LITHOS



Land at Cliffe Lane, Gomersal

For Keepmoat Homes, Yorkshire West

Report no: 5685/1

Date: April 2026

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SUMMARY OF GEOENVIRONMENTAL ISSUES

Job No.	5685	**Site area/ha**	3.5 ha (8.6 acres)
Client:	Keepmoat Homes, Yorkshire West	**NGR:**	SE 202 263
Site:	Cliffe Lane, Gomersal	**Nearest postcode:**	BD19 4SB

The site is located off Cliffe Lane, approximately 18km southwest of Leeds City Centre, and currently comprises grassed fields divided by intermittent hedgerows and trees, used for cattle grazing.

Lithos were commissioned by Keepmoat to provide a geoenvironmental appraisal of the site, which it is understood is to be developed with 97 'traditional' two/three storey builds with two apartment blocks; development plans have been provided. Lithos' investigation included a review of 3rd party reports, the site's history and environmental setting, and a ground investigation comprising 25 trial pits and 11 rotary open probeholes.

A summary of salient geoenvironmental issues is provided in the table below.

Issue	Remarks
Made ground	localised made ground (Made Ground Topsoil over Granular Made Ground) encountered to 0.6m depth around the location of known mine entries (likely associated with historical coal mining & backfilling of shafts once abandoned).
Natural ground	Veneer of Topsoil over Cohesive & Granular Residual Soils. Coal Measures bedrock encountered from between c. 2m & 3m depth.
Contamination	All soils tested across the site are essentially 'clean' with the exception of high concentrations of arsenic. Site-won Topsoil is considered suitable for re-use in private gardens and across areas of POS/landscaping. Mae Ground Topsoil is considered suitable for use across areas of POS/landscaping, but is **not** suitable for use in plot gardens unless isolated beneath 600mm of 'clean' cover. Granular Made Ground should be isolated beneath 600mm of 'clean' cover if it remains beneath gardens or areas of POS. Alternatively, this material is considered geotechnically and chemically suitable to be placed beneath concrete oversite/hardstand where it will be isolated form end users.
Mining & quarrying	There are two known entries located in the centre south-west which have been located and surveyed in. These should be made safe by capping at rockhead prior to construction and a no-build zone is required around each shaft. Review of the proposed layout suggests that the shafts are currently located beneath an area of POS and proposed adoptable highway. Kirklees Council highways may request that the uppermost 35m are pressure grouted prior to adopting highways. The Middleton Main Coal underlies the site and evidence of underground workings in this seam have been encountered. Workings lie at sufficient depth to not pose a risk to proposed plots and highways. However, further consideration to the workings may be required in the northwestern corner beneath a proposed pump station (subject to depth of installation), and a proposed apartment block (subject to foundation solutions/designs).
Hazardous gas	The site is in an area where less than 3-5% of homes are estimated to be above the radon action level. The site is located c. 200m south of an area of historical landfill, and the site is in area considered susceptible to mines gas. Consequently, the site is considered to be at potential risk from migrating hazardous gas.
Preparatory works	• Topsoil strip & stockpile, including **separate** strip, segregation & stockpile of Made Ground Topsoil. • Capping of mine entries at rockhead. • Localised regrade to accommodate changes in topography across development footprint; possibly with a need for retaining walls, underbuild etc.
Foundations	'Traditional' two/three storey plots can be founded on strip/trench footings seated in competent Residual Soils or on bedrock. Foundations should be deepened where influenced by trees, although the presence of shallow bedrock means that few foundations would be extended to >2.5m. Alternative foundations might be required for apartment blocks subject to anticipated loadings and tolerances to settlement. It should be noted that piled foundations in the northwest may be problematic due to the presence of (moderately) shallow underground workings.
Groundwater & excavations	Excavations should remain dry and stable in the short term, but may be come unstable if left open for extended periods.
Flooding & drainage	The site lies in Flood Zone 1, where the risk of flooding from rivers or the sea is low. Soakaways are considered unlikely to provide a suitable drainage solution for surface water run off at the site. Consequently, there is likely to be a need for surface water balancing.

This brief summary should not be assumed to represent a complete account of all the potential geo-environmental issues that may exist at the site. As such it is strongly recommended that the report be read in its entirety.

SUMMARY OF GEOENVIRONMENTAL ISSUES

Job No.	5685	**Site area/ha**	3.5 ha (8.6 acres)
Client:	Keepmoat Homes, Yorkshire West	**NGR:**	SE 202 263
Site:	Cliffe Lane, Gomersal	**Nearest postcode:**	BD19 4SB

Issue	Remarks
Highways	Natural Residual Soils should yield a CBR value of at least 2%; this value should be verified by in-situ testing prior to construction. localised Granular Made ground beneath highway footprints should be excavated to its full thickness and either replaced with an imported fill, or re-engineered to highway specification.

Significant developer abnormals relating to geoenvironmental issues at the site are:

- The two known mine entries should be capped at rockhead and a no-build zone incorporated into the final development layout.

Some further work is required, most notably:

- Soakaway testing.
- Rotary coring to inform detailed design of the pump station once the position is fixed, and depth confirmed.

This brief summary should not be assumed to represent a complete account of all the potential geo-environmental issues that may exist at the site. As such it is strongly recommended that the report be read in its entirety.

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Appendix A - General notes

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02	Ground investigation fieldwork
03	Geotechnical testing
04	Contamination laboratory analysis & interpretation
05	Hazardous gas

Appendix B - Drawings

Drawing	Revision	Title
5685/1	-	Site Location Plan
5685/2	-	Proposed Layout
5685/3	-	Site Features
5685/4	-	Site Photographs
5685/5	-	Preliminary Conceptual Site Model
5685/6	-	Exploratory Hole Locations
5685/7	-	Revised Conceptual Site Model
5685/8	-	Mining Features
5685/9	-	Monitoring Well Locations

Appendix C - Commission

Appendix D - Historical OS plans

Appendix E - Search responses

From	Date	Content
Groundsure	29/01/2026	EnviroInsight & GeoInsight Reports
Mining Remediation Authority	29/01/2026	Consultants Mining Report

Appendix F to G - Exploratory records

Appendix F	TP101 to TP121
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Appendix H - Chemical test results & Risk Assessment Calculations

Appendix I - Geotechnical test results

FOREWORD (GEOENVIRONMENTAL APPRAISAL REPORT)

This report has been prepared for the sole internal use and reliance of the Client named on page 1. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Lithos Consulting Limited (Lithos); such authorisation not to be unreasonably withheld. If any unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

This report has been reviewed by a Competent Person, as defined in the National Planning Policy Framework. Lithos ensure that all projects are managed by individuals with necessary experience, relevant qualifications, and current membership of a relevant professional organisation. Records of engineers, project managers and reviewers involved in this project are maintained by us. Lithos QA/QC procedures for all our work forms an integral part of our ISO9001 accreditation and as such is regularly audited.

The report presents observations and factual data obtained during our site investigation and provides an assessment of geoenvironmental issues with respect to information provided by the Client regarding the proposed development. Further advice should be sought from Lithos prior to significant revision of the development proposals.

The report should be read in its entirety, including all associated drawings and appendices. Lithos cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context. However, it should be noted that in order to keep the number of pages to a minimum, some information (e.g. full copy of the Landmark/Groundsure Report) is not included in the PDF; by request it can be provided.

The findings and opinions conveyed in this report (including review of any third-party reports) are based on information obtained from a variety of sources as detailed within this report, and which Lithos believes are reliable. Reasonable care and skill has been applied in examining the information obtained. Nevertheless, Lithos cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

Intrusive investigation can only investigate shallow ground beneath a small proportion of the total site area. It is possible therefore that the intrusive investigation undertaken by Lithos, whilst fully appropriate, may not have encountered all significant subsurface conditions. Consequently, no liability can be accepted for conditions not revealed by the exploratory holes. Any opinion expressed as to the possible configuration of strata between or below exploratory holes is for guidance only and no responsibility is accepted as to its accuracy.

It should be borne in mind that the timescale over which the investigation was undertaken may not allow the establishment of equilibrium groundwater levels. Particularly relevant in this context is that groundwater levels are susceptible to seasonal and other variations and may be higher during wetter periods than those encountered during this commission.

Where the report refers to the potential presence of invasive weeds such as Japanese Knotweed, or the presence of asbestos containing materials, it should be noted that the observations are for information only and should be verified by a suitably qualified expert.

Lithos cannot be responsible for the consequences of changing practices, revisions to waste management legislation etc that may affect the viability of proposed remediation options.

The report represents the findings and opinions of experienced geoenvironmental consultants. Lithos does not provide legal advice and the advice of lawyers may also be required.

GEOENVIRONMENTAL APPRAISAL
of land at
CLIFFE LANE, GOMERSAL

1 INTRODUCTION

1.1 The commission and brief

1.1.1 Lithos Consulting Limited were commissioned by Keepmoat Homes, Yorkshire West to carry out a Geoenvironmental Appraisal of land between Cliffe Lane and Ferrand Lane in Gomersal.

1.1.2 Correspondence regarding Lithos' appointment, including the brief for this investigation, is included in Appendix C. The agreed scope of works included:

- Review of a third party report
- A site walkover and inspection
- An assessment of the land use history
- Determination of the site's environmental setting
- A mining risk assessment in accordance with Mining Remediation Authority[1] guidance.
- An intrusive ground investigation comprising 25 trial pits, locating one known mine entry, and 11 'deep' rotary open probeholes
- Assessment of the geotechnical properties of the near surface deposits to enable provision of foundation and highway recommendations
- A qualitative assessment of contamination risks
- Recommendations for the necessary site preparatory and remediation works

1.1.3 As agreed on instruction, the spacing of exploratory holes adopted during this investigation is not in full accordance with the Keepmoat scope of works issued in January 2020. The Keepmoat Brief advocates a maximum exploratory hole spacing of 25m, but given anticipated ground here, an initial 45m grid has been assumed. Based on our experience of the area and engineering judgment the scope of works proposed is considered to be robust.

1.1.4 Primary aims of this investigation are to identify salient geoenvironmental issues affecting the site to support the submission of a planning application, and also to enable Keepmoat to obtain budget costs for: foundations; gas protection measures; and site preparatory and remediation works.

1.2 The proposed development

1.2.1 It is understood that consideration is being given to redevelopment of the site with 97 'traditional' two/three storey domestic dwellings and two apartment blocks, each with associated gardens, areas of POS, and adoptable roads and sewers.

1.2.2 A proposed development layout has been provided by Keepmoat (Drawing reference 272/165/SK01, dated November 2025) which is reproduced as Drawing No. 5685/2 in Appendix B to this report.

[1] *On 28th November 2024, the Coal Authority changed their name to the Mining Remediation Authority.*

1.3 Report format and limitations

1.3.1 All standard definitions, procedures and guidance are contained within Appendix A, which includes background, generic information on:

- Assessment of the site's environmental setting
- Ground investigation fieldwork
- Geotechnical testing
- Contamination testing
- Hazardous gas

1.3.2 General notes and limitations relevant to all Lithos geoenvironmental investigations are described in the Foreword and should be read in conjunction with this report. The text of the report draws specific attention to any modification to these procedures and to any other special techniques employed.

2 SITE DESCRIPTION

2.1 General

2.1.1 The site's location is shown on Drawing 5685/1 presented in Appendix B to this report. Site details are summarised in the table below:

Detail	Remarks
Location	8km southeast of Bradford city centre
NGR	SE 202 263
Approximate area	3.5 ha (8.6 acres)
Known services	Underground electric Overhead communications

2.2 Site features

2.2.1 Lithos completed a walkover survey of the site on 23rd February 2026.

2.2.2 Existing salient features, at the time of the walkover are presented on Drawing 5685/3 in Appendix B to this report and summarised in the table below:

Feature	Remarks
Current access	Off Ferrand Lane
Topography	levels broadly fall to the south at around 1v:12h
Approximate areas	34,800m^2 grass 100m^2 buildings 100m^2 pond
Nature of boundaries	North, east & west – Mature hedgerows and trees. South – Garden fences & mature hedgerows and trees.
Surrounding land uses	North – Open fields, with farm buildings beyond. East – Horse stable and yard & housing. South – Housing, with Cliffe Lane beyond. West – Farm buildings and housing, with fields beyond.

2.2.3 A selection of site photographs is included on Drawing 5685/4.

2.2.4 The site is roughly rectangular in shape, slopes generally 1v:10h to the south (max gradients of c. 1v:6h), and comprises grassed fields divided by intermittent hedgerows and trees.

2.2.5 Access to the site is gained at the northern boundary via a padlocked farm gate situated off Ferrand Lane. Alternative site access is available at the western boundary via a padlocked gate situated off Cliffe Lane, however this entrance was not suitable for access during this investigation.

2.2.6 At the time of the walkover, the site was very wet / boggy, particularly at the site entrances, and was used for cattle grazing.

2.2.7 The northern and eastern boundaries comprise wooden fencing, mature trees, and mature hedgerows. Ferrand Lane runs directly beyond the entirety of the northern boundary.

2.2.8 The southern boundary comprises garden fences, mature trees and mature hedgerows. Residential dwellings and associated gardens are situated at, and beyond, the southern boundary.

