, mitigating measures are not considered necessary following the removal of the topsoil.</p> <p>All materials used/imported to site will need to be proven to be clean prior to importation/use. Confirmation on the proposed capping thickness will need to be obtained from the Contaminated Land Office prior to construction.</p>
<p><b>Further Works</b></p>	<ol style="list-style-type: none"> <li>1. Additional investigation within currently inaccessible areas of the site following the demolition of the current site buildings, structures and the removal of ponding surface water. Additional soil sampling a testing of the near surface soils within these areas is required post demolition to include the potential for asbestos containing materials;</li> <li>2. <i>In situ</i> CBR testing (where required);</li> <li>3. An ecology survey.</li> <li>4. Foundation design.</li> </ol>

# **1 INTRODUCTION**

## **1.1 Details of Commission**

- 1.1.1 Alan Wood & Partners (AWP) were appointed by Pegasus Group Ltd on behalf of The Gascoine Group Ltd (the 'Client') to carry out a combined Phase I/II Geo-Environmental Assessment of land off Limestone Road, Burniston, Scarborough (the 'site').
- 1.1.2 It is understood that it is proposed to redevelop the site for a residential end use.
- 1.1.3 This report principally provides geotechnical and environmental information, along with provisional construction proposals and recommendations, in relation to the proposed development works for the western site area. The report provides an appraisal of likely environmental impacts on sensitive receptors and, where necessary, the identification of any remediation and/or subsequent investigative works that may be required. In relation to the proposed northern car parking area, reference is made to the ground conditions encountered and the geotechnical status of the on-site soils.

## **1.2 Scope of Works**

- 1.2.1 The scope of works undertaken as part of this appraisal was to:
- Carry out a physical inspection of the site (walkover survey);
  - Investigate the underlying soil and groundwater conditions and obtain geo-environmental and geotechnical data as required;
  - Develop a Conceptual Site Model (CSM) of potential pollutant linkages relevant to the proposed redevelopment of the site;
  - Provide advice in relation to any environmental and geotechnical issues associated with the site;
  - Provide preliminary foundation recommendations and/or other recommendations needed to facilitate the proposed development work at the site, including, where necessary, any additional phases of work.

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- 1.2.2 Intrusive ground investigation works were undertaken as part of this assessment along with geotechnical and geo-environmental assessment/interpretation of the ground.
- 1.2.3 The findings and recommendations given in this report are based on a site walkover and the intrusive ground investigation works carried out on 14<sup>th</sup> March 2014.

## 2 ENVIRONMENTAL INFORMATION

### 2.1 Site Location & Description

- 2.1.1 The site is located off Limestone Road, Burniston and is centred at approximate National Grid Reference (NGR), 500411mE 493353mN. The location of the site is shown on Figure 35267/001.
- 2.1.2 The area investigated comprises grassed open land with a dilapidated derelict brick, pitch roofed dwelling in the southern portion of the site. Also, a brick building is noted in this area with, what appeared to be, an asbestos cement sheet roof. This building was being used to shelter livestock. The storage of chemicals or above and below ground storage tanks were not observed on site. Ponding surface water was noted to occupy a large area of the northern portion of the site. The ground surface was noted to dip steeply from the southwest to the northeast at a gradient of about 1:4.2 ( $14^{\circ}$ ) and from the south to the north by a gradient of approximately 1:13 ( $5^{\circ}$ ).
- 2.1.3 The southern eastern and western site boundaries neighbour residential areas while the northern boundary is formed by open grassed land.
- 2.1.4 Access to the site is from Limestone Road, on the southern site boundary.

### 2.2 Geology, Mining, Ground Stability, Hydrogeology and Hydrology

- 2.2.1 A copy of the GroundSure reports and historical Ordnance Survey plans are presented in Appendices A, B and C.

**Table 2.1 - Geological Information**

<b>Superficial Deposits</b>	Available information indicates that the superficial soils/drift geology at the site comprise glacial till (Diamicton) of the Devensian. These soils typically comprise interbedded layers of clay, silt, sand and gravel with boulders and cobbles of mixed lithology.
<b>Solid Geology</b>	The solid geology underlying the southern and central portion of the site is indicates to comprise sandstone of the Moor Grit Member and mudstone, sandstone and limestone of the Scarborough Formation. The northern portion of the site is noted to be underlain by sandstone, siltstone and mudstone of the Gristhorpe Member.
<b>Hydrogeology</b>	In April 2010 the Environment Agency revised their approach to determining groundwater vulnerability associated with a Site. The

	<p>revised aquifer designation system replaces the old method of classifying aquifers as either Major, Minor or Non-Aquifer (as defined on the 1:100,000 scale Groundwater Vulnerability maps) units. The new approach is in line with the Agency's Groundwater Protection Policy (GP3) and Water Framework Directive (WFD).</p> <p>On this basis, and with respect to Site specific information presented on the Environment Agency's website, the following has been identified:</p> <p><b>Superficial Soils:</b> The superficial soils are indicated to be 'Unproductive', these being of low permeability and having negligible significance for water supply or river base flow.</p> <p><b>Bedrock:</b> The underlying bedrock is indicated to be a 'Secondary A' aquifer. The classification covers a wide range of solid strata, or drift deposits which have a wide range of water permeability and storage capacities.</p> <p>The <b>Secondary A</b> classification (formerly referred to as Minor Aquifer) assumes that the on-site soils comprise permeable layers which are capable of supporting water supplies at a local scale and, in some cases, form an important source of base flow to rivers.</p>
<b>Hydrology</b>	<p>The nearest surface water feature to the site is indicated to be an unnamed stream being located 47m to the north-west. This is culverted 77m to the northwest. The Quarry Beck lies 176m to the northeast of the site.</p> <p>There is no available information with respect to river quality data.</p>
<b>Mining &amp; Ground Stability</b>	<p>The site is not located in or within 1000m of an area that has been subject to below ground coal mining activities.</p> <p>Risk associated with historic mine workings, on the basis of available information, is considered to be low.</p> <p>There are no geological faults recorded as being within 500m of the proposed development area.</p>
<b>Radon</b>	<p>The site does not lie in an area where radon precautions are required.</p>

## 2.3 Environmental Records

2.3.1 A summary of the available environmental information is presented in Table 2.2 below.

**Table 2.2 - Environmental Data**

<b>Potentially Harmful Discharge Consents to Controlled Waters</b>	There are no records of potentially harmful discharges to controlled waters within 500m of the site.
<b>Licensed Discharge Consents</b>	There are no recorded licenced discharge consents within 1000m of the site.

<b>Pollution Incidents</b>	There are no EA recorded pollution incidents within 500m of the site.
<b>Landfill Sites, Waste Management / Transfer / Treatment and Disposal Sites</b>	There are no Environment Agency historic landfill sites, BGS/DoE non-operational landfill sites or other waste treatment/transfer sites within 500m of the site.
<b>Flood</b>	Available information indicates that the site lies within 250m of an Environment Agency indicative Zone 2 and Zone 3 floodplain.  There are reported groundwater (superficial deposits) flooding susceptible areas within 50m of the site.
<b>Groundwater, Potable and Surface Water Abstractions</b>	There are no records relating to the abstraction of groundwater, surface water and/or potable water within 2km of the site.
<b>Public Register of Contaminated Land: Part 2A (EPA 1990)</b>	There are no sites designated as contaminated land under, Section 78R of the EPA 1990, within 500m of the site.
<b>Invasive Plants</b>	No invasive plant species survey has been carried out by AWP.  Invasive plant species may not have been observed due to seasonal variations or access constraints, so it may be prudent to commission a survey to confirm its existence.
<b>Current Land Uses</b>	There is one record of an electrical substation on site.

## 2.4 Historical Land Use

2.4.1 A summary of the historical land use of the site is given in the following tables below. A copy of the Historical Ordnance Survey plans is presented in Appendix D.

**Table 2.4 - Summary of Historical Features (On Site)**

Year	Scale	Principal Features
1854	1:10,560	Undeveloped agricultural land with field boundaries. Limestone Road adjacent to southern site boundary.
1890	1:10,560 1:2,500	No significant changes recorded
1891*	1:10,560	-
1910	1:10,560	No significant changes recorded
1912	1:2,500	No significant changes recorded
1926-1930 1926	1:10,560 1:10,560	No significant changes recorded
1950	1:10,560	2 No. buildings in southwest corner, adjacent to Limestone Road.
1954	1:2,500	No significant changes recorded
1968	1:2,500	No significant changes recorded
1970	1:2,500	No significant changes recorded
1971	1:10,000	No significant changes recorded
1978*	1:10,000	-
1983	1:2,500	No significant changes recorded
1984	1:2,500	No significant changes recorded
1989	1:2,500	No significant changes recorded
1992	1:10,000	No significant changes recorded
1994	1:2,500	No significant changes recorded
2002	1:10,000	No significant changes recorded
2012	1:1,250	No significant changes recorded
2012	1:10,000	No significant changes recorded

\* No mapping detail/part mapping detail shown

**Table 2.5 - Summary of Historical Features (Off Site)**

Year	Scale	Direction	Principal Features
1854	1:10,560	S E, N, S & W SE	Limestone Road Open undeveloped land (agricultural) Burniston village, approximately 750m
1890	1:10,560 1:2,500	- E NE	No significant changes recorded Moorfields Cottages, approximately 750m Hoggitt Hill dwellings, approximately 75m
1891*	1:10,560	-	
1910	1:10,560	SE N	Expansion of Burniston village expanded Quarries, approximately 500m
1912	1:2,500	E	'The Nurseries', approximately 100m
1926	1:10,560	SE	4 No. dwellings on southern edge of Limestone Road, opposite the site.
1926-1930	1:10,560	-	No significant changes recorded
1950	1:10,560	SW	3 No. dwellings adjacent to site boundary
1954	1:2,500	-	No significant changes recorded
1968	1:2,500	E, W & S	Residential developments
1970	1:2,500	-	No significant changes recorded
1971	1:10,000	N	Quarries, approximately 500m, shown as disused
1978*	1:10,000	-	
1983	1:2,500	E, W & S	Residential developments fully complete
1984	1:2,500	-	No significant changes recorded
1989	1:2,500	-	No significant changes recorded
1992	1:10,000	SE	Expansion of residential area between Burniston and the site
1994	1:2,500	-	No significant changes recorded
2002	1:10,000	-	No significant changes recorded
2012	1:10,000 1:1,250		No significant changes recorded

\* No mapping detail/part mapping detail shown



### **3 PHASE I GEOTECHNICAL ASSESSMENT**

#### **3.1 Made Ground**

- 3.1.1 Although no significant thickness of made ground is anticipated, where these are present, they are anticipated to be associated with the construction of the buildings in the south-western site corner.

#### **3.2 Natural Deposits**

- 3.2.1 The underlying natural soils within each of the development areas are expected to comprise firm to stiff cohesive glacial deposits with sand and gravel inclusions along with occasional cobbles and boulders.
- 3.2.2 The solid geology underlying the sites is shown to comprise mudstone, sandstone and limestone of the Moor Grit Member, the Scarborough Formation and the Gristhorpe Member. Although shallow bedrock is not anticipated to be present, it is possible that cobbles and boulders may be encountered.

#### **3.3 Groundwater**

- 3.3.1 No significant shallow groundwater is anticipated, although some perched water within the upper glacial soils may be present. Trapped water within the vicinity of existing buildings may also be encountered.

#### **3.4 Stability Issues**

- 3.4.1 On the basis of available information, risk associated with shallow mine workings is considered to be low.
- 3.4.2 Localised instability of any made ground soils, where present, along with the weathered or soft natural strata should also be anticipated during construction, particularly during prolonged periods of wet weather and/or where these soils are deep.

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### **3.5 Permeability**

- 3.5.1 The near surface cohesive glacial deposits are anticipated to have a low permeability. Therefore, soakaways may not be an appropriate method of managing surface waters from the proposed development.

## 4 PHASE I ENVIRONMENTAL ASSESSMENT

### 4.1 Initial Conceptual Site Model & Risk Assessment

- 4.1.1 The following section summaries the initial Phase I Conceptual Site Model (CSM), which has been produced following the review of available pertinent desk study and third party information and the completion of a site 'walkover' by AWP. 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 pollutant linkages.
- 4.1.2 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.
- 4.1.3 Risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a pollutant linkage is dependent on site use, as well as environmental conditions: **if no pollutant linkage(s) can be proven, then the risk(s) may be discounted.**

### 4.2 Site Summary

- 4.2.1 Historical OS plans show the subject area to have been open land private residential prior to the construction of a dwelling and associated small buildings in the south-western site corner.

### 4.3 Proposed Development

- 4.3.1 It is understood that the site is to be redeveloped for residential purposes comprising a number of houses with gardens and access roads

### 4.4 Environmental Sensitivity

- 4.4.1 Made ground soils may be present locally on site, most likely comprising reworked natural soils. Some imported aggregate materials associated with hard paved areas and the yard are also expected.

4.4.2 The underlying solid geology at the site is shown to be a 'Secondary A' aquifer (previously designated as a 'minor' aquifer). The near surface and shallow depth soils at the site are expected to comprise glacial sandy gravelly clay.