2.2.9 The western boundary comprises a farm gate for access, wooden fencing, mature hedgerows, and mature trees.

2.2.10 In the southwestern corner of the site a gated smallholding is present surrounded by post wire fencing, and holding chickens, geese, and a cockerel. Amongst the small holding, two small buildings are present (c. 50m^2), one for storage and one for housing the chickens.

2.2.11 A small pond (c. 100 m^2) is also present in the southwest of the site.

3 SITE HISTORY

3.1 Site centred extracts from Ordnance Survey (OS) plans dating back to 1854 have been examined. Some of these plans are presented in Appendix D to this report.

3.2 The table below provides a summary of the salient points relating to the history of the site. It is not the intention of this report to describe in detail all the changes that have occurred on or adjacent to the site. Significant former uses/operations are highlighted in **bold** text for ease of reference.

Date	Site	Surrounding land
1854	Open fields divided up by walls/hedgerows.	Farrand Lane runs along the northern boundary & Cliffe Lane runs east to west c. 20m beyond southern boundary. Surrounding land predominantly open fields. Great Gomersal (village) from 250m east, Cleckheaton (town) from 1km southwest. Several **coal pits** & **Main End Colliery** from 280m north.
1892	No significant changes.	**West Lane Colliery**, inc. buildings & spoil heap/earthworks from 20m east. Coal Pits to the north no longer shown. un-named colliery 230m west.
1905		'Old shaft' at position of West Lane Colliery (buildings, spoil heap etc no longer shown). Localised earthworks from 220m north. Railway in cutting from 250m north, runs below ground into Gomersal Tunnel. Development of Gomersall village to the east. old shaft 250m south.
1931		Gomersal Mills with building, earthworks & reservoir from 150m southeast. Residential dwellings constructed immediately beyond southeastern & southwestern boundaries.
1948		No significant changes.
1966		Further development of Gomersal (east) & Cleckheaton (west). Old shafts no longer shown.
1974		Development of land to the south, including dwellings along Cliffe Lane immediately beyond southern boundary.
1983		No significant changes.
2001		
2020		Gomersal Mill demolished & redeveloped with residential dwellings.

3.3 Online research suggests that sinking of the shaft at West Lane Colliery (located from 20m to the east) began in 1861 and ceased in 1867 with the colliery closing in 1891.

4 ENVIRONMENTAL SETTING

4.1 General

4.1.1 Notes describing how the site's environmental setting has been assessed are included in Appendix A to this report. Reference has been made to publicly available Government held digital data via QGIS (an Open Source Geographic Information System). Extracts from the response received from an Enviro+Geo Insight Report provided by the Groundsure, and responses from the Mining Remediation Authority, the BGS and the Environment Agency are presented in Appendix E. These responses are summarised below, together with the findings of our own "desk study" investigation.

Issue	Data reviewed	Summary
Geology	1:50,000 BGS map (Sheet 77) 1:10,000 BGS map (Sheet SE22NW)	Drift soils – none mapped. Solid (bedrock) – Lower Coal Measures across majority of site. Lepton Edge Rock (Sandstone unit) in centre & southwest. Shallowest coal seam – Middleton Little Coal outcrops across the northwest & underlies the centre at shallow depth; further details in Section 5 below. Strata dip – none given. Faults – none beneath site or surrounding area.
Mining	Mining Remediation Authority	This majority of the site is located within a Coal Mining Development High Risk Area, with the remaining site in a Low Risk Area. Further details in Section 5 below.
Quarrying	Historical OS plans UK Health Security Agency Environment Agency electronic open data via QGIS Defra Catchment data explorer EnviroInsight Report Zetica website	No known quarries within 250m.
Radon		The site lies in an area where 3-5% of homes are estimated to be above the radon action level. Further details in Section 14.
Hydrogeology		Source Protection Zone? None mapped. Aquifer? None mapped (Drift); Secondary A Aquifer (Solid). Groundwater abstractions? Historical groundwater abstraction named Gomersal Mills Ltd. Located 210m southeast of the site. Groundwater vulnerability - Moderate. Pollution incidents? None recorded.
Hydrology		Nearest watercourse(s) – Unnamed tertiary river approx. 175m northwest of the site. Part of the Spen Beck from Source to River Calder Water Body (1.3km west of the site) catchment. Water quality – moderate ecological status, good chemical status. Pollution incidents? None. Abstractions? None recorded. Discharge consents? None recorded.
Flood risk		The site lies in Flood Zone 1, where the risk of flooding from rivers or the sea is classified as low. In accordance with Chapter 14 of the National Planning Policy Framework, a site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1.
UXO		Low Risk.

4.2 Landfills

4.2.1 Known or suspected areas of landfill in the vicinity of the proposed development site are summarised below:

Location	NGR (proximity to site)	Remarks	Source of data
Land to the North of Cliffe Lane Gomersal	SE 200 265 (200m northwest)	Accepted Inert, commercial waste. Site reference: 4700/0020 First recorded 1st January 1976 last recorded 31st December 1990. Licence holder: John Crossland Limited, address: New Lane, Cleckheaton Licence issue 1st June 1977, License surrender 5th May 1994.	Groundsure EnviroInsight Report

4.3 Agriculture

4.3.1 Historical plans show that the site has been occupied by arable farmland. Generally farming is not considered likely to have caused significant ground contamination. However, activities such as slurry spreading, the discharge of chemicals to ground, and unregulated burial are known to have occurred on farmland. Potential contaminants associated with farming activity could include any of the following.

Agricultural activity	Potential contaminant
Sewage farming, slurry spreading	Methane, metals, nitrates, oxygen depletion
Orchards	Metals, pesticides
Plant & animal protection	Pesticides & herbicides
Timber processing/treatment	Metals, PAH, chlorinated organics
Soil conditioners	Metals, sulphates, PAH
Equipment maintenance	Hydrocarbons, metals
Derelict buildings	Asbestos
Naturally occurring contaminants	Arsenic, metals

4.3.2 Whilst it is likely that pesticides have been applied during arable use of the land, these are not likely to include the persistent organochloride pesticides such as Dieldrin, Aldrin, DDT etc. Pesticides routinely used on arable crops the UK (Phenoxy Acetic acid herbicide or PAAH) rapidly degrade in soils or leach via rainwater infiltration to groundwater. It is highly unlikely these would be detected by soil sampling and therefore it is not proposed to undertake analysis of these.

4.3.3 The generation of ground gas in quantities with the potential to impact upon the proposed development would only occur with the presence of significant quantities of organic matter. Ground gas monitoring is not considered necessary unless significant quantities of organic matter are identified during the ground investigation.

5 COAL & MINING

5.1 General

5.1.1 In July 2011 the Mining Remediation Authority (MRA)[2] formalised their requirements in relation to planning applications and introduced some new terminology relating to coal mining development areas. This Section provides the necessary mining risk assessment required by the proposed planning application.

5.1.2 Much of the site is located within a Coal Mining Development **High Risk Area** - an area with specific mining legacy risks to the surface, including mine entries; shallow coal workings etc. The remainder of the site lies in a **Low Risk Area** - within the defined coalfield, but no known defined risks have been recorded by the Mining Remediation Authority; there may still be unrecorded issues.

5.2 BGS information

5.2.1 BGS mapping shows that solid geology beneath the site comprises Lower Coal Measures bedrock, likely weathered near surface to a gravelly Clay (interbedded Siltstones and Mudstones with Sandstone beds/units).

5.2.2 Regionally, strata typically dips to the east, but a local dip angle and direction has not been mapped in the local area.

5.2.3 Geological maps show that the **Middleton Little** Coal Seam (between 0.3m and 0.9m thick) outcrops across the northwest and underlies about 75% of the total site area. Approximate coal outcrops, based on BGS information, are shown on drawing 5695/8.

5.2.4 Th next economical coal seam is the **Middleton Main** Coal which is expected 20m below the Middleton Little Coal, and is between 0.7m and 1.4m thick. The Wheatley Lime Coal (0.6m to 0.7m thick) is then next economic coal, expected about 32m below the Middleton Little Coal.

5.2.5 It should be noted that seam outcrops plotted on geological maps have been known to be inaccurate by distances in excess of 100m.

5.2.6 A BGS Technical Report (Geology of the Country around Huddersfield and Halifax) suggests that Middleton Little and the Middleton Main Coals have been worked in the area and notes that:

- The Middleton Little coal seam in the western part of its northern outcrop is of no value but thickens eastward. It is 8 inches (0.2m thick) either side of the Gomersal ridge with dirt streaks in the lower part.
- The Middleton Little coal seam has been worked as a second class coal.
- The Middleton Main coal has been largely worked out in the area and has been worked on a small scale round Gomersal where it is usually divided into three parts by dirt bands.
- At Upper Lane Colliery between Gomersal and Cleckheaton, the sequence for the Middleton Main had a total thickness of 1.01m (the likely height of any underground workings).
- The Wheatley Lime coal is present throughout the area and has been mined to a considerable extent, though only as a second class coal. At Gomersal the coal is only 12 inch

[2] *On 28th November 2024, the Coal Authority changed their name to the Mining Remediation Authority.*

5.3 MRA Consultants Report

5.3.1 The majority of the site lies within a High Risk Area - an area with specific mining legacy risks to the surface, including mine entries; shallow coal workings etc; the footprint of the Development High Risk area broadly corresponds to the outcrop of the Middleton Little Coal and parts of the site where this seam is expected to lie at very shallow depth.

5.3.2 A Consultants Mining Report has been obtained from the Mining Remediation Authority (MRA), which is reproduced in Appendix E, and which states that:

- There are known workings beneath the site in two seams of coal:
  - The Silkstone Coal Seam, worked at 73m depth, workings thickness of 0.86m, last worked in 1899.
  - The Whinmoor Coal Seam, worked at 121m depth, workings thickness of 0.71m, last worked in 1957.
- There are no known workings beneath the site (*although there could be workings for which the MRA has no records*).
- There are probable unrecorded shallow workings (*i.e. the MRA is aware of economic coal at shallow depth which could have been worked in the past*).
- There are no spine roadways at shallow depth.
- There are two recorded mine entries within the sites boundary, with a further two mine entries within 100m of the site boundary.
- The Middleton Little coal seam outcrops across the northwest.
- There are no geological faults or fissures.
- There are 2 claims of coal mining related subsidence within 50m of the site boundary.
- There are no recorded mine gas emissions, minewater treatment schemes, opencast sites of MRA managed tips within 500m of the site's boundary.

5.3.3 Known workings in the Silkstone and Whinmoor Coal Seams are not considered to pose a significant risk to surface stability or the proposed development; movements associated with these seams should have stopped by now.

5.3.4 The mining reports suggests there are no **known** shallow workings (i.e. at less than 30m depth). However, it should be noted that it did not become a statutory requirement to maintain and preserve plans of abandoned mines until the Mine (Coal) Regulations Act of 1872 and consequently there may be mineworkings beneath the site for which the Mining Remediation Authority have no records.

5.3.5 The locations of the 4 mine entries are shown on Drawing 5685/8 and a summary is provided in the table below:

Type	MRA Reference	Location & remarks
Shaft	420426-003	Located 38m east of the site. Was searched for by drilling in 1983 but was not found. Treatment details unknown.
Shaft	420426-004	Located 66m east of the site. Treatment details unknown.
Shaft	420426-005	Located in the centre of the site. The shaft was located during ground investigation works in October 2019 (see Section 6).
Shaft	420426-006	Located in the centre of the site. The shaft was located during round investigation works in October 2019 (see Section 6).

5.3.6 It should be noted that there may be **further** mine entries located within the site's boundary which the Mining Remediation Authority have no record of.

5.3.1 Implications associated with the presence of mine entries, and likely treatment requirements are discussed in Section 16.2.

5.4 Unrecorded workings

5.4.1 The Middleton Little coal seam outcrops across the northwest and underlies about 75% of the site at shallow depth, the Middleton Main Coal is expected about 20m below the Middleton Little Coal.

5.4.2 Whilst there are no known (recorded) workings, there may be unrecorded workings in these seams which pre-date the requirement for abandonment plans (Coal Mines Regulation Act of 1872).

5.4.3 Early mining methods included drifts or adits from outcrop. Where mining extended further from the crop, bell pits were often sunk, and as the coal got deeper still, shafts were used to access gallery workings (pillar & stall).

5.4.4 The shafts associated with bell pits are typically only about 1.2m in diameter, and the bell pit itself was typically 5m to 10m in diameter (bell pit size would have been constrained by roof stability). Consequently, bell pits are often closely spaced; the most intensive concentration of shafts recorded to date (66 per acre) was at the Middleton Broom Opencast site.

5.4.5 As coal was removed during bell pitting, the unsupported strata above assumed an inverted slope of stability, generating a bee-hive shape around the base of the shaft which forms the characteristic vertical section. The depth limit of bell pit mining is almost certainly 15m, and this is considered a deep bell pit; the vast majority were probably less than half this depth.

5.4.6 At greater depths, pillar and stall workings appear to have been the preferred method, and such workings were often accessed via a single shaft. Consequently, shafts associated with such workings are more widely spaced; but rarely exceeded one quarter of a mile (400m) shaft to shaft, due to problems with ventilation and underground haulage. It was customary to view the life expectancy of an individual pit as about three to five years and at any one time several new pits would be sinking to replace those currently operating.

5.4.7 Up until the last decades of the eighteenth century, coal mining almost always represented a short-term interruption to ongoing use of land for agricultural. The right to sink shafts and extract coal was usually conditional upon restoration of the surface after coal extraction was complete. This not only involved filling the shaft, but also required that any subsequent settlement of shaft fill material did not result in depressions in the field surface. Consequently, it was usual to fill the shaft and heap excess arisings into a dome over the shaft eye. Over subsequent years, the dome supplied material to compensate for settlement of the shaft fill. In the normal course of events, at the conclusion of the recovery period, any remaining spoil accumulations above ground level would have been planed-off to leave a relatively stable, level surface where the shaft had been.

5.4.8 Bell pits may be present across the whole of the site near coal outcrops.

5.5 Mining risks

Mining risks - Summary

5.5.1 The table below summarises the potential risks associated with coal mining legacy issues at this site:

Coal mining issue	Yes	No	Remarks
Known underground coal mining (recorded at shallow depths)		X	The MRA have no records of known shallow workings beneath the site.
Unknown underground coal mining (probable at shallow depths)	X		The Middleton Little Coal Seam outcrops across the northwest, with the Middleton Main about 20m below & there may be workings in these seams for which the MRA hold no records.
Known mine entries (shafts)	X		Two shafts present on site, 2 within 100m of the site boundary.
Unknown mine entry(s)	X		The site is underlain by shallow coal & there may be further unrecorded mine entries which the MRA hold no records of, possibly including bell pits, day holes, adits & shafts.
Coal mining geology (fissures)		X	None recorded beneath the site or surrounding area.
Known record of past mine gas emissions or potential		X	None recorded by the MRA.
Unknown mine gas emissions	X		Whilst no emissions are known, the site is underlain by shallow coal, possible shallow workings & known workings at greater depth. Consequently there is a potential for mines gas emission (see Section 14).
Recorded coal mining surface hazard		X	None recorded by the MRA.
Surface mining (opencast workings)		X	None recorded by the MRA.

5.5.2 For those issues identified as "yes" in the above table, a more detailed discussion and assessment of the risks, both individually and cumulatively, to the application site and the proposed development is provided below.

5.5.3 Risks include:

- Mines gas
- Combustion
- Recorded, and unrecorded, mine entries
- Collapse of shallow mineworkings, with consequent subsidence affecting surface stability

5.5.4 Current UK guidance, CIRIA C758D3, provides information and guidance for engineers and geologists with respect to the design of: mining investigations; foundations; and remedial measures.

Mining risks – gas

5.5.1 Gas monitoring and a hazardous gas risk assessment will be required and is proposed (see Sections 14).

Mining risks – combustion

5.5.2 Where coal is exposed during any site preparatory earthworks, or within excavations, care should be taken to avoid the potential for spontaneous coal combustion.

5.5.3 If any foundation excavation comes into contact with coal, the foundation should be taken through the coal seam, into underlying natural in-situ strata of adequate bearing. The full thickness of coal should then be sealed with mass concrete fill placed as soon as possible after exposing the seam to prevent the ingress of air.

5.5.4 Any ground investigation and/or drilling for grouting purposes should be carried out to HSE and Mining Remediation Authority guidelines to minimise the risk of coal combustion and potential for migration of mine gases into neighbouring properties.

Mining risks – mine entries (known shafts)

5.5.5 The Mining Remediation Authority holds records of two known mine entries located within the site's boundary. There are no further details regarding shaft diameter or depth of bedrock.

5.5.6 The MRA discourage development over or adjacent to shafts. The recommended no build zone around deep shafts is usually defined by a line drawn up at 45° from the top of the shaft, where it intercepts rock head.

5.5.7 Mine entries will be located during the proposed ground investigation, which will inform how they should be allowed for in the proposed layout; see Section 11.7.10.

5.5.8 Whist **shaft treatment** and foundation design must be site-specific, and the Developer is required to obtain MRA approval for proposed treatment, the following principles can usually be applied:

Location of shaft	Appropriate Treatment		Remarks
	Backfilled Shaft	Open Shaft	
POS	A or B	C & A	-
Garden	A or B	C & A	-
Estate Road	A or B	C & A	LA Highways may require A & B
House	A & B	D & A	-

Where:

A. A shaft **cap**, usually at or below rockhead of sufficient bearing capacity for the expected loading. The cap should be a least twice the internal diameter of the shaft. A competent structural engineer should specify cap thickness and reinforcement.

B. Consolidation of shaft backfill (full depth) by **grouting**.

C. **Filling** of open shaft with granular material.

D. **Filling** of open shaft with granular material, followed by stabilisation of the granular fill by **grouting**.

5.5.9 The shafts here are likely in excess of 50m deep and probably associated with mining of the Silkstone and Whinmoor Coal Seams. At this stage, it is proposed that each shaft be located via trial trenching. Assuming they have been backfilled and rockhead is present at relatively shallow depth (<3m or so), it should be acceptable to treat each one by construction of a suitable reinforced concrete cap at rockhead.

5.5.10 Wherever possible **capping at rockhead** is preferred by the MRA. Where there is deep drift (or thick made ground), it might be possible to cast an enlarged cap in the drift after grouting the shaft to a suitable depth below rockhead. (**Note** the MRA offer a cap design service, and it would be prudent to at least consult them).

5.5.11 At both shaft locations bedrock is likely lie within 3m of ground level. Consequently, these shafts should be capped at or below rockhead. The cap should be a least twice the internal diameter of the shaft and be designed by a competent structural engineer. Detailed cap design is beyond the scope of this report but should also include gas venting measures.

Mining risks – mine entries (unknown shafts/entries)

5.5.12 It is possible that in addition to the known entries further, **unrecorded** "shallow" shafts (possibly bell pits) are present, and consideration could be given to a geophysical survey. The success of geophysics would be dependent on the "contrast" between shaft backfill and the surrounding ground (i.e. the survey is likely to be more successful if shaft backfill is significantly different material or less dense than the surrounding ground). Follow-up intrusive investigation (pitting) would be recommended to determine the cause of any anomalies identified by the geophysics.

5.5.13 A topsoil and subsoil strip will be required prior to development and the exposed surface should be carefully inspected for evidence of unrecorded mine entries. Shaft locations might also be tentatively identified by tell-tale signs at surface (i.e. grass die-back, depressions etc).

5.5.1 Adits are not like shafts; risks posed by collapse are lower (due to the much reduced height of void or backfill). Consequently, adits do not require a formal no-build zone. However, it is generally considered prudent not to construct houses over the entrance to any adit.

5.5.2 The MRA would prefer to see Developers revise layouts to avoid building over a shaft wherever possible. However, they accept that (unrecorded) mine entries might be encountered post-planning and revision of the layout might not be possible (especially where there are a large number of entries per acre, e.g. bell pits).

5.5.3 If found, unrecorded mine entries should be treated as outlined above for the known mine entries.

5.5.1 Lithos generally distinguish between 'deep' shafts (>15m) and 'shallow' shafts (i.e. shafts to workings that require grouting to mitigate risks to surface stability), including bell pits. Bell pits (and shallow shafts) are rarely recorded and consequently tend not to appear in MRA mining reports.

5.5.2 Following appropriate treatment of both the shaft and associated shallow workings, Lithos consider shallow shafts to be of less concern than 'deep' shafts and such mine entries do not necessarily require associated "no-build" zones. However, any found during the construction phase of a development will require grouting, and any plots built over or adjacent to bell pits or shallow shafts will require appropriate foundation design.

5.6 Drilling & grouting

5.6.1 Assuming intrusive investigation proves the presence of unrecorded workings with the potential to influence surface stability, then it will be necessary to consolidate the mineworkings by drilling and grouting.

5.6.2 The necessary consolidation should be achieved by drilling holes on an appropriate grid (likely 3m to 5m spacings). A viscous grout composed of appropriate proportions of OPC, PFA, sand or pea gravel would then be injected into the workings via these holes.

5.6.3 Drilling and grouting operations should be carried out with engineering supervision, and be undertaken in accordance with a suitable, approved Specification tailored to the site-specifics associated with this site.

5.6.4 Proposals to treat the mineworkings and shafts will need to be discussed with both Kirklees Council (most notably Highways), and the Mining Remediation Authority well in advance of starting works on site.

6 PREVIOUS INVESTIGATION FINDINGS

6.1 General

6.1.1 Keepmoat have provided Lithos with a copy of the following documents:

- **Document 1.** Letter Report – shaft searches at Cliffe Lane, Gomersall by GeoDyne Geotechnical & Environmental Consultants (Letter ref. 39175/MS/DJH, dated 16th October 2019).
- **Document 2.** Phase II Exploratory Investigation Report for KCS Development by GeoDyne Geotechnical & Environmental Consultants (Report ref. 39175-2, dated by GeoDyne in July 2020).

6.1.2 **Document 1** comprises a letter report detailing the findings of a search for two known mine shafts (as referenced in Section 5.5.5 of Lithos' Desk Study).

6.1.3 **Document 2** comprises an exploratory Phase 2 Investigation Report, including a site description and brief review of a 3rd party Desk Study of the site (not made available to Lithos) and an intrusive ground investigation comprising 15 trial pits, 13 dynamic sample boreholes and a course of monitoring for groundwater and hazardous gasses. A summary of previous works comprising shaft searching (see Document 1) and a geophysical survey (not made available to Lithos) is also included.

6.1.4 A selection of samples were submitted for chemical and geotechnical testing and a discussion of the results is presented.

6.1.5 **In total,** GeoDyne's ground investigation works comprised:

- 15 Trial pits (TPs TP101 to TP115) excavated to between 2.20mbgl to 3.0mbgl.
- 4 Hand dug pits (HDs HD1 to HD4) to between 0.9mbgl and 1.0mbgl.
- 13 Window sampling boreholes (WSs WS1 to WS13) drilled to between 1.00mbgl and 3.00mbgl.
- 17 Rotary open probeholes (RO1 to RO18 – excl. RO15) drilled to between 15mbgl and 40mbgl.
- Machine excavated trenches across the two known mine shafts, which were 'successfully' located.
- Gas/groundwater wells were installed in 7 dynamic sample boreholes with response zones sealed in Residual Soils and bedrock.
- Samples were submitted for laboratory testing:
  - 20 samples of Topsoil, Made Ground & natural soils were submitted for chemical testing including pH, metals, asbestos and PAHs.
  - A further 30 samples were tested for arsenic & lead following initial high results.
  - 8 samples of Residual Soil were submitted for pH and sulphates and determination of Atterberg limits.
- Geotechnical classification tests (Atterberg Limits, pH, soluble sulphate etc).
- Chemical laboratory tests (including heavy metals, speciated PAH, and banded TPH).
- Gas monitoring; 7 visits between February and June 2020, with atmospheric pressures in range 980mb to 1019mb. Flows were recorded between 0.0l/h and 0.8l/h.

6.2 Summary of GeoDyne's findings

6.2.1 Ground conditions typically comprised a veneer of Topsoil (between 0.2m & 0.6m thick, comprising Silt/Clay Topsoil with occasional sand and gravel) over Residual Soils (medium to high strength Clay with gravel of mudstone lithorelicts and occasional ironstone. Rockhead was generally encountered from between 1.5m and 2.0m depth and comprised very weak Mudstones and Siltstones or locally slightly stronger Sandstone.

6.2.2 Localised areas of Made Ground were encountered in 4 exploratory holes (WSs 2, 3, 11 & HD3), plus trenches excavated to search for the mine shafts, from the base of Topsoil to between 0.5m and 0.75m depth comprising sandy Gravel of mudstone, brick and coal or Clay with gravel of ironstone and coal.