4.4.3 There is one unnamed surface water course present within 50m of the development site.

4.4.4 On the basis of available information, no significant contamination sources are expected.

4.4.5 No significant shallow groundwater is expected.

4.4.6 Sensitivity of the site is considered to be low.

## 4.5 Summary of Potential Sources

4.5.1 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'.

**Table 4.1 - Summary of Historic Potential Sources (On-site)**

Potential Sources	Associated Potential Contaminants	
	<i>Metals, inorganics and other (not limited to)</i>	<i>Organics (not limited to)</i>
Potentially contaminated made ground soils associated with former development	Heavy metals/metalloids, phytotoxic contaminants, sulphates, pH	PAH
Underlying Natural Strata	Heavy metals/metalloids, phytotoxic contaminants, sulphates, pH	PAH

## 4.6 Summary of Potential Receptors

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

**Table 4.2 - Summary of Potential Receptors**

Potential Receptor	Description
Human Health	Future site end-users (including maintenance). Site operatives during construction phase only
Construction	Potable water supply pipes
	Foundations (concrete)

## 4.7 Summary of Potential Pathways

- 4.7.1 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.
- 4.7.2 The principal potential pollution pathways by which receptors might become exposed to potential contamination at the site are summarised as follows.

**Table 4.3 - Summary of Plausible Pathways**

Potential Source	Pathway
Any elevated concentrations of metals/ metalloids and/or PAH in shallow made ground soils and/or near surface natural strata	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

Potential Source	Pathway
Any elevated concentrations of metals/ metalloids and/or PAH in shallow made ground soils and/or near surface natural strata	Root uptake by proposed planting and soft landscaping

## 4.8 Risk Assessment

4.8.1 The potential pollutant 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 encountered at the site;
- The actual distribution of contaminants within any made ground and underlying natural soils;
- Hydrogeological regime beneath the site.

4.8.2 On the basis of available information it is considered that some isolated and discontinuous made ground soils, which could be contaminated, may be present on-site. The level of contamination is considered, at this stage, to be largely unknown, being subject to ground investigation, sample recovery, laboratory testing and reporting.

4.8.3 The assessment assumes that the site end-use is to be residential (with plant uptake). This 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.

4.8.4 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them.

4.8.5 The resulting pollutant linkages are considered in Table 4.5 below. The risk classification has been estimated in accordance with those methods prescribed in Section 6 of CIRIA publication C552 'Contaminated Land Risk Assessment: A Guide to Good Practice', 2001, as summarised further below.

4.8.6 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.

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

- **High Likelihood:** a pollutant 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 pollutant 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 pollutant 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 pollutant linkage exists but it is not possible to say if an event will occur even over a very long time.

4.8.8 Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each pollutant linkage presents: this can only be undertaken where there is a possibility of there being an active pollutant linkage. The risk categories which can be assigned are presented in the following table and range between 'very high risk' to 'very low risk'. It is not possible to classify an identified risk as 'no-risk'.

**Table 4.4 - Risk Categories**

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

Reproduced from Table 6.5, CIRIA C552/2001.

- **Very High** – severe harm could arise or that severe harm is occurring. Urgent investigation and remediation is likely to be required;
- **High** – harm could occur 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.



4.8.9 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The resulting pollutant linkages are:

**Table 4.5 - Initial Conceptual Site Model and Risk Assessment**

Potential Source	Potential Receptor	Plausible Pathway	Probability	Severity	Risk
Any elevated concentrations of metals/ metalloids and PAH in shallow made ground soils and/or near surface natural strata	<u>Human Health</u> (Site end-users, inc. maintenance and site workers - short term risk during construction)	Direct ingestion, dermal contact, dust and/or vapour inhalation	Low Likelihood	Medium	<b>Low/Moderate</b>
		Direct ingestion and/or dermal contact with liquid contaminants	Low Likelihood	Mild	<b>Low</b>
	<u>Construction</u> (Potable Water Supply Pipes)	Leaching and direct contact	Low Likelihood	Medium	<b>Low/Moderate</b>
	<u>Construction</u> (Foundations)	Leaching and direct contact	Low Likelihood	Mild	<b>Low</b>
	Vegetation	Root uptake	Low Likelihood	Mild	<b>Low</b>

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

4.8.11 On the basis of available information therefore, further ground investigation and assessment is required to explore each of the risks identified above.

## 5 PHASE II GROUND INVESTIGATION

### 5.1 Objectives

- 5.1.1 The investigation requirements at the site were twofold: to undertake a geotechnical investigation (for construction purposes) and an environmental investigation.
- 5.1.2 The review of available information highlighted the possibility of there being some shallow discontinuous made ground soils on site, which may contain elevated levels of metals, metalloids and organic contaminants. The made ground is likely to be isolated to the area within the vicinity of existing site strictures.
- 5.1.3 A Phase II environmental investigation was therefore designed so that site-specific data could be obtained with respect to any potential soil and groundwater contamination associated with the historic use of the site so that risks could be quantified in relation to the *source-pathway-receptor* scenarios and plausible pollutant linkages postulated in the initial conceptual site model. Given the, albeit low, potentially contaminative nature of the on-site made ground soils, it was considered possible that, when considered within the context of proposed end-use, the on-site soils may therefore present an unacceptable risk to human health and the wider environment.
- 5.1.4 The environmental investigation was integrated with a geotechnical investigation, which was carried out to identify liabilities in relation to the proposed development work at the site and aid the design of appropriate foundation solutions.
- 5.1.5 Ground investigation works with respect to the environmental investigation were undertaken so that site-specific data could be obtained with respect to ground conditions for the site, the potential for soil and groundwater contamination and so that risks could be quantified in relation to the pollutant linkages postulated in the initial conceptual site model above.
- 5.1.6 The objectives of the ground investigation were therefore to:
- Confirm ground conditions at selected positions across the site;
  - Collect soil samples to assess the potential for soil contamination within any made

ground soils and the underlying natural strata: to test for heavy metals, metalloids, non-metal inorganics and speciated PAH;

- Recover geotechnical samples for testing (as necessary);
- Assess the thickness and nature of made ground soils across the site;
- Assess the geotechnical properties of the underlying natural strata, the thickness and nature of any reworked natural soils and the depth to competent strata;
- Assess the depth to groundwater and establish the hydrogeological regime beneath the site (where encountered).

5.1.7 The objectives of the environmental investigation were undertaken in isolation to the requirements of the geotechnical investigation. As such, the requirements of the environmental investigation were not compromised by those of the geotechnical investigation and vice versa.

## **5.2 Scope of Works**

5.2.1 The strategy of the environmental investigation was designed to reflect the general requirements of the risk assessment and the objectives set out above. Works were designed in accordance with the general principles of BS10175:2011 (aligned with the requirements of a main investigation), the strategic approach for the environmental investigation being to ensure that the design was sufficient to address the objectives as closely as possible.

5.2.2 The investigation set out to assess the identified pollutant linkages by obtaining information on ground conditions, the extent and nature of any contamination (via laboratory testing) and the nature of the hydrogeological regime beneath the site.

## **5.3 Site Works**

5.3.1 The exploratory site works were carried out on 14<sup>th</sup> March 2014, with the ground investigation comprising 9 No. mechanically excavated trial pits (TP1 – TP9), the results of which have been incorporated into this report.

5.3.2 It was not possible to investigate the south-western corner of the site as this area was being used for the storage of livestock. Also, the former dwelling was noted to be in a

dilapidated and very unstable condition. Any vibration resulting from the breaking out of concrete and subsequent excavation within this area may have caused instability of the building.

5.3.3 The positions of all of the exploratory boreholes are shown on the ground investigation plan, Figure 35267/002.

5.3.4 Ground conditions were logged in accordance with BS5930:1999, (BS5930:1999 Amendment 1) and BS EN 1997-2/2007 (EC7 Part 2). A copy of the investigation logs is presented as Appendix E.

## **5.4 Analytical Strategy**

5.4.1 The analytical strategy adopted for the environmental investigation was designed to provide an overall assessment of potential contaminants thought to be present within the on-site soils.

5.4.2 Whilst no specific contaminants of concern were anticipated in significant concentrations, the soil testing undertaken was for a suite of contaminants that are routinely encountered on development sites/where historic made ground soils of unknown type and origin may be present. The testing of the following analytes would allow for an assessment of risk, in relation to human health (e.g. direct contact and inhalation) and the migration of soluble contaminants to be made:

- Heavy metals (including As, Cd, Cr, Cu, Hg, Pb, Ni, Zn);
- Speciated Polycyclic Aromatic Hydrocarbons;
- Cyanide (free and total) and Thiocyanate;
- Phenol (total);
- Sulphates (Total and Water Soluble);
- Sulphide and pH;

5.4.3 Sampling was undertaken in accordance with those guidelines prescribed in Sections 8.3.2 and 8.6 of BS 10175:2011.

5.4.4 Spot samples of soil collected were representative of the material being sampled, with care being taken to minimise cross contamination (i.e. wiping of sampling equipment

between each sampling event) between the made ground horizon and the underlying natural soils. Samples were packed into appropriate and relevant sample containers as supplied by the laboratory: this was to ensure appropriate preservation of the samples prior to their analysis.

- 5.4.5 The samples were packed into cool boxes with ice packs and transported by courier to an MCERTS and UKAS accredited laboratory for storage and analysis. A copy of the chemical laboratory test results is included in Appendix F.

## 6 GROUND CONDITIONS & GEOTECHNICAL ASSESSMENT

### 6.1 General

6.1.1 The ground conditions encountered in the exploratory holes completed at the site have been reviewed. A summary of the lithologies encountered is given in the table below, while discussion about each one is given in the following paragraphs.

**Table 6.1 – Summary of Ground Conditions**

Lithology	Location	Depth to Base (m)	Thickness (m)	Allowable Bearing Capacity (kN/m <sup>2</sup> )
Topsoil	All Locations	0.2 to 0.4	0.2 to 0.4	Nil
Glacial Till	All Locations	1.70+ to 4.00+ Not fully penetrated	1.50+ to 3.80+ Proved	154
Groundwater	None Encountered			

6.1.2 **Topsoil:** This material was noted to comprise soft brown slightly sandy slightly gravelly clay. The gravel fraction comprised angular fragments of sandstone. During the intrusive ground investigation, it was noted that the JCB 3CX excavator sank to its axles in numerous locations on the site. Samples of the topsoil have been scheduled for a targeted programme of laboratory analysis for its suitability within proposed gardens.

6.1.3 No made ground soils were encountered within any of the exploratory holes. However, this material is likely to exist in the south-western corner, associated with the current site buildings on this area. Investigation in this area was not possible due to the storage of livestock and potential instability of the dilapidated former dwelling.

6.1.4 **Glacial Till (Diamicton):** This was encountered within all of the trial pits at shallow depth, below the topsoil. The glacial deposits were noted to comprise firm becoming stiff red/brown mottled grey slightly sandy gravelly clay. The gravel fraction comprises angular to rounded sandstone, siltstone and coal with local inclusions of rounded quartzite. In situ shear vane testing gave a shear strength of between 60 kN/m<sup>2</sup>

and 120kN/m<sup>2</sup> confirming its firm to stiff nature. The base of the glacial deposits was not encountered within any of the exploratory holes.

- 6.1.5 Selected representative samples of the near surface cohesive soils were scheduled for a targeted programme of geotechnical classification tests. The results of the laboratory analyses are summarised below and present in full in Appendix G.

Analysis	Result
Moisture Content (%)	16 to 23
Liquid Limit (%)	24 to 36
Plastic Limit (%)	15 to 18
Plasticity Index (%)	9 to 18
NHBC Modified Plasticity Index (%)	9.1 to 16.92 Low Volume Change Potential

## 6.2 Groundwater

- 6.2.1 No groundwater was encountered within of the exploratory holes across the site. However perched isolated discontinuous groundwater may be present within the near surface cohesive soils.

## 6.3 Stability

- 6.3.1 No stability issues with respect to mine workings are anticipated.
- 6.3.2 Localised instability of any currently unforeseen made ground soils and the underlying near surface natural soils could be encountered during excavation within the south-western corner of the site.
- 6.3.3 It was not possible to investigate some parts of the site due to the steep nature of the site topography and the soft topsoil resulting in potential instability of the excavator. A

large area of ponding water was also present in the northern portion of the site which reduced access to this area. Also, it was not possible to access the south-western site corner, adjacent to the buildings on site, due to the storage of livestock etc. Instability of proposed site plant should be anticipated, therefore, suitable precautions may need to be put in place to ensure that proposed site plant etc. have suitable stable designed and engineered platforms to track and operate from.

## **6.4 Shrinkable Soils**

- 6.4.1 Geotechnical test results indicate that the on-site cohesive soils have a low volume change potential. A copy of the geotechnical test results are presented in Appendix G.



## **7 LABORATORY CHEMICAL TEST RESULTS**

### **7.1 Chemical Test Results - Soil**

- 7.1.1 Representative samples of the underlying made ground and natural soils were collected and tested for a suite of contaminants comprising metals, non-metal inorganics, PAH and asbestos presence. This was in order to assess the general degree and nature of contamination within the on-site soils.
- 7.1.2 A summary of the test results is given in the following tables, whilst a copy of the individual test results is presented in Appendix F.