6.2.3 Ground conditions encountered by GeoDyne are summarised in the Tables below:

Summary of GeoDyne ground conditions (shallow soils)

Hole ID	Final depth	Depth to Base (mbgl)			Rockhead (penetration)
		Total Made Ground	Topsoil	Residual Soils	
HD1	0.95	0.3	0.3 (MG)	0.95	-
HD2	0.9	-	0.3	0.9	-
HD3	1.0	0.5	0.30 (MG)	1.0	-
HD4	0.9	-	0.2	0.9	-
TP101	3.0	-	0.4	2.2	2.2 (0.8)
TP102	3.0	0.4	0.40 (MG)	1.9	1.9 (1.1)
TP103	2.2	-	0.3	0.5	0.5 (1.7)
TP104	3.0	-	0.3	1.8	1.8 (1.2)
TP105	3.0	-	0.45	2.1	2.1 (0.9)
TP106	3.0	-	0.3	1.5	1.5 (1.5)
TP107	3.0	0.2	0.20 (MG)	0.5	0.5 (2.5)
TP108	3.0	0.4	0.40 (MG)	1.2	1.2 (1.8)
TP109	3.0	0.2	0.20 (MG)	1.4	1.4 (1.6)
TP110	3.0	0.2	0.20 (MG)	1.5	1.5 (1.5)
TP111	3.0	0.2	0.20 (MG)	1.4	2.1 (0.9)
TP112	3.0	-	0.2	0.6	0.6 (2.4)
TP113	3.0	-	0.25	2.1	2.1 (0.9)
TP114	2.3	-	0.3	1.0	1.0 (1.3)
TP115	3.0	-	0.2	1.0	1.0 (2.0)
WS01	1.9	-	0.4	1.5	1.5 (0.4)
WS02	2.0	0.75	0.35 (MG)	2.0	-
WS03	2.0	0.5	0.30 (MG)	2.0	-
WS04	1.8	-	0.3	1.5	1.5 (0.3)
WS05	2.0	0.6	0.60 (MG)	1.5	1.5 (0.5)
WS06	2.0	-	0.5	1.9	1.9 (0.1)
WS07	2.0	0.4	0.40 (MG)	1.5	1.5 (0.5)
WS08	1.0	0.3	0.30 (MG)	0.8	0.8 (1.2)
WS09	2.0	-	0.3	1.2	1.2 (0.8)
WS10	1.9	-	0.3	1.2	1.2 (0.7)
WS11	3.0	0.6	0.40 (MG)	2.3	2.3 (0.7)
WS12	2.0	-	0.3	1.6	1.6 (0.4)
WS13	2.0	-	0.3	1.2	1.2 (0.8)

Summary of GeoDyne ground conditions (mining investigation)

Hole ID	Final Depth	Rock-head (mbgl)	Coal		10h?	Coal		10h?	Coal		10h?
			depth to top	thickness		depth to top	thickness		depth to top	thickness	
R01	40.0	2.0	27.0	2.0	Yes	38.0	0.5	Yes	-	-	-
R02	40.0	2.0	22.5	1.0	Yes	-	-	-	-	-	-
R03	40.0	2.0	19.0	1.5	Yes	27.0	1.0	Yes	-	-	-
R04	36.0	2.0	19.5	1.5	Yes	-	-	-	-	-	-
R05	40.0	2.0	22.5	1.5	Yes	32.0	1.0	Yes	-	-	-
R06	40.0	2.0	24.0	1.5	Yes	33.0	0.5	Yes	-	-	-
R07	40.0	2.0	26.0	1.5	Yes	29.0	1.0	Yes	36.0	0.5	Yes
R08	40.0	2.0	22.0	1.5	Yes	-	-	-	-	-	-
R09	31.0	2.0	26.0	2.0	Yes	29.0	1.0	Yes	-	-	-
R10	40.0	2.0	26.0	4.0	Yes	36.0	1.0	Yes	-	-	-
R11	35.7	2.0	31.0	2.0	Yes	34.0	0.7	Yes	-	-	-
R12	33.5	2.0	28.0	2.0	Yes	31.5	1.0	Yes	-	-	-
R13	32.0	2.0	27.0	2.0	Yes	30.0	1.0	Yes	-	-	-
R14	15.0	-	-	-	-	-	-	-	-	-	-
R16	38.5	2.0	34.0	1.0	Yes	36.5	1.0	Yes	-	-	-
R17	37.0	2.0	32.0	1.5	Yes	35.0	1.0	Yes	-	-	-
R18	35.0	2.0	30.0	1.5	Yes	33.0	1.0	Yes	-	-	-

Note: values in red represent where evidence of workings was recorded. The recorded thickness represents the hight of the workings or collapsed workings, not the thickness of coal.

6.2.4 Whilst some samples of Topsoil and Made Ground were found to have 'elevated' concentrations of some inorganic contaminants (arsenic and lead), GeoDyne carried out supplementary sampling, statistical analysis and bioaccessibility testing and determined that site-won materials were chemically suitable to remain at/near surface without remediation.

6.2.5 Gas monitoring at the site concluded that the site should be characterised as Characteristic Situation 2 (CS2).

6.2.6 The mine entries should be capped at rockhead.

6.2.7 It is suggested that mineworkings in the Middleton Little and Middleton Main Coal Seams require consolidation by means of Drill and Grout. Where coal outcrops at surface it is recommended that it be isolated beneath at least 1.0m of clean inert cover to mitigate combustion risks.

6.2.8 A safe bearing capacity of 120kN/m^2 is given for Residual Soils and 200kN/m^2 is given for bedrock which GeoDyne suggest should enable adoption of strip footings at a minimum depth of 0.9m for residential plots. Below ground concrete should be Design Sulphate Class DS-1 with an ACVEC Class of AC-1.

6.3 Lithos comments

6.3.1 The scope of GeoDyne's investigation is considered to represent a 'minimum' scope of works at this site. It would be prudent to allow for advancing further exploratory holes (both shallow trial pits, and deep rotary probeholes) to improve confidence in shallow ground conditions and the potential impact of deep mineworkings.

6.3.2 It is not readily apparent if the mine entries were accurately measured and surveyed in once located. Shaft diameter the co-ordinates for the shaft centre (provided by a surveyor to +-10mm accuracy) should be provided to inform the development layout (notably no-build zones) and to inform design of remedial works (shaft caps).

6.3.3 The rotary probehole logs comprise hand-written drillers records and it is not clear whether the probeholes were logged and supervised by an experienced Geoenvironmental Engineer. Consequently, there is a degree of ambiguity with relation to the accuracy and reliability of these logs.

6.3.4 Notably, several logs include areas of 'Mudstone with Coal traces' where coal seams would be expected and it might be the case that packed workings have been 'missed' during drilling. Regardless, it seems **unlikely** that (based on the information reviewed to date) consolidation of shallow mineworkings will be required; further investigation is required to confirm whether this is indeed the case.

7 PRELIMINARY CONCEPTUAL SITE MODEL

7.1 Assessment of contaminated land is based on an evaluation of pollutant linkages (Source-Pathway-Receptor).

7.2 No potentially contaminative industrial land uses have been identified and consequently there are no obvious Sources. The site is essentially greenfield, although farming activities, may have given rise to some (likely minor) contamination; see Section 4.4.

7.3 A preliminary conceptual site model, presented as Drawing 5685/5 in Appendix B, has been prepared after consideration of all the data presented in Sections 2 to 6 inclusive of this report.

7.4 Potential contaminant linkages are shown on the preliminary conceptual site model.

7.5 The conceptual model will likely be subject to modification in light of data arising from the proposed intrusive ground investigation.

8 LAND CONTAMINATION – PART IIA & PLANNING

8.1 Local Authorities have responsibilities with respect to land contamination in the context both of Part IIA of the Environmental Protection Act 1990, and Planning.

8.2 The contaminated land regime in Part IIA was introduced specifically to address the historical legacy of land contamination. It applies where there is unacceptable risk, assessed on the basis of the **current** use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission. This is primarily a task for the planning system, which aims to control development and land use in the **future**.

Planning

8.3 The National Planning Policy Framework (NPPF), supported by web-based planning practice guidance, includes the following with respect to contamination and site investigation:

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

8.4 Planning policies and decisions should ensure that:

- The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses, and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation
- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the environmental protection act 1990
- Adequate site investigation information, prepared by a competent person, is presented'

8.5 Annex 2 of the NPPF states that 'all investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as BS10175[3])'.

This site

8.6 Underlying Lower Coal Measures bedrock is classified as a Secondary A aquifer. The nearest surface watercourse is the an unnamed river, which flows in a western direction, 175m beyond the site's northern boundary. Therefore, the site's environmental setting is considered to be of moderate sensitivity.

8.7 With respect to human health, the proposed end use (residential) is sensitive.

8.8 It is considered that the site should be suitable for the proposed use subject to implementation of appropriate preparatory works.

9 GROUND INVESTIGATION DESIGN

9.1 Anticipated ground conditions & potential issues

9.1.1 Based on the data reviewed in Sections 4 (Environmental Setting) and 5 (Previous Investigation Findings), anticipated ground conditions are expected to comprise:

Anticipated condition	Remarks
Made ground	None anticipated although some may be present on site associated with the adjacent colliery.
Natural soils	A veneer of topsoil over Cohesive Residual Soils (firm Clays).
Bedrock	Lower Coal Measures Siltstone and Mustone bedrock from shallow depth.
Mineworkings	Anticipated at shallow depth.
Groundwater	Anticipated at depth within bedrock.

9.1.2 Based on the data above and that in Sections 2 (Site Description) and 3 (History), potential ground-related issues associated with this site are likely to include:

Type of issue	Specific issue	Remarks
Potential on-site contamination sources	1. Agricultural practices 2. Made ground 3. Shallow coal & mineworkings	1. Loss of fuels/lu8bricants, discharge of chemicals, burial of ACSs, animals etc is all known to have taken place across farmland. 2. Encountered during 3rd party investigations (although GeoDyne did not find significant contamination). 3. Generation & migration of hazardous gasses.
Potential off-site contamination sources	1. Landfill 2. Shallow mineworkings	1 & 2. Potential for generation & migration of hazardous gasses.

[3] *BS10175 (2011) - Code of practice for the investigation of potentially contaminated sites*

Type of issue	Specific issue	Remarks
Potential geotechnical hazards	1. Made Ground 2. Shallow mineworkings 3. Known & unknown mine entries	1. Potential for localised deep made ground (need for deepening of foundations/alternative foundations. 2. Surface instability, migration of crown holes, etc. 3. Potential shaft collapse/settlement. Known shafts should be capped at rockhead, further unrecorded shafts may be encountered during construction. There may be a need for further remediation, no build zones etc.
Other potential constraints	1. Underground & overhead utilities	1. There may be a need for easements/diversion. Utility providers may object to changes in levels above/below existing utility runs.

9.2 Ground investigation design & strategy

9.2.1 The preliminary conceptual site model was used as a basis for design of an appropriate ground investigation, the scope of which is summarised below.

Exploratory holes	Purpose
About 25 Trial Pits	To determine the nature, distribution and thickness of shallow natural soils, including suitability of the ground for founding structures and highways. To determine the general nature of any localised areas of made ground
trial trenches	at the location of the known mine entries to confirm shaft locations & record shaft dimensions & co-ordinates.
14 rotary open Probeholes	To check for the presence of voids or broken ground associated with possible unrecorded shallow mine workings To install monitoring wells in order to monitor for hazardous gasses & determine groundwater levels & flow directions.

9.2.2 Proposed exploratory hole locations were selected to provide a representative view of the strata beneath the site and to target potential areas of interest identified in Section 8 above. A nominal 35m grid spacing was proposed. Additional exploratory locations might be scheduled by the site engineer in light of the ground conditions actually encountered.

9.2.3 The number of representative samples taken will be reflective of the geological complexity actually encountered. However, in general about 3 samples will be taken from most trial pits.

9.2.4 Review of the site's history (see Section 3) has confirmed the complete absence of any previous development or past potentially contaminative land uses (other than agriculture). Therefore, in accordance with the National Planning Policy Framework, this site is Greenfield rather than Brownfield.

9.2.5 The only potential sources of contamination identified are metals & asbestos (associated with windblown/background or illegal deposits) and organics (associated with leakage from farming machinery). If these contaminants are present, they will be found within near-surface soils (topsoil), rather than at depth (in natural soils) and consequently, contaminant analysis will (at least initially) be restricted to recovered samples of topsoil.

9.2.6 If made ground, or elevated concentrations of contaminants within topsoil, are recorded during the ground investigation, testing of subsoil samples may be necessary.

10 FIELDWORK

10.1 Objectives

10.1.1 The original investigation strategy is outlined in Section 9.2 above.

10.2 Exploratory hole location constraints

10.2.1 No access was available in the far southeast of site due to ongoing use as a small holding.

10.2.2 No access was available over/beneath the line of utilities which cross the far-west of the site.

10.3 Scope of works

10.3.1 Fieldwork was supervised by Lithos between the 23rd and 26th February and between the 30th March and the 2nd April 2026 and comprised the exploratory holes listed below:

Technique	Exploratory holes	Final depth(s)	Remarks
Trial pitting (machine dug)	TPs 101 to 121	1.8m to 3.5m	Vane tests in cohesive soils Trial pits typically refused in bedrock.
Topsoil strip (machine dug)	Shaft 005 & 006	2.6m to 3.0m	Excavated within the location of recorded mine entries.
Rotary open probeholes	PHs 101 to 111	21.0m to 30.0m	Monitoring wells installed in shallow PHs adjacent to PHs 101, 103, 104 & 107.

10.3.2 Lithos initially intended to undertake the whole investigation in February 2026, but ground conditions were too wet for rotary drilling to be carried out safely and without causing excessive damage to surfaces. Consequently, the drilling was paused (although trial pits & shaft searches went ahead) until ground conditions dried up in late-March 2026 when Lithos returned to site to complete the drilling.

10.3.3 Notes describing ground investigation techniques, in-situ testing and sampling are included in Appendix A to this report.

10.3.4 Exploratory hole logs are presented in Appendices F and G to this Report. These logs include details of the:

- Samples taken
- Descriptions of the solid strata, and any groundwater encountered.
- Results of the in-situ testing
- The monitoring wells installed

10.3.5 Exploratory hole locations are shown on Drawing 5685/6 presented in Appendix B; exploratory holes were set-out by a surveyor and co-ordinates/ground levels are included on the logs.

11 GROUND CONDITIONS

11.1 General

11.1.1 A complete record of strata encountered beneath the proposed development site is given on the various exploratory hole records, presented in Appendices F and G.

11.1.2 Typical ground conditions encountered at the site are described below in Sections 11.2 (made ground) and 11.3 (natural ground), with a summary provided in the table on page 22.

11.2 Made ground

11.2.1 Localised Made ground was encountered around the two recorded mine entries (MRA ref's. 420426-005 & -006) and in TP101. The Made Ground comprised a veneer of **Made Ground Topsoil** (300mm thick - slightly sandy Clay with gravel of mixed lithologies, coal and clinker) over **Granular Made Ground** (to 0.6m depth - clayey gravel of coal, mudstone, sandstone and clinker.

11.2.2 Within the footprint of the two mine entries (Shaft 005 & Shaft 006), **Shaft Backfill** was encountered, which extends to depths of greater than 3.0m (likely to some or full thickness of the shafts) and which comprises Gravel of mudstone and occasional brick, coal and sandstone.

11.2.3 It is apparent that the Made Ground is associated with historical coal mining at this site, with the Granular Made Ground and Shaft Backfill comprising colliery arisings which have been used to backfill disused shafts and to regrade levels around the shafts.

11.3 Natural ground

11.3.1 Natural ground was encountered in all of the exploratory holes, and typically comprised the following succession:

- **Topsoil:** Encountered in all exploratory holes except TP101 to a typical depth of 0.4m comprising slightly sandy Clay with occasional Gravel of mudstone.
- **Cohesive Residual Soil:** Encountered in all but one trial pit to a maximum depth of 2.3m (average of 1.4m) comprising firm and/or stiff Clay with gravel of mudstone and sandstone.
- **Granular Residual Soil:** Encountered in all locations to between 1.8m and 3.5m comprising clayey slightly sandy angular Gravel of sandstone and sandstone lithorelicts. Granular Residual Soils were typically encountered beneath Cohesive Residual Soils and graded into bedrock.

11.3.2 Rockhead was encountered in trial pits from between 1.8m and 3.0m depth, and typically comprised medium strong Sandstone. Excavations using an 8 tonne JCB 3CX equipped with a 0.6m wide toothed bucket typically refused on encountering bedrock.

Summary of ground conditions

Hole ID	Final depth	Depth to Base of Made Ground	Depth to Base of					Depth to top of bedrock	Remarks
			Made Ground		Natural Soils				
			Granular Made Ground	Made Ground Topsoil	Topsoil	Cohesive Residual Soil	Granular Residual Soil		
TP101	2.9	0.6	0.6	0.3	-	1.2	2.9	-	Refusal at 2.9m.
TP102	2.8	-	-	-	0.4	1.1	2.8	-	Refusal at 2.8m.
TP103	2.3	-	-	-	0.5	1.5	2.3	-	Land drain at 0.7m depth. Refusal at 2.3m.
TP104	3.0	-	-	-	0.4	2.3	3.0	-	Refusal at 3.0m.
TP105	2.9	-	-	-	0.5	1.6	2.9	-	Refusal at 2.9m.
TP106	3.4	-	-	-	0.3	1.3	3.4	-	-
TP107	2.4	-	-	-	0.5	1.7	2.4	-	-
TP108	2.8	-	-	-	0.5	1.5	2.8	-	Refusal at 2.8m.
TP109	1.9	-	-	-	0.5	1.1	1.9	-	Refusal at 1.9m.
TP110	2.1	-	-	-	0.4	1.1	2.1	-	Refusal at 2.1m.
TP111	2.5	-	-	-	0.3	1.1	2.5	-	Refusal at 2.5m.
TP112	2.6	-	-	-	0.5	1.7	2.6	-	Water seepage at 1.9m. Refusal at 2.6m.
TP113	3.0	-	-	-	0.4	1.3	3.0	-	Refusal at 3.0m.
TP114	2.6	-	-	-	0.3	1.6	2.6	-	Refusal at 2.6m.
TP115	3.5	-	-	-	0.4	2.1	3.5	-	-
TP116	3.0	-	-	-	0.3	2.2	3.0	-	-
TP117	2.9	-	-	-	0.3	1.3	1.8	1.8	-
TP118	3.0	-	-	-	0.3	1.4	3.0	-	Refusal at 3.0m.
TP119	1.8	-	-	-	0.3	-	1.8	-	Refusal at 1.8m.
TP120	2.5	-	-	-	0.3	0.7	2.5	-	Refusal at 2.5m.
TP121	2.5	-	-	-	0.3	1.0	2.5	-	Water seepage at 2.5m. Refusal at 2.5m.

11.4 Visual & olfactory evidence of organic contamination

11.4.1 No visual or olfactory evidence of contamination was noted during the investigation works.

11.5 Groundwater

11.5.1 Groundwater was encountered as seepages in TP 112 at 1.9m and in TP121 at 1.9m depth when excavating through Granular Residual Soils.

11.6 Stability

11.6.1 Stability of excavations within natural ground (Residual Soils) was generally good.

11.7 Mining investigation

Shallow workings (rotary probeholes)

11.7.1 It is clear from the Desk Study that the site is underlain by the Middleton Little Coal from surface to shallow depth, with the Middleton Main Coal about 20m below this.

11.7.2 It cannot be discounted that one or both of these seams have been worked using underground methods, indeed the 3rd party ground investigation supports this supposition.

11.7.3 The conjectured outcrop of the Middleton Little seam is shown on Drawing 5685/8 in Appendix B to this report.

11.7.4 Consequently, a mining investigation has been undertaken, comprising the drilling of 11 'deep' rotary open probeholes; a further 4 shallow probeholes were advanced to enable the installation of gas/groundwater monitoring wells.

11.7.5 A full record of ground conditions is given on the exploratory hole logs in Appendix G, and a summary of the mining investigation is presented below:

Summary of mining investigation

Hole ID	Final depth (mbgl)	Rock-head (mbgl)	Middleton Little Coal		Middleton Main Coal						Remarks
			Top (mbgl)	Thickness (m)	Top (mbgl)	Thickness (m)	Workings?	competent cover (m)	10x seam thickness	>10h competent cover?	
PH101	30.0	3.0	-	-	-	-	-	-	-	-	No evidence of coal or workings encountered.
PH102	27.0	4.0* (3.0)	-	-	22.2	1.7	No	19.2	17.0	Yes	-
PH103	30.0	2.0	-	-	26.5	1.0	Yes	24.5	10.0	Yes	Evidence of workings comprises 1.0m of soft/loose ground & loss of flush.
PH104	21.0	4.0* (3.0)	-	-	17.6	1.4	Yes#	14.6	14.0	Yes	# Tentative evidence of workings comprises loss of flush on encountering solid coal seam. Loss of flush in the coal could also be due to weathering/fracturing of the coal.
PH105	24.0	1.8	-	-	20.4	1.4	Yes#	18.6	14.0	Yes	# Tentative evidence of workings comprises loss of flush on encountering solid coal seam. Loss of flush in the coal could also be due to weathering/fracturing of the coal.
PH106	21.0	1.0	-	-	-	-	-	-	-	-	-
PH107	24.0	1.5	-	-	-	-	-	-	-	-	-
PH108	27.0	1.5	-	-	-	-	-	-	-	-	-
PH109	27.0	2.2	-	-	24.1	1.1	Yes	21.9	11.0	Yes	Evidence of workings comprises soft/loose ground & loss of flush.
PH110	30.0	1.7	-	-	28.3	1.2	Yes	26.6	12.0	Yes	Evidence of workings comprises soft/loose ground & partial loss of flush.
PH111	30.0	2.3	-	-	25.8	1.4	No	23.5	14.0	Yes	-

* Note: Depth to bedrock in PHs 102 & 104 is uncharacteristically deep compared to the wider dataset. Comparison has been made to adjacent machine excavated trial pits which consistently refused on bedrock at no more than 3.0m depth in this area. Consequently, a depth to rockhead of 3.0m has been adopted for these locations.

11.7.6 On review of the data obtained during the mining investigation, it is apparent that:

- The Middleton Little Coal is absent beneath this site – likely either very thin, of washed out in the immediate area.
- The Middleton Main Coal is present from as shallow as 17.6m depth;
  - The coal has a typical seam thickness of up to 1.4m.
  - 5 of 7 probeholes to the Middleton Main encountered evidence of workings (although evidence in two probeholes was 'tentative').
  - A sufficient thickness of competent cover is present above the Middleton Main Coal Seam to mitigate the risks posed to surface stability and the proposed development

11.7.7 Given the number of probeholes drilled, and the relatively consistent level and thickness of the coal encountered, it is considered that a sufficient investigation has been completed to allow for assessment of mining related risks to 'traditional' two/three storey residential dwellings across the site.

11.7.8 However, it is noted that an apartment block and a water/sewage pump station are proposed in the northwesternmost corner. Further consideration of mining risks may be required beneath these structures subject to detailed design requirements; see Section 16.2.

11.7.9 A further 4 probeholes were taken to shallow depth to enable the installation of gas monitoring wells.

Mine entry search

11.7.10 As discussed in Section 5, there are two known mine entries within the site's boundary (MRA Ref's. 420426-005 and 420426-006). The mine entries were located during the 3rd party ground investigation (see Section 6) and Lithos re-exposed both entries to confirm their exact position and allow for the features to be surveyed in.

11.7.11 Excavation encountered a veneer of Made Ground Topsoil over Shaft Backfill (sandy slightly clayey Gravel of mudstone and occasional siltstone, brick and coal) which extends down the shaft to greater than the depth of excavation (up to 3.0m). With depth, the Shaft Backfill includes a portion of mudstone cobbles.

11.7.12 Mine entry ref. -005 was found to be unlined and circular in shape with a diameter of 1.7m (at 3.0m depth). The surveyed position of the centre of Shaft -005 is 420280.39E / 426311.11N 141.018mAOD.

11.7.13 Mine entry ref. -006 was found to be unlined; previous excavation made the shape and diameter difficult to determine but it appeared to be roughly circular in shape and about 2.0m in diameter. The surveyed position of the centre of Shaft -006 is 420270.00E / 426322.00N 139.440mAOD.

11.8 Revised conceptual ground model (ground conditions)

11.8.1 The Preliminary Conceptual Site Model has been revised in light of data obtained during the ground investigation, most notably with respect to:

- The nature and distribution of made ground, including the presence of significant buried obstructions
- The strength, nature and depth of underlying natural strata
- The presence of coal/shallow workings
- The nature and distribution of contamination (based on visual/olfactory evidence only)

11.8.2 Further refinement of the Conceptual Site Model is presented in Sections 13.3, where the results of laboratory testing for contaminants have been considered.

12 CONTAMINATION (ANALYSIS)

12.1 General

12.1.1 The site has not been the subject of a past potentially contaminative industrial land use. However, historical mapping suggests arable farming has been carried out on the site. Sampling of the topsoil has been undertaken to confirm its suitability for re-use.

12.1.2 An assessment of potential contaminants associated with the former uses has been undertaken; see Section 6.1.

12.1.3 In the context of risks to human health associated with residential redevelopment, the Tier 1 Soil Screening Values referenced in this report have been derived via the CLEA default conceptual site model (CSM) used for generating SGVs, but amended, where appropriate, to be more specific to redevelopment within the planning process. See also Section 12.3.16.

12.1.4 Where available, Category 4 Screening Levels (C4SL) have also been referenced.

12.1.5 Generic Note 04 in Appendix A provides further details with respect to current guidance and the interpretation of analytical data.

12.2 Testing scheduled

12.2.1 Based on the above assessment, Lithos submitted a test schedule (summarised in the table below) to a UKAS accredited laboratory. Account has also been taken of visual and olfactory evidence recorded during the ground investigation.