### **7.2 Guidance for Analytical Results - Assessment Criteria**

- 7.2.1 With reference to the proposed end use of the site, the results of the chemical testing were assessed as part of an environmental risk assessment against a number of potential receptors, considering risks to human health, environmental quality and the built environment. In accordance with CLR11 (DEFRA and Environment Agency, 2004) a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the contaminant concentrations identified. The tier 1 GQRA comprises the initial comparison of the measured concentrations with Generic Assessment Criteria (GAC), which in this instance are considered protective of a *public open space* end-use. For soil data, UK Soil Guideline Values (SGV's), where published, have formed the basis for the GAC.
- 7.2.2 For PAH, GAC values have been sourced from LQM/CIEH 2009 (2<sup>nd</sup> Edition) so that a preliminary and conservative indication of the risk posed by the measured concentrations to human health can be ascertained. The GAC values applied are based on a soil containing 2.5% Soil Organic Matter. In the absence of published SGVs, authoritative GAC values from other sources have been used. Where these are not available, in-house values have been calculated using CLEA (v1.06), adopting appropriate assumptions and input parameters as provided in the recently introduced SR series of Environment Agency reports.

## 7.3 Assessment of Inorganic and Organic (PAH) Contaminants

7.3.1 A summary of the analytical test results is presented in the following table.

**Table 7.1 – Summary of Chemical Test Results (Inorganic)**

Contaminant of Concern	GAC (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
As	32	8.5	53	8	1	Fail
Bo	290^	<0.4	7.5	8	0	Pass
Cd	10	<0.1	0.24	8	0	Pass
Cr (III)	3000^	15	22	8	0	Pass
Cu	200^	7.9	17	8	0	Pass
Hg (Inorganic)	170	<0.1	0.32	8	0	Pass
Ni	130	9.6	29	8	0	Pass
Pb	450**	22	80	8	0	Pass
Se	350	<0.2	0.45	8	0	Pass
Zn	450^	37	67	6	0	Pass

- Test Scenario: Planning - is the true mean lower than the Critical Concentration;

**GAC** for residential with plant uptake unless otherwise stated;

^ AWP/LQM/CIEH;

\*\* SGV<sup>10</sup> has been used as the most suitable source for a lead GAC given the specific calculation method and input data applied.

**Table 7.2 – Summary of Chemical Test Results (Organic)**

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Naphthalene	1.6	<0.1	<0.1	8	0	Pass
Acenaphthylene	380	<0.1	<0.1	8	0	Pass
Acenaphthene	460	<0.1	<0.1	8	0	Pass
Fluorene	370	<0.1	0.17	8	0	Pass
Phenanthrene	200	<0.1	0.15	8	0	Pass
Anthracene	4900	<0.1	<0.1	8	0	Pass
Fluoranthene	460	<0.1	0.54	8	0	Pass
Pyrene	1000	<0.1	0.41	8	0	Pass
Benzo(a)anthracene	4.9	<0.1	0.39	8	0	Pass
Chrysene	8.1	<0.1	0.39	8	0	Pass
Benzo(b)fluoranthene	6.5	<0.1	0.37	8	0	Pass
Benzo(k)fluoranthene	9.6	<0.1	0.15	8	0	Pass
Benzo(a)pyrene	0.94	<0.1	<0.1	8	0	Pass
Dibenzo(ah)anthra...	0.86	<0.1	<0.1	8	0	Pass
Indeno(123cd)pyrene	3.9	<0.1	<0.1	8	0	Pass
Benzo(ghi)perylene	46	<0.1	<0.1	8	0	Pass

- Test Scenario: Planning - is the true mean lower than the Critical Concentration;

\* [LQM/CIEH 2009] for residential land-use scenario at 2.5% SOM unless otherwise stated.

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*Metal, Metalloids and Other Inorganics*

- 7.3.2 A total of 8 samples of near surface and underlying natural soil were tested.
- 7.3.3 Assessment of the soils data indicates that a single sample of soil taken from TP9 at 0.2m depth had 53mg/kg of arsenic in comparison to its GAC of 32mg/kg. This is 1.66 greater than the GAC for the determinand. All of the other metals, metalloids and other inorganics tested for had concentrations below their respective GACs.
- 7.3.4 Potential unacceptable risk to human health in the residential or similar land use with respect to metals, metalloids and non-metal inorganics is therefore anticipated to be significant, on the basis of available data, although the potential risk associated with arsenic should be mitigated.

*Organics (PAH)*

- 7.3.5 A total of 8 samples of near surface and underlying natural soil were tested.
- 7.3.6 Evaluation of the soils data indicates that there are no significant concentrations of potential contaminants of concern that exceed relevant GAC criteria.
- 7.3.7 Potential unacceptable risk to human health with respect to organic contaminants is therefore not anticipated to be significant, on the basis of available data.
- 7.3.8 Made ground was not encountered during the intrusive ground investigation. However, made ground is anticipated to be present within the south-western corner of the site, not accessible during the recent ground investigative works. Following the demolition and removal of the existing site buildings/structures, additional samples of the near surface soils should be analysed for a similar suite of determinands and to include testing for the presence asbestos.
- 7.3.9 Further investigation and analysis of the near surface soils is required in the northern portion of the site following the removal of the ponding water.

## **8 REVISED CONCEPTUAL SITE MODEL & RISK ASSESSMENT**

### **8.1 Introduction**

- 8.1.1 The preliminary CSM given above presented our initial understanding of the site, being based on available geological information, site location, likely contamination status and the overall risk it presented to the identified receptors through various pollution pathways.
- 8.1.2 This section revises the initial CSM on the basis of supplementary information presented above.
- 8.1.3 The CSM and risk assessment has been derived for the protection of human health, assuming a residential (with gardens) scenario, for the post-development case.

### **8.2 Ground Conditions - Summary**

- 8.2.1 No made ground was encountered at the site, with topsoil being underlain by firm becoming increasingly stiff cohesive soils throughout the profile of each exploratory hole.
- 8.2.2 No significant groundwater was encountered during the ground investigation.
- 8.2.3 No visual or olfactory evidence of contamination were noted within the on-site soils during the investigation.

### **8.3 Contaminated Land Risk Assessment**

- 8.3.1 Current UK legislation on contaminated land is principally contained in Sections 78(A) to (YC) in Part IIA of the Environmental Protection Act 1990, which was retrospectively inserted by Section 57 of the Environment Act 1995. The Contaminated Land Regulations 2000 were amended in 2005. The Environmental Protection Act 1990: Part IIA Contaminated Land, Statutory Guidance, Edition 2, 2006, promulgates the revised statutory guidance with respect to the operation of the Contaminated Land Regime following the implementation of the Contaminated Land Regulations, 2005.

8.3.2 The definition of contaminated land is central to the operation of Part IIA. Legislation adopts the principle of a 'suitable for use' approach for the assessment of contaminated land, the rationale reflected in the site-specific risk assessment and determination of remedial strategy. Action is only required if unacceptable risks are posed to human health or to the environment, taking into account the current land use and geo-environmental setting.

8.3.3 The legislation places a responsibility on the Local Authority to determine whether the land under its jurisdiction is contaminated by consideration of whether:

- Significant harm is being caused;
- There is a significant possibility of significant harm being caused;
- Significant pollution of controlled waters is being caused or is likely to be caused.

8.3.4 Section 86 of the Water Act 2003 amends the definition of contaminated land so that Part IIA only applies where 'significant' pollution of controlled waters is being caused, or there is a significant likelihood of there being pollution caused. The definition of what constitutes 'significant' has yet to be issued however.

## **8.4 Assessment Framework**

8.4.1 The statutory guidance describes a risk assessment methodology in terms of 'significant pollutants' and 'pollutant linkages', using 'source-pathway-receptor' scenarios for the site. Pollutant linkages are formed when there is a linkage between a contaminant source and a receptor by means of a pathway. Each element has to be present, or no linkage can be formed.

8.4.2 Risk assessment and the procedure of identifying sources, pathways and receptors is recognised as an approach to determine the extent and significance of contamination either within the context of Part IIA (when assessing current site status or when considering the acquisition of an existing development) or the planning process (for the redevelopment of an existing site, or when considering the acquisition of a site for redevelopment purposes).

Either way, the 'suitable for use' approach is adopted when assessing risk and the source-pathway-receptor assessment defines the conceptual model for the site.

8.4.3 Within the context of this report therefore, the revised risk assessment has been undertaken on the basis that the 'suitable for use' approach remains aligned with the site continuing in its current end use.

## 8.5 Risk Assessment - Summary of Initial Linkages for Assessment

8.5.1 The initial CSM assigned a range of risk categories to the potential pollutant linkages identified for the site:

- Ingestion, dermal contact and inhalation of contaminants (including liquid/dissolved contaminants) within made ground and underlying natural soils by future end users, maintenance workers and construction workers was considered to be **low to moderate**;
- Risk from leaching and/or direct contact with potable water supply pipes and foundations was considered to be **low to moderate**;
- Risk with respect to plant uptake was considered to be **low**.

## 8.6 Revised Assessment Linkages

8.6.1 On the basis of the ground investigation and laboratory test results, it is evident that the on-site soils do not contain elevated concentrations of the majority of the metal, metalloid, and non-metal inorganic contaminants of concern in excess of the adopted GAC, although a single sample of the near surface soil in the northern portion of the site had a slightly elevated arsenic concentration.

8.6.2 Reassessment of the potential pollutant linkages in relation to the site specific contamination data indicates that there is a potential pollutant linkage which may result in a potential unacceptable risk to the proposed development. In summary, the revised CSM identified the following:

- Ingestion, dermal contact and inhalation of contaminants within made ground and underlying natural soils by future end users, maintenance workers and construction workers is considered to be **low to moderate**;
- Ingestion, dermal contact and inhalation of liquid/dissolved contaminants within made ground and underlying natural soils by future end users, maintenance workers and construction workers is considered to be **low**;
- Risk from leaching and/or direct contact with potable water supply pipes is considered to be **low**;
- Risk from leaching and/or direct contact with foundations is considered to be **low**;
- Risk to underlying natural strata/controlled waters is considered to be **low**;
- Risk to future plant growth is considered to be **low**.



## **9 RECOMMENDATIONS**

### **9.1 Site Preparation**

- 9.1.1 Subject to confirmation of proposed levels, it is envisaged that the bulk of the enabling works for the site will be associated with the demolition and breaking-out of existing buildings, floor-slabs, foundations and areas of hardstanding. These works will need to be integrated into any additional works where excavation is required to reduce and/or re-grade site levels given the elevation differences that exist locally across the proposed development area.
- 9.1.2 Given the steeply inclined nature of the site's current topography, finished site levels will need to be established by creating suitably designed and engineered development platforms and access roads. This may require a cut and fill operation during the initial site enabling works. Designed and engineered temporary/permanent earth retaining structures may be required to accommodate finished site ground levels.
- 9.1.3 Any materials 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. The waste should also 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.

### **9.2 Foundations**

- 9.2.1 Made ground soils, where present, are unsuitable founding material due to their lateral and vertical variation. These soils are considered to have insufficient allowable safe bearing capacity to support traditional shallow foundations, without the likelihood of foundation shear failure and/or unacceptable total and differential settlements.
- 9.2.2 Ground conditions indicate that traditional strip or trench fill foundations will be suitable for use within the farm site development area, these being taken through the upper soil and loam surface and into the underlying clay at a probable depth of between 750-900mm. Consideration will need to be given to the placement of the proposed plots in

relation to any planned earth retaining structures, to achieve finished ground levels, in order to ensure their continued stability.

- 9.2.3 Where traditional foundations are suitable, care will need to be taken where they are found to straddle strata of different type, or where soft or locally unstable ground is encountered at founding depth. Where this occurs foundations may need to be widened, deepened and/or strengthened to prevent differential settlement.

### **9.3 Precautions Near Trees**

- 9.3.1 Precautions may be required when in clay given the presence of trees along the western side of the workshops/yard area. The on-site cohesive soils have been proven to have a low volume change potential.

### **9.4 Floor Slabs**

- 9.4.1 It is anticipated that ground floor slabs will be suspended where proposed plots are located within the vicinity of existing or removed trees or where made ground is in excess of 600mm thick. Otherwise, ground bearing slabs may however be adopted.

### **9.5 Concrete Design**

- 9.5.1 Soil sulphate concentrations measured during the investigations have been compared to levels within the BRE Special Paper SD1:2005. In considering the sulphate values, the site is considered to be Brownfield.
- 9.5.2 The Design Sulphate Class is anticipated to be DS-1, the Aggressive Chemical Environment for Concrete (ACEC) Class, AC-1s. This does not make any necessary allowance for the requirements of structural strength, or requirements for durability of concrete and concrete products in the ground.

### **9.6 Drainage**

- 9.6.1 Percolation tests were undertaken in two accessible trial pits, in accordance with BRE365. The results of the testing are presented in full in Appendix E. These confirm the impermeable nature of the near surface cohesive soils and are considered that soakaways will not be suitable for use at the site.