Type of sample	No. of samples	Determinands
Made ground	2	pH, water soluble boron, and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) & Asbestos ID TOC, Speciated Polycyclic Aromatic Hydrocarbons (PAH), Banded Total Petroleum Hydrocarbons (TPH)
Topsoil	10	pH, water soluble boron, and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) & Asbestos ID Speciated Polycyclic Aromatic Hydrocarbons (PAH)
Shaft Backfill	6	pH & water soluble sulphates

12.3 Soil contamination results

12.3.1 The soil contamination test results are summarised in the tables on pages 27 and 28.

12.3.2 Laboratory test certificates as received from the laboratory are presented in Appendix H to this report.

Summary of degree of soils contamination (topsoil)

Hole ID	Depth (m)	Material	Concentrations in mg/kg unless otherwise stated. Trigger Level Concentrations are shown in BLUE and assume a **residential with garden**s end-use.												PAH		Asbestos I.D.
			pH	As ∞	B ~	Cd ∞	Cr x	Cu♣$	Pb ∞	Hg *	Ni	Se	Vn	Zn $	% TOC	B(a)P ∞	Naphthalene	
				37	5	26	4000	100	200	199	109	434	584	200		5	10	
TP101	0.2	Made Ground Topsoil	7.7	**42**	0.3	0.4	17	64	120	0.23	19	< 0.5	35	84	15	<0.03	<0.03	N.D.
TP101	0.4	Granular Made Ground	7.5	**140**	0.3	0.2	7.0	28	33	0.22	10	1.5	16	26	36	<0.03	0.06	N.D.
TP104	0.2	Topsoil	7.3	**44**	0.6	0.3	20	78	160	0.53	20	< 0.5	38	80	14	< 0.03	< 0.03	N.D.
TP106	0.2	Topsoil	7.0	**60**	0.7	0.4	30	100	200	0.65	29	< 0.5	54	120	11	< 0.03	< 0.03	N.D.
TP108	0.3	Topsoil	6.9	**61**	0.8	0.4	28	**120**	190	0.59	30	< 0.5	56	130	14	< 0.03	0.03	N.D.
TP110	0.2	Topsoil	6.9	**64**	0.9	0.4	31	**130**	**290**	0.53	31	< 0.5	60	130	12	< 0.03	< 0.03	N.D.
TP111	0.2	Topsoil	6.4	33	1.1	0.4	25	63	110	0.31	26	< 0.5	49	100	8.6	< 0.03	< 0.03	N.D.
TP113	0.2	Topsoil	6.5	**44**	1.1	0.4	25	68	140	0.34	28	< 0.5	54	110	7.1	< 0.03	< 0.03	N.D.
TP114	0.1	Topsoil	7.3	37	0.9	0.4	18	49	69	0.27	22	< 0.5	40	92	6.9	< 0.03	< 0.03	N.D.
TP116	0.1	Topsoil	7.6	23	0.9	0.3	21	41	77	0.22	21	< 0.5	30	85	6.5	< 0.03	< 0.03	N.D.
TP117	0.2	Topsoil	6.8	29	1.1	0.4	29	47	110	0.31	19	< 0.5	40	96	7.0	< 0.03	< 0.03	N.D.
TP118	0.1	Topsoil	7.0	22	1.2	0.3	27	40	75	0.22	19	< 0.5	35	88	5.5	< 0.03	< 0.03	N.D.
TP121	0.1	Topsoil	6.6	26	1.3	0.3	26	43	95	0.27	19	< 0.5	37	86	7.1	< 0.03	< 0.03	N.D.

Key		Source of guidance trigger level	
36	Parameter tested for and found to be in excess of Tier 1 value.	With the exception of those annotated with one of the symbols below (∞, $, ~), all Soil Screening Values in brackets above have been derived using CLEA v1.071. Values assume contaminants located in a sandy loam, with 6% soil organic matter (SOM).	
179	Parameter tested for and found to be > 5 x Tier 1 value.		
12	Parameter tested for but not found to be in excess of Tier 1 value.	∞	Category 4 Screening Level – SP1010, December 2013 (CL:AIRE/Defra).
-	Parameter not tested for.	$	MAFF. Code of Practice for Agricultural Practice for the Protection of Soil, 1998.
♣	Tier 1 Value is pH dependent.	*	Assumes mercury present as an inorganic compound (cf elemental metal or within organic compound). See Science Report SC050021/Mercury SGV.
x	Assumes Cr is CrIII. If demonstrated Cr is CrVI Tier 1 would be 21mg/kg.		
N.D.	No fibres detected (asbestos screen)		
~	Engineering judgement (Lithos). Boron is a phytotoxic, although most phytotoxic compounds can pose a risk to human health if sufficient concentrations are present. However, plants represent the most sensitive receptor, and a Tier 1 value which is protective of flora is therefore also protective of human health.		

Summary of degree of organic contamination (in Made ground)

Hole ID	Depth (m)	Material	Concentrations in mg/kg. Trigger Level Concentrations are shown in BLUE and assume a **residential with gardens (and no cover)** end use			
			% TOC	TPH - C6 to C40		
				GRO~ C_6 to C_{10}	DRO◊ C_{10} to C_{21}	LRO C_{21} to C_{40}
				22	215	3299
TP101	0.2	Made Ground Topsoil	15.0	<0.1	<51	<26
TP101	0.4	Granular Made Ground	36.0	<0.1	<30	<20

Key		**Source of guidance trigger level**	
All Soil Screening Values in brackets above have been derived using CLEA v1.071. Values assume contaminants located in a sandy loam, with 6% soil organic matter (SOM).			
60	Parameter tested for and in excess of Tier 1 concentration.	~	Assumes all GRO is aromatic fraction C7 to C8.
0.3	Parameter tested for but not in excess of Tier 1 concentration.	◊	Assumes all DRO is aliphatic fraction C10 to C12.
-	Contaminant not tested for.	∞	Category 4 Screening Level – SP1010, December 2013 (CL:AIRE/Defra).

Inorganic determinands

12.3.3 Of the 11 samples of Topsoil and two samples of Made Ground (13 in total), 6 can be classified as uncontaminated and 7 could be classified as 'contaminated'.

12.3.4 These samples have been classified by comparison with Tier 1 Soil Screening Values for an end use including domestic gardens and any area where plants are to be grown (the most sensitive of proposed end-uses).

12.3.5 The most common contaminants are arsenic (7 exceedances), copper (2 exceedances) and lead (1 exceedance).

12.3.6 Current UK guidance regarding the statistical analysis of soil contamination data obtained during a site investigation is provided by CL:AIRE[4], and uses two-way confidence intervals and graphical summaries, to assist assessors when determining whether or not a dataset is adequate to answer the question posed; e.g. "is existing site topsoil suitable for retention & re-use?". To answer such a question, it is necessary to recover and test a large number of samples (a minimum of 10; ideally 20+) in order to undertake meaningful statistical analysis.

12.3.7 The difference between the old and new approaches, including how Lithos apply the statistical assessment is detailed in Generic Note 04, included as Appendix A to this report.

12.3.8 Lithos can confirm that statistics assessment of inorganic determinands in the Made Ground is not appropriate here as an insufficient number of samples have been recovered to allow representative statistical analysis to be undertaken.

12.3.9 But, Lithos can confirm that statistical assessment of inorganic determinands in Topsoil is appropriate because:

- There is a well understood, robust CSM which identifies possible source areas
- Sampling locations are relatively evenly spread across the site and only random sample data has been included in the assessment
- Samples are considered by strata type
- More than 10 samples have been taken

12.3.10 Statistical analysis assumes that a given stratum is reasonably homogenous in terms of composition, the distribution of contaminants and the degree of contamination; the CSM indicates that this is a reasonable assumption at this site.

12.3.11 The Dot and Box Plots are presented in Appendix H and the results are summarised below.

Topsoil

Contaminant	Critical concentration	Mean	Upper confidence level (95%)	Lower confidence level (5%)	Range of 'true' mean	Mean above critical concentration
Arsenic	37	40.3	50.8	31.1	31.1 to 50.8 (19.7)	**Yes**
Copper	100	70.8	92.6	51.6	51.6 to 92.6 (51.6)	No
Lead	200	124.7	170.2	84.6	84.6 to 170.2 (85.6)	No
Zinc	200	101.6	113.8	90.8	90.8 to 113.8 (23.0)	No

All concentrations are in mg/kg
Notes: Values in **bold** indicate that the true mean range exceeds the relevant Tier 1 value.

[4] *CL:AIRE, 2020.Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration.*

12.3.12 Statistical analysis indicates that the true mean for arsenic is slightly elevated compared to the relevant Tier 1 Screening Value. Further assessment of this contaminant is required; see Section 12.4.

12.3.13 The true mean for copper lead and zinc fall below the relevant screening values, and consequently when considered as a whole soil type, site won Topsoil is not considered to be 'contaminated' with these determinands.

Asbestos

12.3.14 No visual evidence of asbestos-containing materials (ACMs), such as broken fragments of asbestos-cement sheeting, was noted during the excavation of trial pits.

12.3.15 No asbestos fibres were identified in any of the 13 samples screened. Leachables

Organic determinands

12.3.16 This site is essentially greenfield and therefore for organic compounds, the Tier 1 Values used in this report have been derived with reference to a CSM that assumes a residential with gardens end use, and that no clean soil cover will be placed in gardens/landscaped areas (Lithos Scenario A).

12.3.17 Lithos have used the CLEA model to derive risk-based screening values for hydrocarbons, in accordance with the methodology detailed by the TPHCWG, and reviewed by a UK workshop of experts with respect to UK adoption of the method.

12.3.18 However, these screening values assume a Soil Organic Matter (SOM) of 6% (equivalent to a TOC of 3.5%). Many organic contaminants are more mobile when the SOM is lower, and consequently comparison of soil results with lower screening values may be required.

12.3.19 In order to check the validity of Lithos' Tier 1 Soil Screening Values, the average TOC for each common fill type (beyond any areas of obvious hydrocarbon impact) have been determined.

Fill type	Typical TOC (%)	Comparison of soil results with revised screening value necessary?
Topsoil	>5%	No.
Made Ground Topsoil		
Granular Made Ground		

Hydrocarbons (TPH & PAH)

12.3.20 **Topsoil:** There are numerous PAH compounds. The USEPA identified 16 PAHs that are considered to represent the most problematic in terms of toxicology, fate and behaviour. The UK have also focused on these 16 and these are included in the laboratory report where speciated PAH analysis has been scheduled.

12.3.21 Speciated PAH analysis has been undertaken on 11 samples of Topsoil in order to determine concentrations of the key "marker" compounds: benzo(a)pyrene (considered the most toxic of the PAHs); and naphthalene (the most mobile and volatile of the PAHs).

12.3.22 Speciated analysis has confirmed the absence of significant concentrations of both benzo(a)pyrene and naphthalene in the soils beneath this site.

12.3.23 **Made Ground:** A sample of Made Ground Topsoil (recovered from TP101 at 0.2m) and a sample of Granular Made Ground (recovered from TP101 at 0.4m) were submitted for testing for petroleum based hydrocarbons.

12.3.24 Given the absence of visual/olfactory evidence of any hydrocarbon contamination, only a simple banded TPH (cf full speciation) was initially scheduled.

12.3.25 Assessment of TPH associated with a fuel/oil source would normally be undertaken in accordance with a 3-step approach, (outlined in Generic Note 04 in Appendix A) on fully speciated TPH results. However, although only banded TPH analysis has been scheduled here, none of the fractions exceed their respective Tier 1 criteria, even if it is conservatively assumed all of each fraction is either aliphatic or aromatic.

12.3.26 Consequently, no significant petroleum hydrocarbon concentrations have been identified, and there is no risk to human health from these hydrocarbons.

12.3.27 Speciated PAH analysis has been undertaken in order to determine concentrations of the key "marker" compounds: benzo(a)pyrene (considered the most toxic of the PAHs); and naphthalene (the most mobile and volatile of the PAHs).

12.3.28 Speciated analysis has confirmed the absence of significant concentrations of both benzo(a)pyrene and naphthalene in the soils beneath this site.

12.4 Bioaccessibility testing

General

12.4.1 Chemical analysis of site-won Made Ground and Topsoil have yielded elevated concentrations of arsenic across all soil types.

12.4.2 Statistical analysis has demonstrated than the true mean for arsenic in Topsoil is elevated compared to the Tier 1 Screening Value and that high results are not outliers or contamination 'hot spots' clustered around one or more sources; this is likely also the case for Made Ground Topsoil and Granular Made Ground although an insufficient number of samples have been tested to confirm by further statistical analysis.

12.4.3 As a result, site-won Topsoil may not be suitable for placement in the uppermost soil layer in gardens or landscaped areas. Off-site disposal could be considered, but this would be expensive and not in line with current philosophy and good practice regarding sustainable development. Two alternative solutions are:

- Bioaccessibility testing of selected soil samples, with assessment of the results to determine their true significance (Note: this cannot be guaranteed to confirm the suitability of the soil for re-use, however it is rare for bioaccessible arsenic to exceed 50% of the total concentration).
- Isolation of the soil materials beneath a minimum 300mm thick "blinding" layer.

Laboratory analysis

12.4.4 To estimate the bioaccessibility of arsenic, laboratory analysis is based on the arsenic bio-accessibility calculation methodology outlined by Ruby et al (1996) and developed by BARGE (Bio-accessibility Research Group Europe).

12.4.5 A key assumption in the calculation of any arsenic screening value is that 100% of the arsenic present in the soil is accessible to be absorbed by the digestive tract, i.e. 100% of the arsenic in the soil could be absorbed and metabolised in the body.

12.4.6 In reality, arsenic may either be strongly bound to the surface of the soil within the crystalline lattice of soil minerals, or be present in an insoluble form. Consequently, not all of the "total" arsenic identified within a soil sample may be in the bioaccessible or potentially harmful form.

Laboratory results:

Hole ID & depth (m)	Total As (mg/kg)	Gastric bio-accessibility (% total As)	Gastro intestinal bio-accessibility (% total As)
TP106, 0.2m	44	1.3	0.8
TP108, 0.3m	51	1.1	1.0
TP110, 0.2m	53	1.0	0.8
TP113, 0.2m	33	1.4	<0.5

12.4.7 The bioaccessibility laboratory data has been incorporated within the CLEA model to derive an amended screening value for arsenic. When considered using the typical bioaccessibility portion shown above, the site-specific screening value returned is 395mg/kg. But, even with a very conservative assumption that 50% of the arsenic in soils was bioaccessible, the revised screening value is 69mg/kg; well above the upper 95% confidence limit for arsenic in the Topsoil. CLEA worksheets are included within Appendix H.