9.6.2 Surface water will need to be taken to a suitable drainage system (possibly to an existing drains that cross/exit the site), subject to obtaining approvals from regulatory authorities.

## **9.7 Roads and Car Parks**

9.7.1 A preliminary CBR value of 2.0% is suggested for the natural soils at the site.

9.7.2 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.

9.7.3 It is recommended that In-situ CBR testing is carried out when final site levels are known.

9.7.4 All road design should be discussed with the local authority if highways are to be subject to a Section 38 agreement.

## **9.8 Potable Water Supply**

9.8.1 Whilst risk to potable water supply pipes is considered to be low, it may be that protective measures may be required should there be a water feed to the new buildings.

9.8.2 Consultation should also be undertaken with the local water authority with respect to any precautions they may require, prior to construction.

## **9.9 Ground Stability**

9.9.1 Given the steeply inclined ground surface and the very soft nature of the topsoil, instability of proposed site plant is to be anticipated. Therefore, designed and engineered platforms and temporary road ways will be required for the site plant to operate from. Further assessment should be undertaken.

9.9.2 It is possible that some localised instability of excavations may be encountered during construction, particularly during periods of wet weather. Instability should therefore be anticipated, particularly where deep service trenches are excavated.

9.9.3 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.

## **9.10 Groundwater**

9.10.1 No significant groundwater was encountered during the ground investigation. However, its existence cannot be entirely ruled out and allowances should be made for the management of localised perched groundwater bodies should they be encountered.

## **9.11 Outline Remediation and Environmental Management**

9.11.1 An elevated concentration of arsenic has been measured within the shallow on-site soils. As such, it is considered that mitigation measures will be required given the proposed end use of the site.

9.11.2 Given that the elevated arsenic concentration was recorded within a single sample of the topsoil and given that this will be removed as part of the initial site enabling works and that samples of the underlying glacial deposits had concentrations of the contaminants of concern tested for below their respective GACs, further mitigating measures are not considered necessary. However, this will need to be confirmed once additional investigation of the flooded area of the site and the inaccessible area in the south-western corner of the site has been undertaken.

9.11.3 Contamination is likely to pose only a short-term risk to workers during construction. Any potential risks must however be specifically assessed as part of the health and safety evaluation for the works to be performed in accordance with prevailing legislation. Site practices must conform to the specific legislative requirements and follow appropriate guidance (e.g., HSE, 1991; CIRIA, 1996).

9.11.4 Should brightly coloured or odorous soil or groundwater be encountered during the proposed construction works, AWP should be notified immediately. An experienced geo-environmental engineer will visit site for further sampling, analysis and risk assessment, where required.

9.11.5 Any materials 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. The waste should also 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.

## 10 LIMITATIONS OF STUDY

- 10.1.1 This document has been prepared by AWP for the titled project and should not be relied upon or used for any other project without prior written authorization being obtained from AWP. AWP 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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- 10.1.3 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. AWP 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 AWP. 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. AWP's 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.
- 10.1.4 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.
- 10.1.5 This report provides an assessment of the potential contamination status of the ground below the site, being based only upon information available for review. This report does not however constitute an archaeological or ecological assessment, nor does it

constitute an asbestos inspection. A suitably qualified consultant should be consulted where these aspects of work are required.

10.1.6 The assessment has been completed in accordance with the general principles of BS:10175 (2011).

10.1.7 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, AWP reserves 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 AWP 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.

10.1.8 The conclusions and recommendations presented in this report are based on site-specific information obtained during the desk study, ground investigation and laboratory analysis. They are however limited to those that could be reasonably made at the time the assessment was undertaken. AWP reserve the right to retract either conclusions or recommendations in light of any further information that may become available.

10.1.9 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.

10.1.10 The limitations of liability of AWP 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.

## 11 REFERENCES

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] British Geological Survey, Sheet E35 & E44 Whitby & Scalsby (1:50,000 scale, solid & drift edition);
- [2] The Coal Authority, [www.coal.gov.uk](http://www.coal.gov.uk);
- [3] BRE BR211 (2007) *Radon: guidance on protective measures for new dwellings*;
- [4] BRE GBG 75 (2009), '*Radon Protection For New Large Buildings*';
- [5] Environment Agency (2009). *Using SGV's*. Science Report SC050021/SGV, Introduction;
- [6] Environment Agency (2009). *Human Health Toxicological Assessment of Contaminants in Soil*, Science Report SC050021/SR2;
- [7] Environment Agency (2009). *Updated Technical Background to the CLEA Model*, Science Report SC050021/SR3;
- [8] Environment Agency (2004) *Model Procedures for the Management of Land Contamination*, Contaminated Land Report CLR11;
- [9] NHBC Chapter 4.2 (2003), *Building near trees*, NHBC Publication, July 2007;
- [10] CIRIA C665 (2007), *Assessing risks posed by hazardous ground gases to buildings*;
- [11] BS5930 (1999), *Code of practice for site investigations*;
- [12] LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment, 2nd Edition, 2009;



- 
- [13] 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 20<sup>th</sup> March 2000.

## FIGURES



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Client. **The Gascoine Group Ltd**

Project. **Limestone Road, Burniston**

Drawing. **Site Location Plan**

Date. **01.04.14**

Scale. **NTS**

Drawn by.

**AHB**

Check by.

Approved by.

Status:

**FINAL**

Job no.

**35267**

Fig. no.

**001**

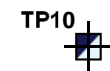
Rev.



# KEY



AWP Percolation Test



AWP trial pit location



Approximate red line site boundary



Inaccessible area due to ponding surface water



Alan Wood & Partners

Client. **Gascoine Group Limited**

Project. **Limestone Road, Burniston**

Drawing. **Ground Investigation Location Plan**

Date. **14.03.14**

Scale. **NTS**

Drawn by.

**AHB**

Check by.

Approved by.

Status: **FINAL**

Job no.

**35267**

Fig. no.

**002**

Rev.



## **APPENDIX A**

### **EMAPSITE - GROUNDSURE GEOINSIGHT REPORT, MARCH 2014**



EmapSite

Masdar House,  
Eversley, RG27 0RP

Report Reference: EMS-239929\_320558

Your Reference: EMS\_239929\_320558

Report Date 3 Mar 2014

Report Delivery Method: Email - pdf

## GroundSure Geoinsight

Address: ,

Dear Sir/ Madam,

Thank you for placing your order with GroundSure. Please find enclosed the **GroundSure GeoInsight** 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 GeoInsight





# GroundSure GeoInsight

Address: ,  
Date: 3 Mar 2014  
Reference: EMS-239929\_320558  
Client: EmapSite



Aerial Photograph Capture date:  
Grid Reference: 500411,493353  
Site Size: 2.02ha

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# Overview of Findings

The GroundSure GeoInsight 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 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow 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

1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?	Yes
	1.2.2 Are there any records relating to permeability of superficial geology within the study site boundary?	Yes
	1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	1.2.4 Are there any records relating to permeability of landslips within the study site boundary?	No
1.3 Bedrock, Solid Geology & Faults	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 relating to permeability of bedrock within the study site boundary?	Yes
	1.3.3 Are there any records of faults within 500m of the study site boundary?	No
1.4 Radon data	1.4.1 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
	1.4.2 Is the property in an area where Radon Protection Measures 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

## Section 2:Ground Workings

	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	0	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	0	0	0	2	2

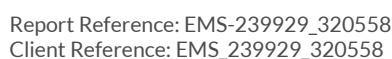
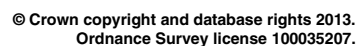
Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining	0	0	0	0	0
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Very Low
4.2 Landslides	Very Low
4.3 Ground Dissolution of Soluble Rocks	Null
4.4 Compressible Deposits	Negligible
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Very Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	0	0	0

Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	3	0	4

## 1.1 Artificial Ground Map





# 1 Geology

## 1.1 Artificial Ground

### 1.1.1 Artificial/ Made Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:044

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

Database searched and no data found.

---

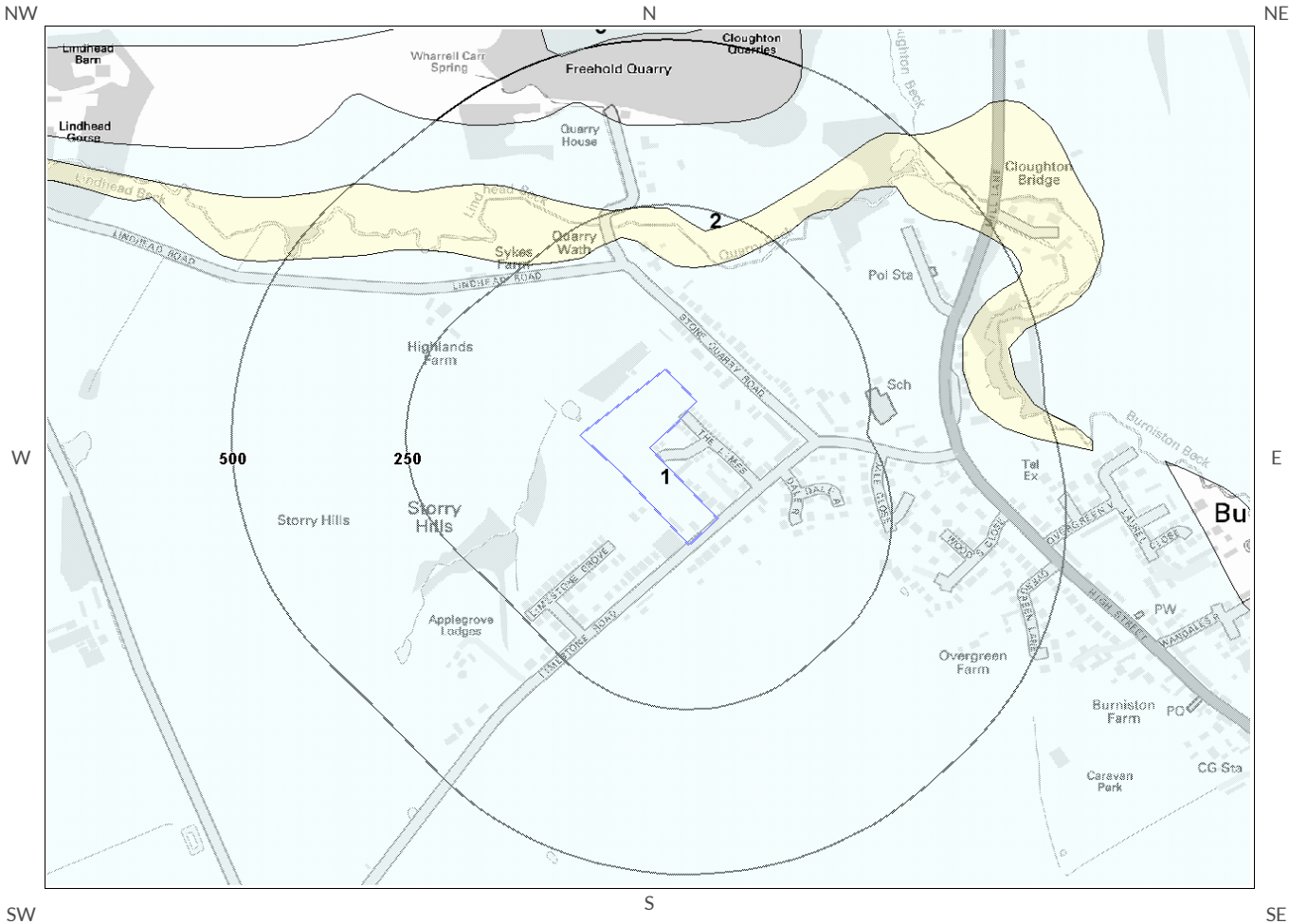
### 1.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

---


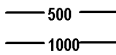
# 1.2 Superficial Deposits and Landslips Map



Superficial Deposits and Landslips  
Legend



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-  Site Outline
-  Search Buffers (m)

## 1.2 Superficial Deposits and Landslips

### 1.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
2	158.0	N	ALV-CSSG	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	498.0	N	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

### 1.2.2 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	High	Low

### 1.2.3 Landslip

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

Database searched and no data found.

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.