12.4.8 Consequently, the site-won Topsoil at this site is considered suitable for re-use in gardens and areas of POS/landscaping, despite recording a typical 'total' arsenic concentration in excess of the Tier 1 Screening Value.

12.5 Topsoil

12.5.1 Topsoil (and made ground topsoil), typically 300mm thick is present across most of the site. Testing suggests this material is chemically suitable for re-use.

BS3882 Topsoil testing

12.5.2 Topsoil, typically 300mm thick underlies the entire site. Contaminant testing suggests this material is chemically suitable for re-use.

12.5.3 The presence of visible contaminants, sharps (glass etc) was assessed by the Engineer in the field (inspection of initial trial pit arisings; **none** were identified. BS3882 considers visual contaminants to comprise 'undesirable potentially injurious foreign object(s) visible to the naked eye'.

12.5.4 The clay/sand/silt content of 4 Topsoil samples have been determined to check compliance with BS3882[5] requirements.

12.5.5 The results are summarised below:

Parameter	BS3882 Specification	TP103, 0.2m	TP112, 0.3m	TP115, 0.3m	TP119, 0.2m
Retained on 2mm sieve	< 30%	12	13	12	13
Retained on 20mm sieve	< 10%	0	0	3	0
Retained on 50mm sieve	0%	0	0	0	0
Clay content	5 to 35%	**73**	**74**	**74**	**75**
Silt content	0 to 65%				
Sand content	0 to 90%	15	13	14	
Visible contaminants	< 0.5%	0	0	0	0

Note: Values in **bold** type fail the required specification for multipurpose topsoil. Additional testing is awaited to determine the clay/silt content of the topsoil, the above table will need to be updated upon receipt.

[5] *BS3882:2015. Specification for topsoil. Published by BSI Standards Limited.*

12.5.6 The above results suggest that the topsoil at this site complies to the standards set out in BS3882. In terms of textural classification, the topsoil falls into the 'clay or silty clay loam' class.

12.5.7 Consequently, topsoil here is expected to be suitable to support plant growth, although only a reduced BS3882 suite of testing has been undertaken (i.e. there has been no analysis for N-P-K etc.).

13 CONTAMINATION (QUALITATIVE RISK ASSESSMENT & REMEDIATION)

13.1 Topsoil

13.1.1 Topsoil, typically 300mm thick underlies the majority of the site. Testing suggests this material is chemically suitable for re-use.

13.2 Summary of significant contamination

13.2.1 Localised areas of made ground are present in the general area of the two known mine shafts (MRA ref's. 420426-005 and 420426-006) which are likely associated with historical coal mining, handling of mine arisings and backfilling of shafts/regrade of land around the shafts.

13.2.2 The made ground has been found to be 'contaminated' with arsenic (although no further inorganic or organic determinands of concern have been identified to date). The made ground is also considered undesirable as a near surface material as it contains a portion of gravel and anthropogenic materials.

13.2.3 Made Ground Topsoil overlies the Made Ground around the vicinity of the mine shafts. To date only one sample of Made Ground Topsoil has been recovered for chemical testing which has suggested that the Made Ground Topsoil is also 'contaminated' with arsenic (but no other inorganic or organic determinands).

13.2.4 No significant groundwater contamination has been encountered during this ground investigation.

13.3 Revised conceptual ground model (contamination)

13.3.1 A revised Conceptual Site Model is presented as Drawing 5685/7 in Appendix B. The Model includes the contaminants described in Section 13.2 above, and potential contaminant linkages (summarised below in Section 13.4) to receptors.

13.4 Environmental setting & end use

13.4.1 It is apparent from Section 13.2 above, that only a limited range of contamination has been identified to date in the soils beneath this site. In order to assess the significance of this contamination, consideration must be given to the site's environmental setting and the proposed end use.

13.4.2 The underlying Coal Measures are classified as a Secondary A Aquifer is an un-named tertiary watercourse about 175m to the northwest. Therefore, the site's environmental setting is considered to be **moderate sensitivity**.

13.4.3 With respect to human health, the proposed end use (residential) is considered sensitive.

13.4.4 Transient risks to construction workers can be addressed by the adoption of appropriate health and safety measures, see Section 17.6.

13.5 Contaminant linkages

13.5.1 In terms of a proposed redevelopment of this site, plausible contaminant linkages can be summarised as follows:

Contaminants

13.5.2 Contaminants are limited to arsenic in the Made Ground Topsoil and Granular Made Ground around the former mine shafts.

13.5.3 Whilst Topsoil across the wider site includes 'elevated' results for Arsenic, bioaccessibility testing and assessment has demonstrated that this does not pose a significant risk to human health.

Pathways

13.5.4 Potential contaminant pathways include:

- Ingestion

Receptors

13.5.5 Potential contaminant receptors include:

- End users of the site (residents)

13.5.6 It can be concluded that there are plausible pathways between the soil contaminants summarised in Section 13.2 above and potential receptors. Consequently, some remediation will be required; either treatment/removal of the contaminant, or "breakage" of the pathway.

13.6 Potential remediation options

General

13.6.1 Approval of the recommendations given below should be sought from the appropriate regulatory authorities prior to commencement of site redevelopment.

13.6.2 Given the very limited sample size available to date, consideration could be given to carrying out some further testing of made Ground Topsoil and Granular Made Ground at this site to improve confidence in the recommendations made herein.

13.6.3 Testing of the Made Ground Topsoil would be best carried out following the Topsoil strip and stockpile. Topsoil underlain by made ground (i.e. Made ground Topsoil) should be carefully stripped and stockpiled **separately** to 'natural' Topsoil with samples being recovered for testing from the segregated stockpile.

13.6.4 However, based on the data reviewed to date, the following is considered an appropriate scheme of treatment/remediation.

Made Ground Topsoil

13.6.5 The Made Ground Topsoil is not considered chemically suitable to remain beneath plot gardens and is not geotechnically suitable to be placed beneath plot floor slabs, areas of hardstand or highways.

13.6.6 **Soil cover:** Were the Made Ground Topsoil to remain beneath gardens then it should be isolated beneath a 600mm thick surface cover of 'clean' soil comprising 500mm subsoil and 100mm topsoil is recommended. This cover will break potential contaminant linkages between the contaminated made ground and future end-users.

13.6.7 Consideration could also be considered to stripping, stockpiling and **off-site disposal** of the Made ground Topsoil. However, this is not economical, or considered in line with current government philosophy or industry good practice in relation to sustainability.

13.6.8 **Areas of landscaping/POS:** Whilst the Made Ground Topsoil is not considered suitable to remain in plot gardens, it is considered chemically suitable to be placed at surface in areas of POS. This is because:

- Given the trend of bioaccessibility assessment and testing for Topsoil across the wider site demonstrating that the Topsoil is suitable for re-use, and the Made ground Topsoil is analogous in terms of composition and chemical signature, it is highly likely that the same can be said of the Made Ground Topsoil; much of the arsenic in this material is not readily accessible to end users.
- The level of arsenic reported in the sample tested from TP101 was 42mg/kg; this exceeds Lithos' (conservative) Tier 1 screening value which is derived based on a plot garden. However, DEFRA have derived an equivalent C4SL screening value[6] for arsenic in areas of POS of 79mg/kg; the value reported falls below this screening value.

13.6.9 Consequently, distribution across area(s) of POS is considered a more sustainable and economical use of site-won Made Ground Topsoil cf. distribution beneath clean cover, or off-site disposal.

Granular Made Ground

13.6.10 **Soil Cover:** The made ground has yielded elevated concentrations of arsenic. Therefore, where residual made ground remains beneath garden and landscaped areas (i.e. not beneath hardstanding) a **600mm** thick surface cover of "clean" soil comprising 500mm subsoil and 100mm topsoil is recommended. This cover will break potential contaminant linkages between the contaminated made ground and future end-users.

13.6.11 It might be possible to place a lesser thickness of soil cover in landscaped and\or POS areas following review of the final development layout; further advice should be sought from Lithos at the appropriate time. In addition to the nature of the contaminants present, considerations would include lateral extent and shape of the POS, and responsibilities of any management company.

13.6.12 Alternatively, the granular made ground is considered suitable for redistribution beneath concrete oversite or areas of hardstanding, where they would be satisfactorily isolated from end users.

Groundwater & surface water

13.6.13 As discussed in Section 13.2 above, no significant water contamination has been encountered.

13.6.14 Groundworkers should make all necessary arrangements to prevent off-site migration of contaminants via surface water runoff, inadvertent groundwater disturbance and airborne dust.

[6] *DEFRA SP1010 Policy Companion Document, March 2014.*

13.7 Summary of potential contaminant linkages & mitigation

13.7.1 In terms of the proposed redevelopment plausible contaminant linkages, and feasible remediation options, can be summarised as follows:

Receptors	Pathways	Contaminants	Plausible contaminant linkage? (and remediation options where required)
Human health (Future residents) ◊	Consumption of contaminated vegetables	Metals, in the Granular Made Ground & Made Ground Topsoil	**Yes:** Isolation of Granular Made Ground beneath at least 600mm clean soil cover in garden and landscaped areas where present. Distribution of Made Ground Topsoil across areas of POS.
	Ingestion		
Buildings	Migration/accumulation of explosive gas	Methane in shallow coal/workings	To be assessed on completion of monitoring and gas risk assessment

◊ transient risks to construction workers will be addressed by the adoption of appropriate health and safety measures in accordance with the Health and Safety at Work Act 1974 and regulations made under the Act including for example the COSHH Regulations.

13.8 Waste classification

13.8.1 Some excess arisings (topsoil & subsoil) may be generated by excavations for foundations, sewers etc. If these are intended for retention and reuse on the site, they would be classed as clean naturally occurring soils and would not be considered waste, under the Waste Framework Directive.

13.8.2 Off-site disposal of surplus clean naturally occurring soils to landfill is not recommended. In accordance with the CL:AIRE Code of Practice[7] any excess natural soil arisings should be suitable for Direct Transfer to another development site, for use either as clean cover material, or bulk fill, without the need for waste legislation to be applied.

[7] *The Definition of Waste: Development Industry Code of Practice. CL:AIRE, 2011.*

14 HAZARDOUS GAS

14.1 General

14.1.1 Consideration of the conceptual site model and potential linkages has enabled a preliminary qualitative assessment of risks associated with gas:

Source	Receptors	Hazard	Pathway	Initial risk
Shallow mineworkings	Human health	Asphyxiation & explosion	Vertical migration, ingress & accumulation	**Moderate**: no significant thickness of low permeability drift or bedrock above workings
	Buildings	Explosion		
Landfill (off-site)	Human health	Asphyxiation & explosion	Vertical migration, ingress & accumulation	**Low**: Landfilled material likely to be of low gas generating potential.
	Buildings	Explosion		

14.1.2 Given the above gas monitoring wells have been installed in 5 probeholes across the site. Details of the installations are given on the probehole logs presented in Appendix G to this report.

14.1.3 The generation potential of the gas source was initially considered to be moderate. Consequently, in accordance with CIRIA Report C665[8], given the proposed residential end use, 9 visits have been scheduled over a 6-month period.

14.1.4 A hazardous gas risk assessment incorporating all of the results will be issued on completion of monitoring in October 2026.

14.2 Radon

14.2.1 Requirements with respect radon measures are set out in Building Regulations Approved Document C. Probability bandings (based on the proportion of properties in a given area that exceed the Action Level; currently 200 Bq.m^{-3}) are used to determine whether a property requires no, basic or full measures.

14.2.2 At present Approved Document C advocates basic measures for the probability banding 3% to 10% (full measures if >10%). However, the UK Health Security Agency (HSA) would like to see all new build include basic measures.

14.2.3 In December 2022, the British Geological Survey (BGS), deployed a revised dataset which increased accuracy and also the number of properties falling within radon affected areas. This revised dataset is now referenced by maps on the HSA website.

14.2.4 The HSA website radon map indicates that the site is in an area where **3% to 5%** of homes are estimated to be above the action level, and **basic** radon protection measures are required in new dwellings.

[8] *CIRIA C665: Assessing risks posed by hazardous ground gases to buildings (2007).*

14.2.5 Basic radon measures comprise a radon resistant barrier* (membrane) laid within the floor construction and across the wall cavity in accordance with BR211:2023[9]. The joints between the sheets that form the membrane and cross the cavity **must** be sealed, along with all service penetrations, to make the construction as airtight as possible. A separate cavity tray should be installed in the cavity one brick course above the radon membrane. In order to withstand the installation and follow on construction process membranes should be no less than 400 microns thick.[10]

14.2.6 BRE211:2023 highlights the importance of good practice and a high standard of workmanship to ensure radon membranes are installed to a high standard.

14.2.7 A building site is a harsh environment and barriers can easily become damaged during construction by operatives or equipment moving across or working over a completed section of barrier. As a consequence, where there is a risk of puncturing the membrane, it should be ensured that the membrane is well protected with sand or lean mix concrete before advancing construction.