### 1.2.4 Landslip Permeability

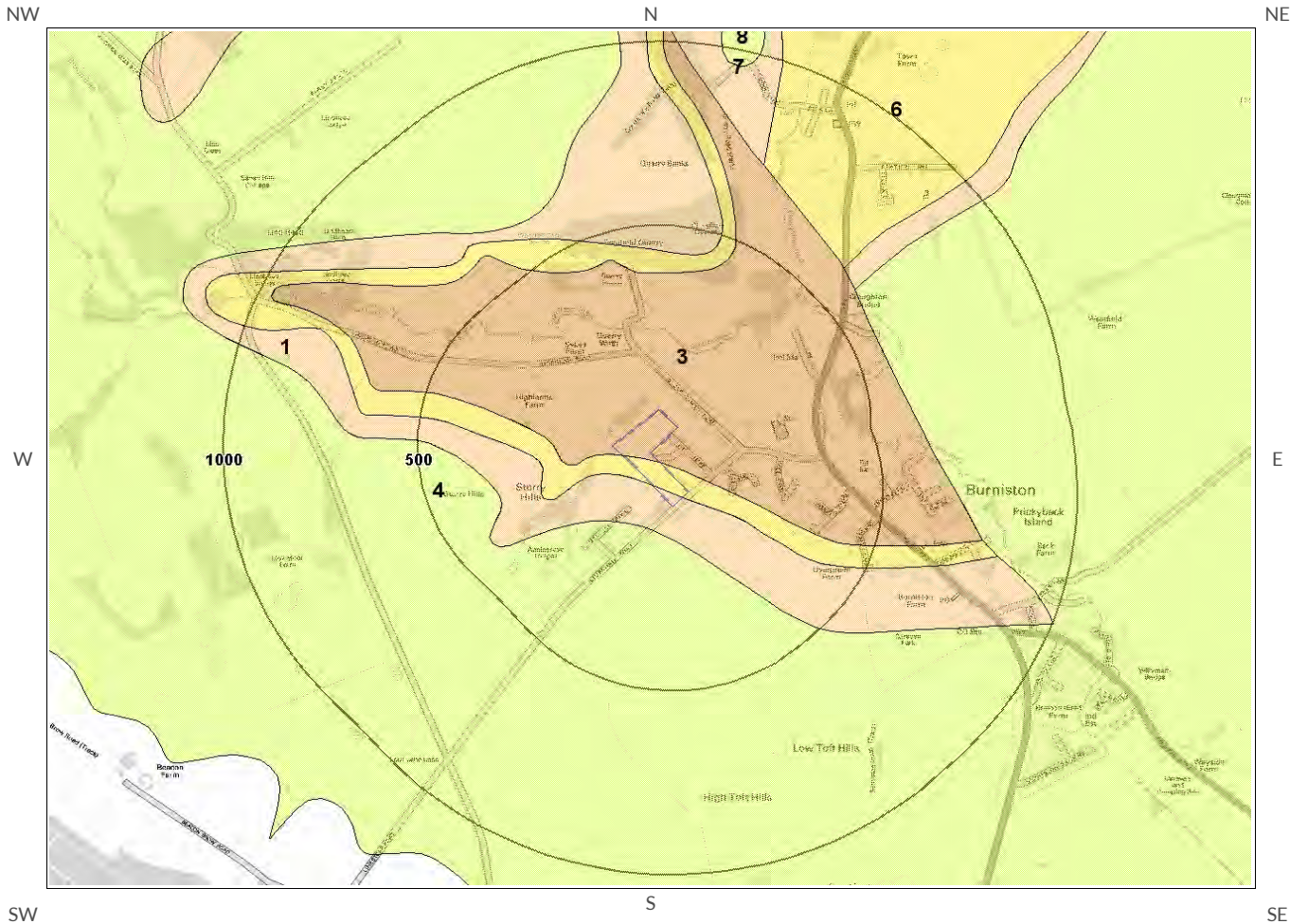
Are there any records relating to permeability of landslips within the study site\*\* boundary? No

Database searched and no data found.

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




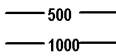
# 1.3 Bedrock and Faults Map



Bedrock and Faults Legend



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-  Site Outline
-  Search Buffers (m)

# 1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:044

## 1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	MRG-SDST	Moor Grit Member - Sandstone	Bajocian
2	0.0	On Site	SCR-MDSL	Scarborough Formation - Mudstone, Sandstone And Limestone	Bajocian
3	0.0	On Site	GRPE-SDSM	Gristhorpe Member - Sandstone, Siltstone And Mudstone	Bajocian
4	80.0	SW	LNAB-SDSM	Long Nab Member - Sandstone, Siltstone And Mudstone	Bathonian / Bajocian

## 1.3.2 Permeability of Bedrock Ground

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

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low
0.0	On Site	Intergranular	High	Low
0.0	On Site	Mixed	High	Moderate

## 1.3.3 Faults

Are there any records of Faults 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 nationwide coverage.

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



# 1.4 Radon Data

## 1.4.1 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

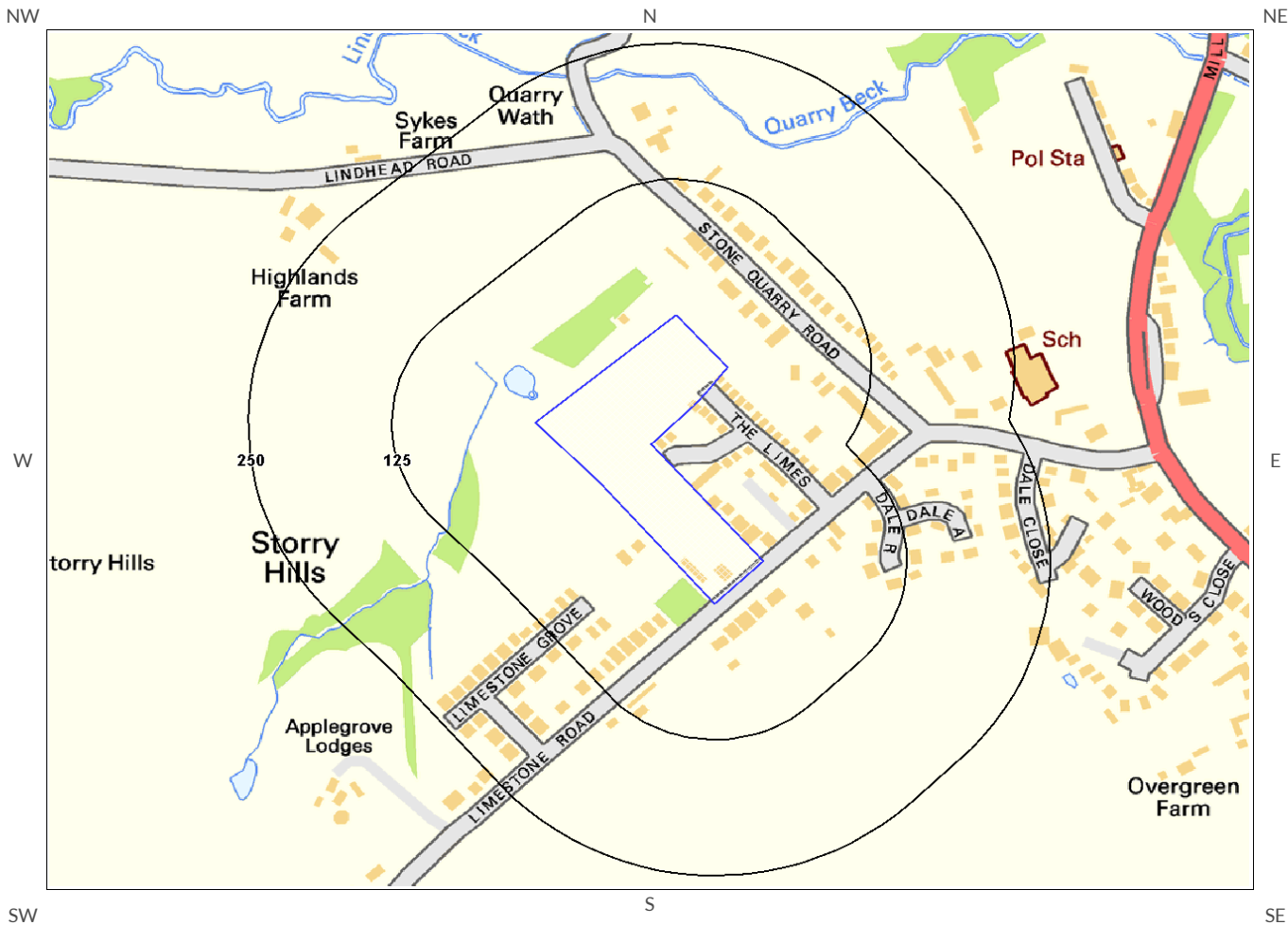
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## 1.4.2 Radon Protection

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

---





# 2 Ground Workings Map



Ground Workings Legend



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



## 2 Ground Workings

### 2.1 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.

### 2.2 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.

### 2.3 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	456.0	N	500535 493922	Sandstone	Cloughton Mill	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	494.0	N	500385 493970	Sandstone	Cloughton	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	501.0	N	500490 493975	Sandstone	Cloughton	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	534.0	NW	500200 493960	Sandstone	Freehold	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

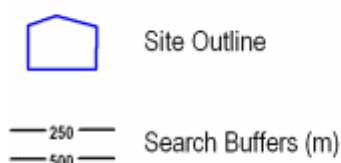
# 3 Mining, Extraction & Natural Cavities Map



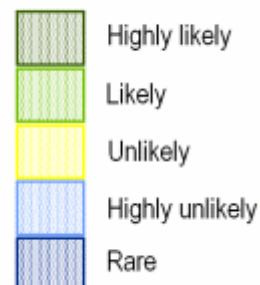
Mining, Extraction and  
Natural Cavities Legend



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## Non-Coal Mining





## 3 Mining, Extraction & Natural Cavities

### 3.1 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.

---

### 3.2 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.

---

### 3.3 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.

---

### 3.4 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.

---

### 3.5 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.

---

### 3.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

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

Database searched and no data found.

---

### 3.7 Brine Extraction

This dataset provides information from the Brine Compensation Board which has been discontinued and is now covered by the Coal Authority.

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

Database searched and no data found.

---

### 3.8 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.

---

### 3.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level.

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

Database searched and no data found.

---

### 3.10 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

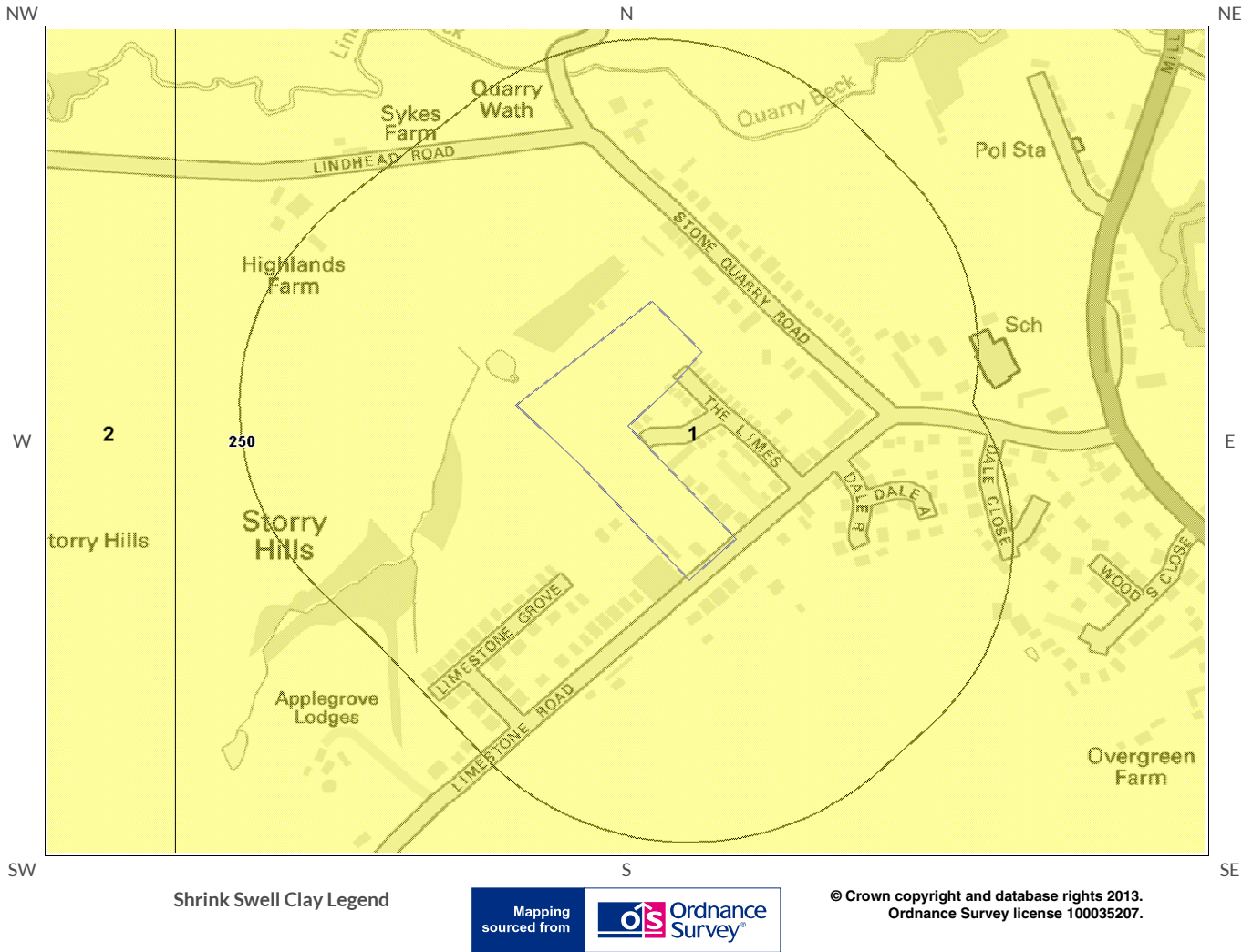
Database searched and no data found.

---



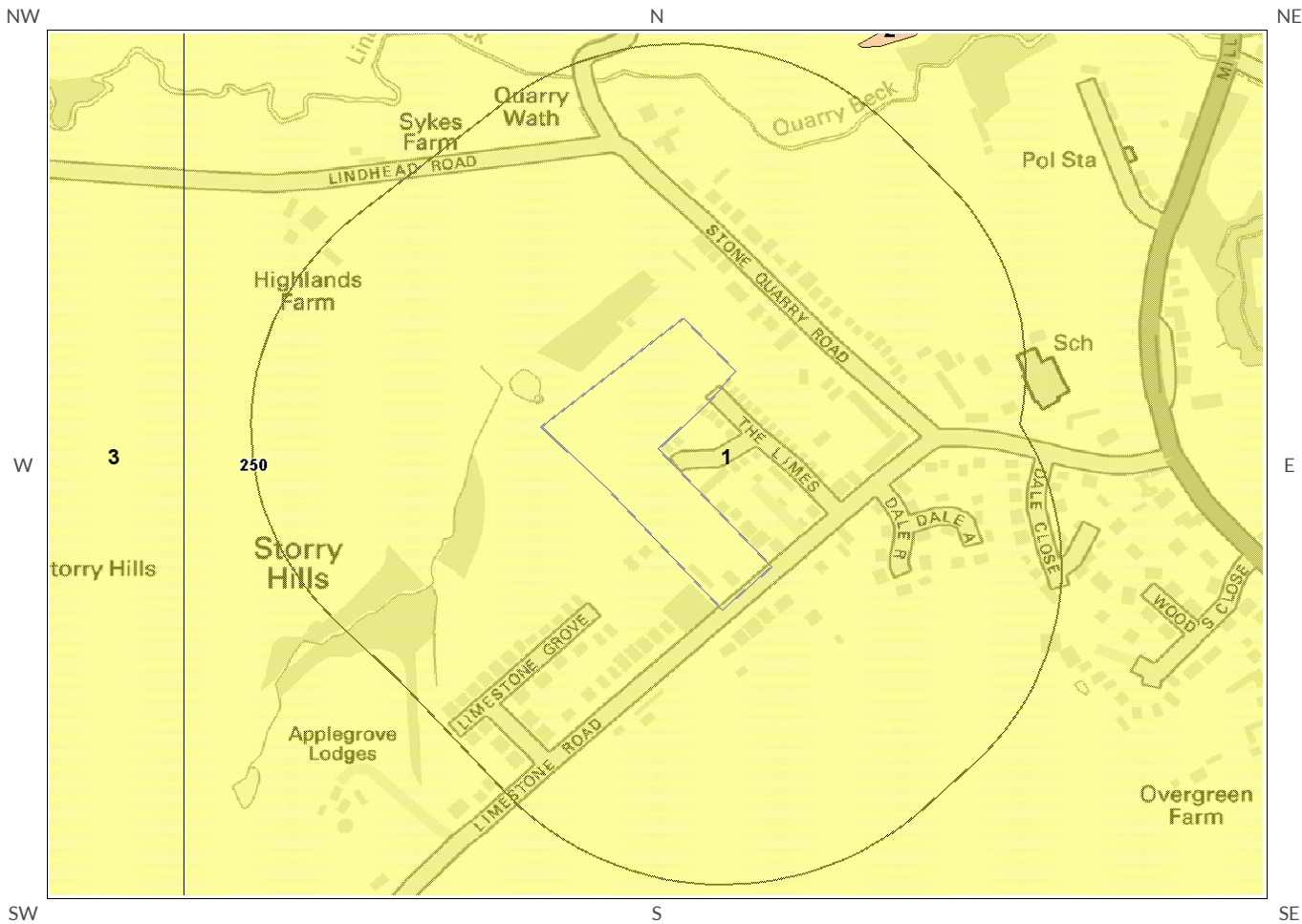
# 4 Natural Ground Subsidence

## 4.1 Shrink-Swell Clay Map





# 4.2 Landslides Map



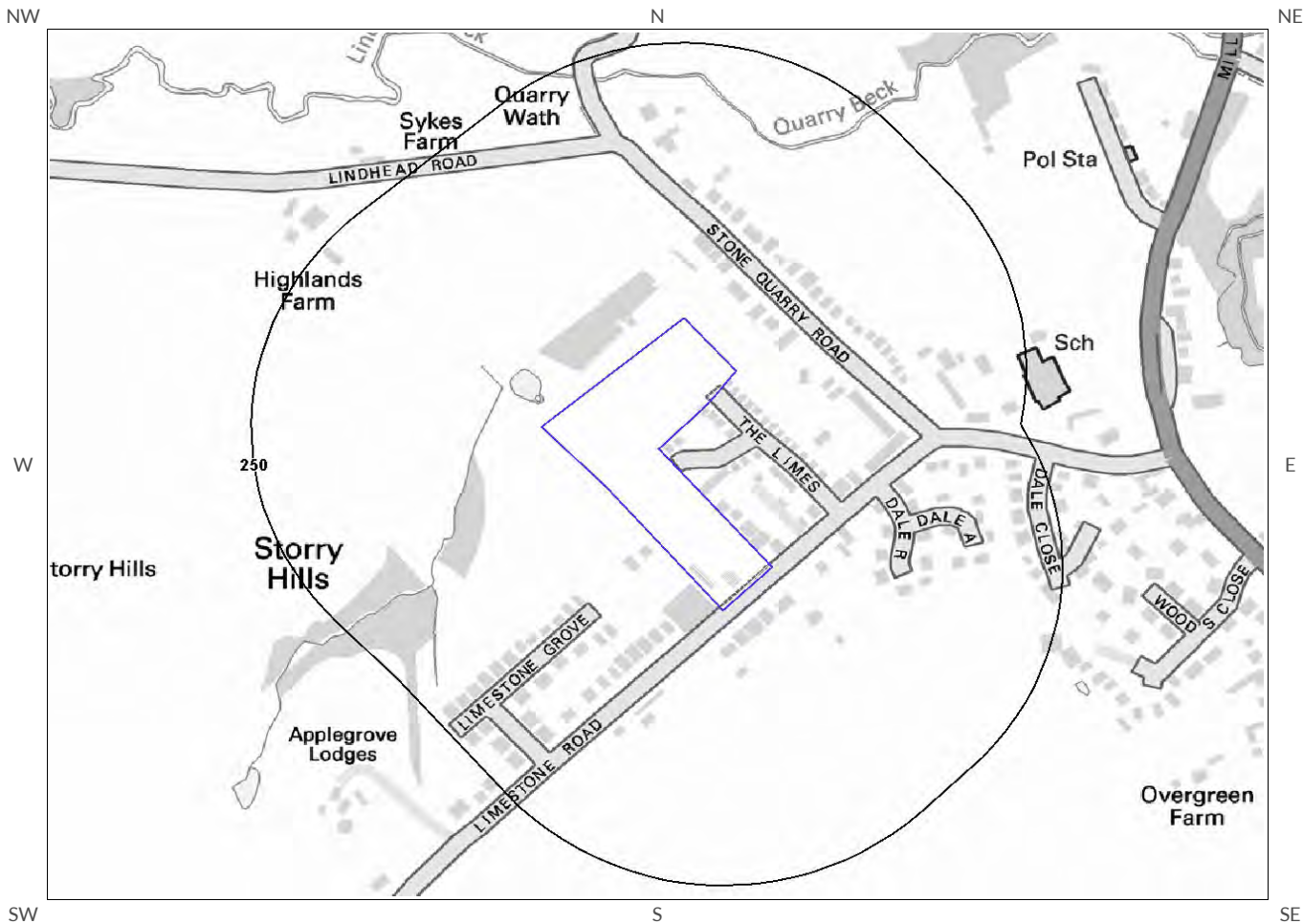
Landslides Legend



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# 4.3 Ground Dissolution Soluble Rocks Map



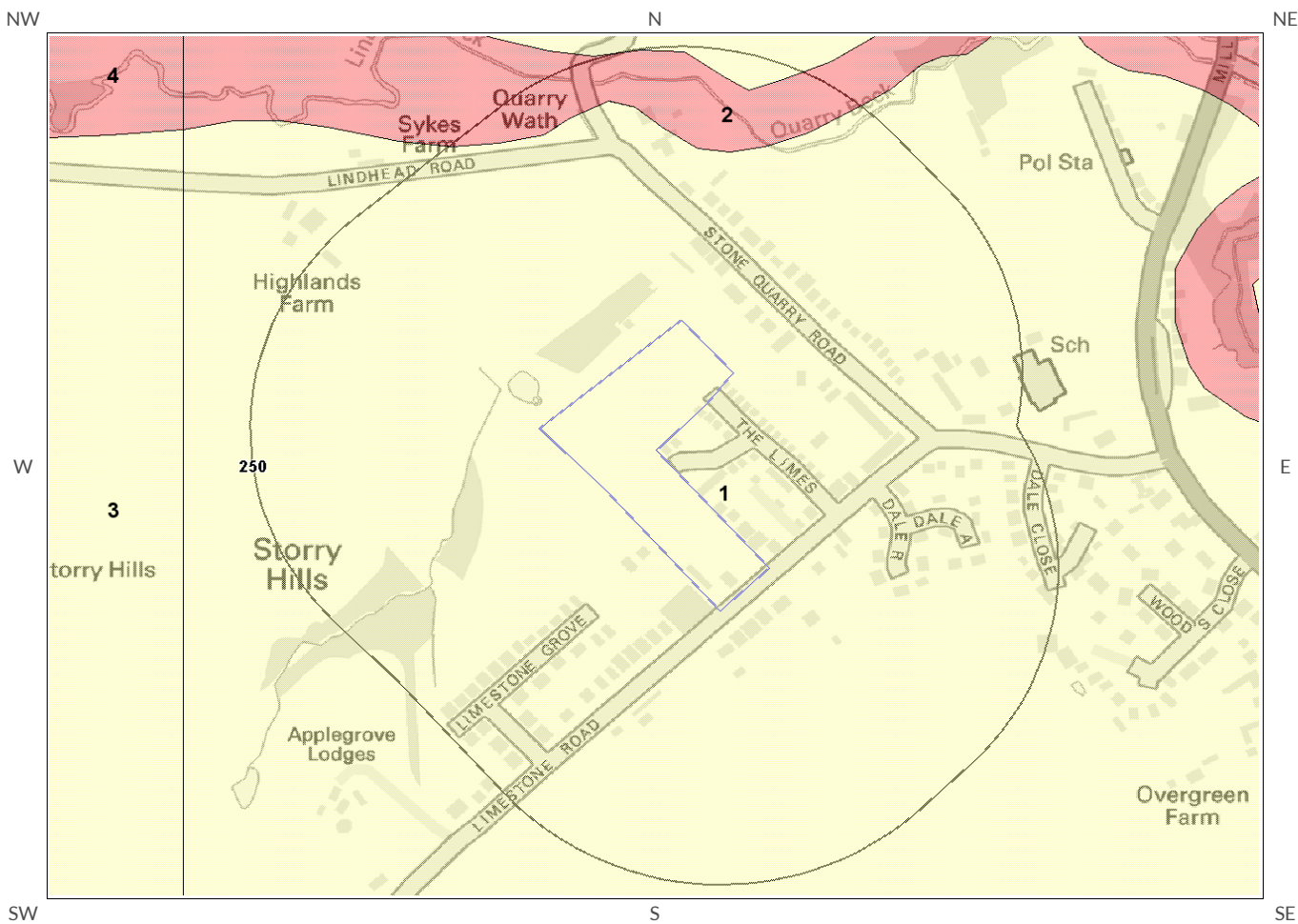
Ground Dissolution Soluble Rocks Legend



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	Site Outline		No Data / Null		Low
	Search Buffers (m)		Negligible		Moderate
			Very Low		High

# 4.4 Compressible Deposits Map



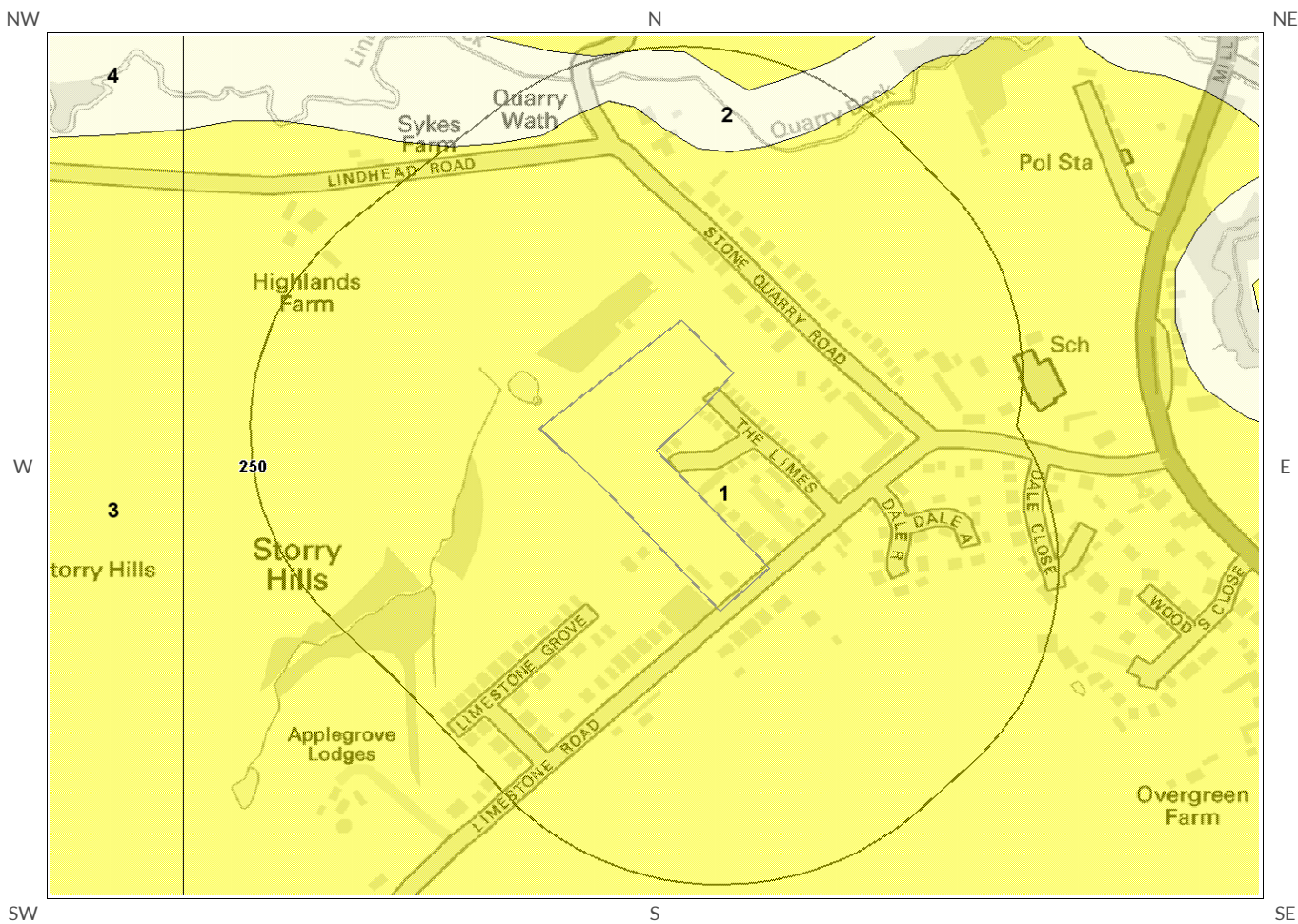
Compressible Deposits Legend



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# 4.5 Collapsible Deposits Map



Collapsible Deposits Legend

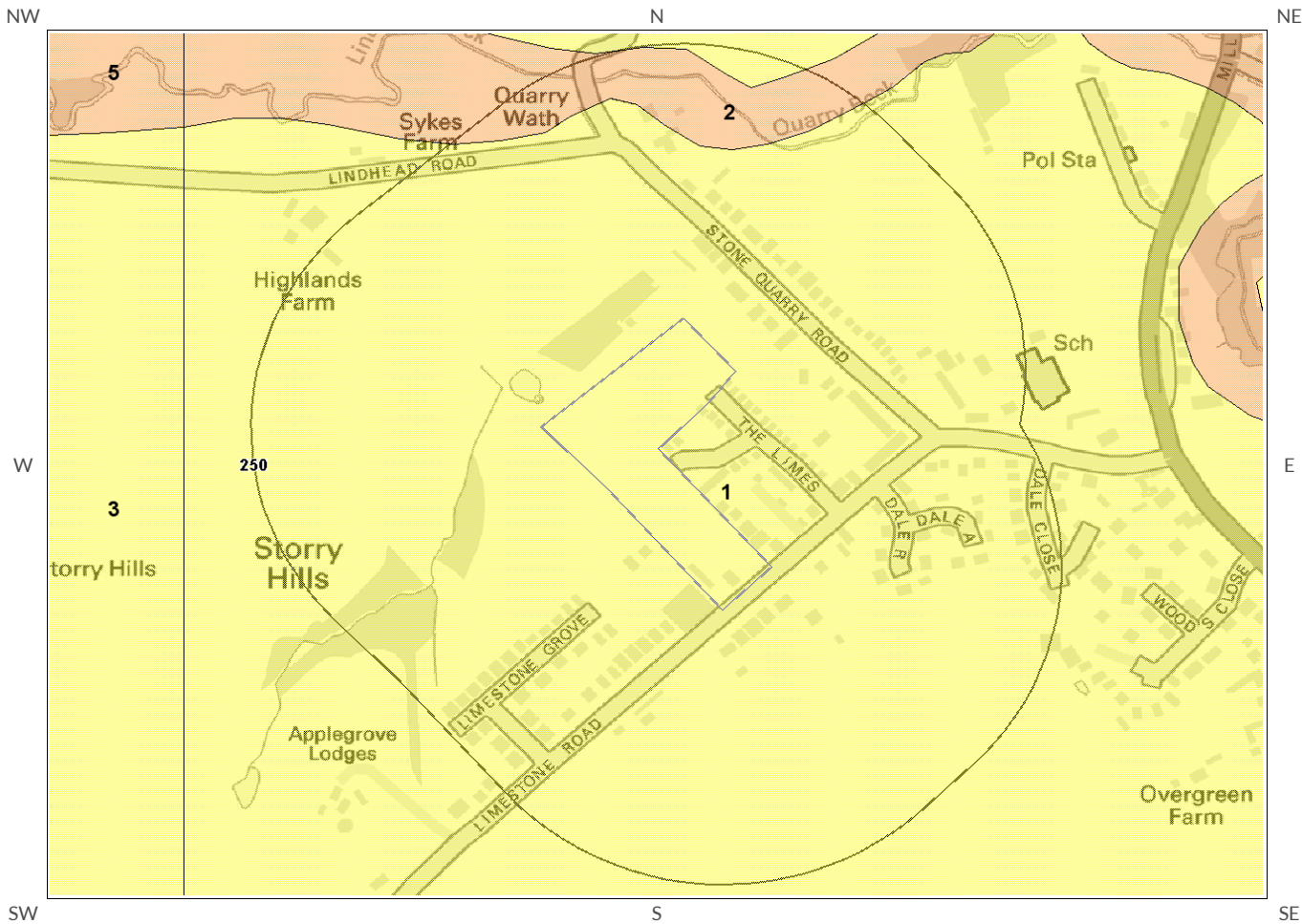


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# 4.6 Running Sand Map



Running Sand Legend



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## 4 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? Very Low

### 4.1 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	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

### 4.2 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.

### 4.3 Ground Dissolution of Soluble Rocks

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

Distance (m)	Direction	Hazard Rating	Details
0	On site	Null-Negligible	Soluble rocks are not present in the search area. 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.

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

## 4.4 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	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

## 4.5 Collapsible Deposits

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

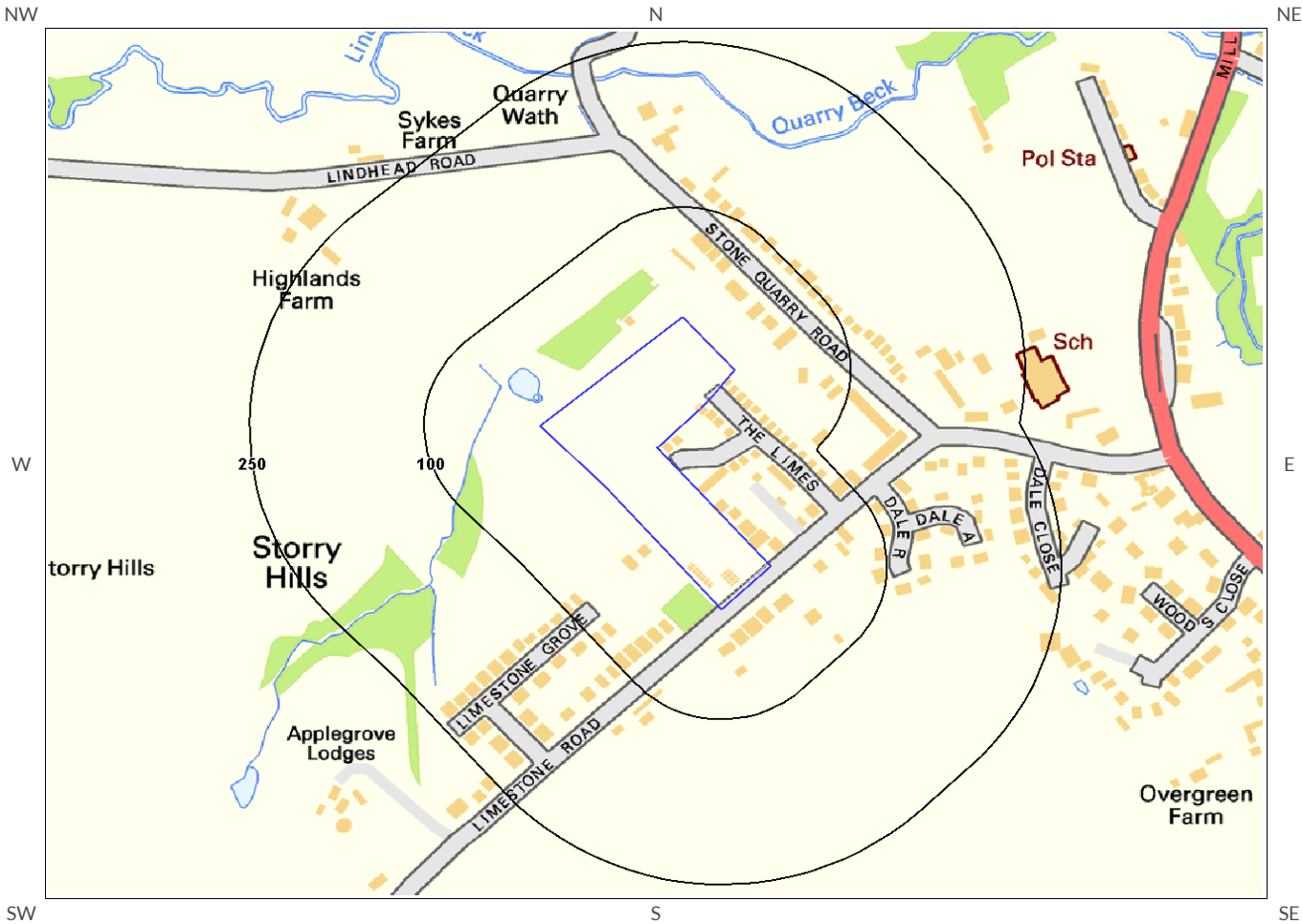
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

## 4.6 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	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. 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.



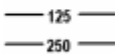
# 5 Borehole Records Map



Borehole Records Legend



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-  Site Outline
-  Borehole Locations
-  Search Buffers (m)





## 5 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.

---



## 6 Estimated Background Soil Chemistry

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

7

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

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 mg/kg
80.0	SW	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 mg/kg
158.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 mg/kg
213.0	S	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 mg/kg
218.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<150 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.

# Contact Details



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Telephone: 0118 9736883  
sales@emapsite.com



## British Geological Survey Enquiries

Kingsley Dunham Centre  
Keyworth, Nottingham NG12 5GG  
Tel: 0115 936 3143.  
Fax: 0115 936 3276.  
Email: [enquiries@bgs.ac.uk](mailto:enquiries@bgs.ac.uk)  
Web: [www.bgs.ac.uk](http://www.bgs.ac.uk)

BGS Geological Hazards Reports and general geological enquiries



## British Gypsum

British Gypsum Ltd  
East Leake  
Loughborough  
Leicestershire  
LE12 6HX



## The Coal Authority

200 Lichfield Lane  
Mansfield  
Notts NG18 4RG  
Tel: 0845 762 6848  
DX 716176 Mansfield 5  
[www.coal.gov.uk](http://www.coal.gov.uk)



## Public Health England

Public information access office  
Public Health England, Wellington House  
133-155 Waterloo Road, London, SE1 8UG  
<https://www.gov.uk/government/organisations/public-health-england>  
Email: [enquiries@phe.gov.uk](mailto:enquiries@phe.gov.uk)  
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## Ordnance Survey

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## Getmapping PLC

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## Peter Brett Associates

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Waterman Place  
Reading  
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Tel: +44 (0)118 950 0761 E-mail: [reading@pba.co.uk](mailto:reading@pba.co.uk)  
Website: <http://www.peterbrett.com/home>



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Report Reference: EMS-239929\_320558

Client Reference: EMS\_239929\_320558

## Standard Terms and Conditions

### 1 Definitions

In these terms and conditions unless the context otherwise requires:

**"Beneficiary"** means the person or entity for whose benefit the Client has obtained the Services.

**"Client"** means the party or parties entering into a Contract with GroundSure.

**"Commercial"** means any building or property which is not Residential.

**"Confidential Information"** means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than

(i) information which the Client can prove was rightfully in its possession prior to disclosure by GroundSure and

(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).

**"Support Services"** means Support Services provided by GroundSure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

**"Contract"** means the contract between GroundSure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.

**"Third Party Data Provider"** means any third party providing Third Party Content to GroundSure.

**"Data Reports"** means reports comprising factual data with no accompanying interpretation.

**"Fees"** has the meaning set out in clause 5.1.

**"GroundSure"** means GroundSure Limited, a company registered in England and Wales under number 03421028.

**"GroundSure Materials"** means all materials prepared by GroundSure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.

**"Intellectual Property"** means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.

**"Mapping"** means a map, map data or a combination of historical maps of various ages, time periods and scales.

**"Order"** means an electronic, written or other order form submitted by the Client requesting Services from GroundSure in respect of a specified Site.

**"Ordnance Survey"** means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.

**"Order Website"** means the online platform through which Orders may be placed by the Client and accepted by GroundSure.

**"Report"** means a Risk Screening Report or Data Report for Commercial or Residential property.

**"Residential"** means any building or property used as or intended to be used as a single dwelling.

**"Risk Screening Report"** means a risk screening report comprising factual data with an accompanying interpretation by GroundSure.

**"Services"** means any Report, Mapping and/or Support Services which GroundSure has agreed to provide by accepting an Order pursuant to clause 2.6.

**"Site"** means the area of land in respect of which the Client has requested GroundSure to provide the Services.

**"Third Party Content"** means data, database information or other information which is provided to GroundSure by a Third Party Data Provider.

"User Guide" means the user guide, as amended from time to time, available upon request from GroundSure and on the website ([www.GroundSure.com](http://www.GroundSure.com)) and forming part of this Contract.

### 2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 GroundSure agrees to provide the Services in accordance with the Contract.

2.2 GroundSure shall exercise reasonable skill and care in the provision of the Services.

2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.

2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.

2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, GroundSure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and GroundSure will have no liability therefor. In addition you acknowledge and agree that GroundSure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.

2.6 GroundSure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by GroundSure. GroundSure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by GroundSure. GroundSure's acceptance of an Order

shall be binding only when made in writing and signed by GroundSure's authorised representative or when accepted through the Order Website.

### 3 The Client's obligations

3.1 The Client shall comply with the terms of this Contract and

(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and

(ii) be liable to GroundSure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.

3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.

3.3 The Client shall supply to GroundSure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as GroundSure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.

3.4 Where the Client's approval or decision is required to enable GroundSure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.

3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the GroundSure Materials, or use the GroundSure Materials in a manner for which they were not intended. The Client may make the GroundSure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that GroundSure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

### 4 Reliance

4.1 The Client acknowledges that the Services provided by GroundSure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by GroundSure to be reliable.

4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;

- (i) the Beneficiary,
- (ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),
- (iv) the first purchaser or first tenant of the Site, and
- (v) the professional advisers and lenders of the first purchaser or tenant of the Site.

4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by GroundSure. Any party considering such Reports and Services does so at their own risk.

### 5 Fees and Disbursements

5.1 GroundSure shall charge and the Client shall pay fees at the rate and frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by GroundSure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").

5.2 The Client shall pay all outstanding Fees to GroundSure in full without deduction, counterclaim or set off within 30 days of the date of GroundSure's invoice or such other period as may be agreed in writing between GroundSure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.

5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of GroundSure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

### 6 Intellectual Property and Confidentiality

6.1 Subject to

- (i) full payment of all relevant Fees and
- (ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the GroundSure Materials.

6.2 All Intellectual Property in the GroundSure Materials are and shall remain owned by GroundSure or GroundSure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.

6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client shall, and shall procure that any recipients of the GroundSure Materials shall:

- (i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to GroundSure or any third party from the Services;
  - (ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;
  - (iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);
  - (iv) not combine the Services with or incorporate such Services into any other information data or service;
  - (v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);
  - (vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and
  - (vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,
- 6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the GroundSure Materials in order to advise the Beneficiary in a professional capacity. However, GroundSure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.

6.6 The Client shall procure that any person to whom the Services are made available shall notify GroundSure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

#### **7.Liability: Particular Attention Should Be Paid To This Clause**

7.1 This Clause 7 sets out the entire liability of GroundSure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

- (i) any breach of contract, including any deliberate breach of the Contract by GroundSure or its employees, agents or subcontractors;
- (ii) any use made of the Reports, Services, Materials or any part of them; and
- (iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.

7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.

7.4 GroundSure shall not be liable for

- (i) loss of profits;
- (ii) loss of business;
- (iii) depletion of goodwill and/or similar losses;
- (iv) loss of anticipated savings;
- (v) loss of goods;
- (vi) loss of contract;
- (vii) loss of use;
- (viii) loss or corruption of data or information;
- (ix) business interruption;
- (x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;
- (xi) loss or damage that arise as a result of the use of all or part of the GroundSure Materials in breach of the Contract;
- (xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the GroundSure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;
- (xiii) loss or damage to a computer, software, modem, telephone or other property; and
- (xiv) loss or damage caused by a delay or loss of use of GroundSure's internet ordering service.

7.5 GroundSure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.

7.6 GroundSure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of GroundSure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against GroundSure in relation to the Services or other matters arising pursuant to the Contract.

#### **8 GroundSure's right to suspend or terminate**

8.1 If GroundSure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, GroundSure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.

8.2 GroundSure shall be entitled to terminate the Contract immediately on written notice in the event that:

- (i) the Client fails to pay any sum due to GroundSure within 30

days of the Payment Date; or

- (ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or
- (iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or
- (iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

#### **9. Client's Right to Terminate and Suspend**

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.

9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

- (i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon GroundSure's acceptance of the Order; and
- (ii) the Reports and/or Mapping provided under this Contract are
  - (a) supplied to the Client's specification(s) and in any event
  - (b) by their nature cannot be returned.

#### **10 Consequences of Withdrawal, Termination or Suspension**

10.1 Upon termination of the Contract:

- (i) GroundSure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in GroundSure's possession or control; and
- (ii) the Client shall pay to GroundSure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay GroundSure any additional costs incurred in relation to the termination or suspension of the Contract.

#### **11 Anti-Bribery**

11.1 The Client warrants that it shall:

- (i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;
- (ii) comply with such of GroundSure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and
- (iii) promptly report to GroundSure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

#### **12 General**

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.

12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through GroundSure.

12.3 GroundSure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of GroundSure.

12.4 No failure on the part of GroundSure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.

12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.

12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.

12.7 GroundSure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

- (i) the Client or Beneficiary's failure to provide facilities, access or information;
- (ii) fire, storm, flood, tempest or epidemic;
- (iii) Acts of God or the public enemy;
- (iv) riot, civil commotion or war;
- (v) strikes, labour disputes or industrial action;
- (vi) acts or regulations of any governmental or other agency;
- (vii) suspension or delay of services at public registries by Third Party Data Providers;
- (viii) changes in law; or
- (ix) any other reason beyond GroundSure's reasonable control.

In the event that GroundSure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then GroundSure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly

given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 GroundSure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at GroundSure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent required by law

## **APPENDIX B**

### **EMAPSITE - GROUNDSURE ENVIROINSIGHT REPORT, MARCH 2014**



EmapSite  
Masdar House, ,  
Eversley, RG27 ORP

GroundSure  
Reference: EMS-239929\_320559

Your Reference: EMS\_239929\_320559

Report Date 3 Mar 2014

Report Delivery Method: Email - pdf

## GroundSure EnviroInsight

Address: ,

Dear Sir/ Madam,

Thank you for placing your order with GroundSure. Please find enclosed the **GroundSure Enviroinsight** 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 EnviroInsight





# GroundSure EnviroInsight

Address: ,  
Date: 3 Mar 2014  
Reference: EMS-239929\_320559  
Client: EmapSite

NW

N

NE

W

E



SW

S

SE

Aerial Photograph Capture date:  
Grid Reference: 500411,493353  
Site Size: 2.02ha

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# Overview of Findings

For further details on each dataset, please refer to each individual section in the main 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: Environmental Permits, Incidents and Registers		On-site	0-50m	51-250	251-500		
1.1 Industrial Sites Holding Environmental Permits and/or Authorisations							
1.1.1	Records of historic IPC Authorisations	0	0	0	0		
1.1.2	Records of Part A(1) and IPPC Authorised Activities	0	0	0	0		
1.1.3	Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0		
1.1.4	Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0		
1.1.5	Records of List 1 Dangerous Substances Inventory sites	0	0	0	0		
1.1.6	Records of List 2 Dangerous Substances Inventory sites	0	0	0	0		
1.1.7	Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0		
1.1.8	Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0		
1.1.9	Records of Licensed Discharge Consents	0	0	0	2		
1.1.10	Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0		
1.2	Records of COMAH and NIHHS sites	0	0	0	0		
1.3 Environment Agency Recorded Pollution Incidents							
1.3.1	National Incidents Recording System, List 2	0	0	0	1		
1.3.2	National Incidents Recording System, List 1	0	0	0	0		
1.4	Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0		
Section 2: Landfill and Other Waste Sites		On-site	0-50m	51-250	251-500	501-1000	1000-5000
2.1 Landfill Sites							
2.1.1	Environment Agency Registered Landfill Sites	0	0	0	0	0	Not searched
2.1.2	Environment Agency Historic Landfill Sites	0	0	0	0	1	0
2.1.3	BGS/DoE Landfill Site Survey	0	0	0	0	0	0
2.1.4	GroundSure Local Authority Landfill Sites Data	0	0	0	0	0	0
2.2 Landfill and Other Waste Sites Findings							
2.2.1	Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
2.2.2	Environment Agency Licensed Waste Sites	0	0	0	0	0	0

Section 3: Current Land Use	On-site	0-50m	51-250	251-500
3.1 Current Industrial Sites Data	1	0	3	Not searched
3.2 Records of Petrol and Fuel Sites	0	0	0	2
3.3 Underground High Pressure Oil and Gas Pipelines	0	0	0	0

Section 4: Geology	
4.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
4.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
4.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 5: Hydrogeology and Hydrology	0-500m					
5.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes					
5.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes					
	On-site	0-50m	51-250	251-500	501-1000	1000-2000
5.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
5.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
5.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
5.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
5.7 Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	No
5.8 Detailed River Network entries within 500m of the site	0	1	8	15	Not searched	Not searched
5.9 Surface water features within 250m of the study site	No	Yes	Yes	Not searched	Not searched	Not searched

Section 6: Flooding	
6.1 Are there any Environment Agency Zone 2 floodplains within 250m of the study site?	Yes
6.2 Are there any Environment Agency Zone 3 floodplains within 250m of the study site?	Yes
6.3 Are there any Flood Defences within 250m of the study site?	No
6.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
6.5 Are there any areas used for Flood Storage within 250m of the study site?	No
6.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Very High
6.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low



## Section 7: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
7.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
7.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
7.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
7.5 Records of Ramsar sites	0	0	0	0	0	0
7.6 Records of Ancient Woodlands	0	0	0	0	0	0
7.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
7.8 Records of World Heritage Sites	0	0	0	0	0	0
7.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0
7.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
7.11 Records of National Parks	0	0	0	0	2	0
7.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
7.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	1

## Section 8: Natural Hazards

8.1 What is the maximum risk of natural ground subsidence?

Very Low

## Section 9: Mining

9.1 Are there any coal mining areas within 75m of the study site?

No

9.2 What is the risk of subsidence relating to shallow mining within 150m of the study site?

Negligible

9.3 Are there any brine affected areas within 75m of the study site?

No

# Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between GroundSure and the Client. The document contains the following sections:

## 1. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

## 2. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

## 3. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure underground oil and gas pipelines.

## 4. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

## 5. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

## 6. Flooding

Provides information on surface water flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

## 7. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

## 8. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence.

## 9. Mining

Provides information on areas of coal and shallow mining.

## 10. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, GroundSure provide a free Technical Helpline (08444 159000) for further information and guidance.

## Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

# 1. Environmental Permits, Incidents and Registers Map



Environmental Permits,  
Incidents and Registers Legend



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- |                    |                               |  |
|--------------------|-------------------------------|--|
| Site Outline       | Recorded Pollution Incident   | RAS 3 & 4 Authorisations                                       |
| Search Buffers (m) | Dangerous Substances (List 1) | Part A(1) Authorised Processes and Historic IPC Authorisations |
|                    | Dangerous Substances (List 2) | Part A(2) and Part B Authorised Processes                      |
|                    | Water Industry Referrals      | COMAH / NIHHS Sites  |
|                    | Licenced Discharge Consents   | Sites Determined as Contaminated Land                          |
|                    | Red List Discharge Consents   | Hazardous Substance Consents and Enforcements                  |





# 1. Environmental Permits, Incidents and Registers

## 1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

### 1.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

### 1.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

### 1.1.3 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

### 1.1.4 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

### 1.1.5 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.