14.2.8 The radon protection system should be subject to inspection and verification by a third party inspector that has a full understanding of all elements of the radon protection system.

14.2.9 Verification should be carried out at a minimum frequency of 1 in 10 plots where groundworkers carry out installation, and 1 in 20 plots where accredited installers are used. Plots selected for inspection should be located across the development and not clustered.

[9] *BRE Report BR211, 2023: "Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects"*

* *Confirmation of resistance to radon must be obtained from the manufacturer.*

[10] *BS8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. January 2019.*

15 GEOTECHNICAL TESTING

15.1 General

15.1.1 A total of 13 samples of natural soil were delivered to a suitably accredited laboratory with a schedule of geotechnical testing drawn up by Lithos.

15.1.2 The geotechnical laboratory test results are presented in Appendix I to this report.

15.2 Atterberg limits

15.2.1 The plasticity indices of 13 samples of cohesive soil have been determined; results are summarised below.

Soil type	No. samples tested	Moisture content range % (average)	Range of Plasticity Indices % * (average)	Shrinkability
Cohesive Residual Soil	13	16 – 35 (27)	23 – 40 (32)	Medium

* Modified where appropriate in accordance with Chapter 4.2 of the NHBC Standards.

Note. The term Shrinkability is equivalent to the term Volume Change Potential used in Chapter 4.2.

15.2.2 For the purposes of foundation design, it is recommended that all cohesive soils be regarded as being of **medium shrinkability**.

15.3 Soluble sulphate and pH

15.3.1 In accordance with BRE SD1[11], this site has been classified as greenfield with a mobile groundwater regime.

15.3.2 It is envisaged foundations will extend to depths of about 1m through any made ground and natural strata and samples taken from this depth range have been submitted for pH and water-soluble sulphate (2:1 soil/water extract).

15.3.3 The concentrations of sulphate in the aqueous natural soil extracts of 16 samples were determined. In addition, 4 samples of Granular Made Ground/Shaft Backfill were tested as part of the contamination suite. The pH value of each sample has also been determined.

15.3.4 The highest water-soluble sulphate concentration and the lowest pH value for each soil type analysed are shown in the table below:

Soil type	No. samples tested	Lowest pH values	Highest soluble sulphate concentration (mg/l)
Shaft backfill	4	5.6	31
Cohesive Residual Soil	13	6.2	43
Granular Residual Soil	3	6.3	24

15.3.5 pH values were all above 5.5, therefore concentrations of chloride and nitrate are considered insignificant.

In accordance with Tables C1 and C2 of SD1, sub-surface concrete should be Design Sulphate Class **DS-1**, with the site allocated an ACEC Classification of **AC-1**.

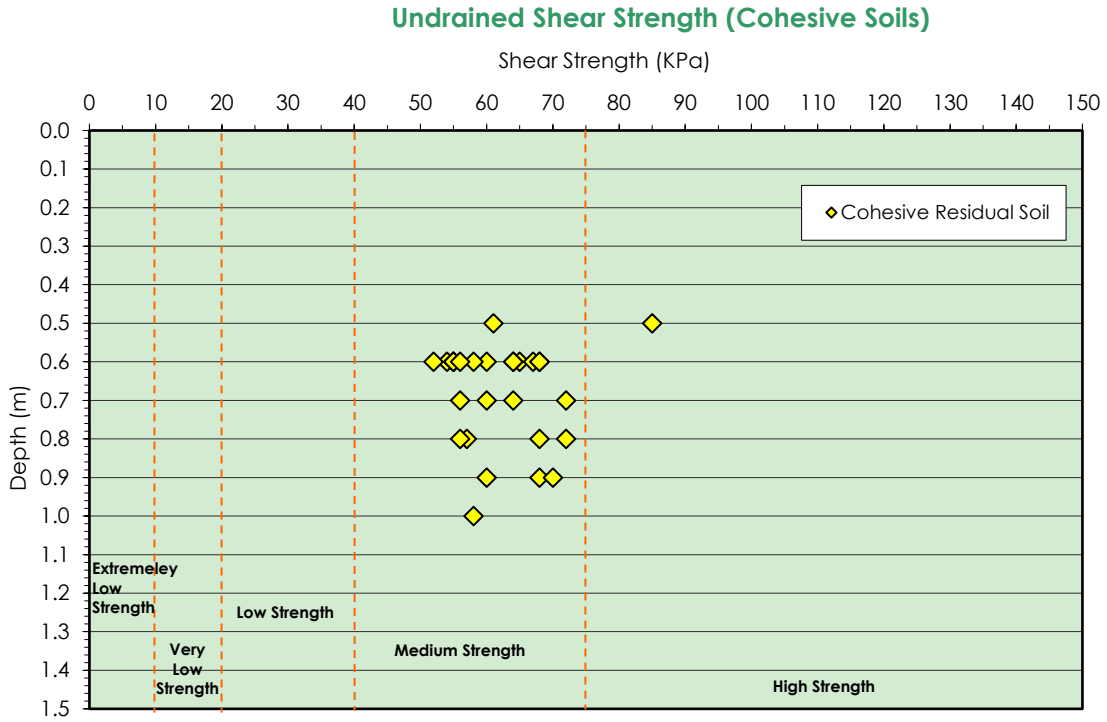
[11] *BRE Special Digest 1 (2005) – Concrete in aggressive ground.*

15.4 Undrained shear strength testing

Hand shear vane testing

15.4.1 Hand shear vane testing was undertaken within trial pits in-situ to around 1.0m depth.

15.4.2 The results are summarised within the plot below and illustrate a linear increase in undrained shear strength (Su) with depth within the Cohesive Residual Soils. Below about 0.9m (the anticipated minimum founding depth), Su is typically greater than 55kPa.



15.4.3 The above results broadly support the field description of the Cohesive Residual Soils as being firm to stiff (broadly equating to medium strength).

16 GEOTECHNICAL ISSUES

16.1 Conceptual site model

16.1.1 Ground conditions across the site predominantly comprise a veneer of Topsoil over Cohesive and Granular Residual Soils with Coal Measures bedrock from around 2m to 3m depth.

16.1.2 A localised area of Granular Made Ground is present around the area of two mine shafts, which have been filled with Shaft Backfill (see below).

16.1.3 BGS mapping suggests that the Middleton Little Coal outcrops across the northwest, but Lithos' (and the 3rd party) investigation suggests that this seam is absent/washed out in this area. The Middleton Main Coal c. 18m to 30m depth and is around typically around 1.4m thick.

16.2 Mining & quarrying

16.2.1 Much of the site is located in a Coal Mining Development High Risk Area, with the remainder being in a Development Low Risk Area.

16.2.2 The Middleton Main Coal Seam lies at between c. 18m and 29m depth beneath the site with a typical seam thickness of 1.4m (maximum thickness encountered of 1.7m). Evidence of underground workings in this seam has been encountered in 5 of 7 'deep' probeholes which encountered this seam.

16.2.3 Two known mine entries are present, which have been located by Lithos (and the 3rd party ground investigation). It should be noted that there may be further unrecorded shafts across this site for which the MRA do not hold any records; it would be prudent to allow for careful examination of the subsurface during/following the Topsoil strip

Shallow mineworkings

16.2.4 CIRIA SP32[12] suggests voids resulting from mineral extraction are unlikely to migrate more than 10 times the seam thickness through competent bedrock. CIRIA C758D[13] notes that the use of this 10 times 'rule-of-thumb', as the design basis for treatment depth, has been observed to be successful over many years for a wide range of mineworkings and overlying rock/soil strata scenarios. However, consideration must always be given to site specifics such as nature of roof strata, strata dip, groundwater, extraction ratio etc.

16.2.5 Consequently, the risk of subsidence associated with the shallow mineworkings is considered negligible for the 'traditional' two/three storey plots across this site; a sufficient thickness of competent cover is present between the coal seam and rockhead in all of Lithos' rotary probeholes.

16.2.6 However, the Middleton Main Coal is 'borderline' shallow enough to pose a potential risk in the northwesternmost corner of the site where an apartment block and a water/sewer pump station is proposed; further consideration of mining risks will be required for these two structures as outlined below:

16.2.7 **Apartment block:** Should the apartment block require alternative foundations (i.e. piles) due to the structure having higher line loads or a low tolerance for settlement then consideration will need to be given to the implications of piling over abandoned mineworkings.

[12] *CIRIA SP32 (1984) - Construction over abandoned mine workings*
[13] *CIRIA C758D (2019) – Abandoned mine workings manual*

16.2.8 In order to reach a sufficient length (piles are typically required to have a minimum length of 5.0m), piles would been to be socketed into bedrock and would terminate in ground with less than 10x seam thickness of competent cover above any underground workings.

16.2.9 Piling over shallow mineworkings (even after grouting) is not common practice, and consequently this letter provides some further advice. In addition, it would be prudent to discuss proposals with specialist piling contractor and seek their views.

16.2.10 Current UK guidance is provided in CIRIA C758D[14], which provides information and guidance for engineers and geologists with respect to the design of: mining investigations; foundations; and remedial measures. It describes: past methods of mining employed in the UK; their short and long-term effects on surface stability; techniques for the consolidation of old mine workings; and remedial measures for mine shafts.

16.2.11 CIRIA C758 provides advice:

16.2.12 If workings occur within 20m of surface it would be unusual to find a satisfactorily thick and rigid founding stratum for highly-loaded piles above, and sufficiently isolated from, the workings. When loadings are light (e.g. for houses), a suitable horizon might be available, but often piles will need to penetrate the workings to found in a stable stratum adequately below the disrupted floor of the workings.

16.2.13 Whatever the depth of workings, even if they are thought to be fully filled or the roof strata to be rigid, piles should not be terminated immediately above an untreated worked horizon because this could concentrate load on a potentially unstable stratum which may initiate eventual collapse.

16.2.14 The objective of a conventionally spaced, over-site grout treatment grid is to ensure against surface settlements. It will not adequately serve below ground support for individual piles. Experience shows that grid separations exceeding 3m in partially collapsed or back-stowed workings are prone to uneven grout distribution and leaving isolated untreated areas or discrete void pockets. These circumstances heighten the risks of pile construction defects and differential performance which need to be minimised by enhanced treatment.

16.2.15 It should be recognised that pressurised grout treatments (even if enhanced) are unlikely to achieve full closure or permeation of randomly distributed or occluded voids, especially if water-filled. This consequence of earthworks treatments is well known, but also it is industry wisdom that grout acceptance maximises at about 90-95% of voidage). Therefore, the pile designer may need to examine additional means to negate residual voids, perhaps by the pile-head detailing and group interconnection measures.

16.2.16 It is recommended that all improvements to the workings themselves, whether by grouting or other filling takes place before piling. All improvement work should be allowed to attain the requisite strength before piling.

16.2.17 When there is a continuing risk of subsidence or residual movements, piles should be taken into competent strata below any seam floor disruption and heave consequential on the workings. Ground treatments should be scheduled to mitigate both installation effects and future settlements.

16.2.18 Particular attention should be given in design to accommodating consequential loads and down-drag generated from ongoing consolidation or reactivated subsidence potential.

[14] *CIRIA C758D:2019. Abandoned mine workings manual*

16.2.19 Founding piles above a system of **untreated** workings is not recommended because collapsed workings are rarely in a permanently stable condition and so have some form of residual settlement potential. Thus, either creep settlement, strata relaxation or collapse migration remain intermittent subsidence possibilities. In which case, structure vulnerability can be an issue if its settlement performance and distortion criteria are too restrictive.

16.2.20 Piling above workings might be possible where sufficiently reliable strata (e.g. a substantial massive and competent bed of sandstone) are present to enable a detachment zone to be defined, or created by enhanced ground treatment. The thickness of this zone will depend on the pile installation method and the size and loading of the pile group.

16.2.21 When a prospective horizon is present, the following key issues, should be examined before deciding if the proposal is viable:

- depths, dip and thickness of the subsidence restricting horizon
- geotechnical and geomechanical properties of the restricting horizon
- separation between pile toe level and the restricting horizon (ie the detachment zone)
- establishing that past collapses have arrested at the restricting horizon
- specific connectivity arrangements at pile heads/caps.

16.2.22 To enable piles to found at a higher level than a significantly stressed worked seam, bulk filling of open workings or grout treatment should be carried out beforehand as standard practice. If grouting, a more comprehensive treatment regime than for spread foundations will be required to produce reliable higher strength characteristics in the intensely stressed zones. These strengths should be specified via the grout mix and validated afterwards.

16.2.23 So, in summary the scenario here is fairly unusual, and further advice should be sought from a specialist piling contractor(s), and discussions held with the pile designer before committing to a contract to grout mineworkings beneath the proposed new build.

16.2.24 **Sewer/surface water pump station:** In the absence of finalised design details it is unknown what the final depth of the pump station will be. However, it is likely to extend to at least 5m (likely further) below existing ground levels.

16.2.25 Excavation to a depth of (at least) c. 5m will remove enough ground such that sufficient competent cover will not be present between the base of the pump station and unrecorded workings in the Middleton Main Coal Seam.

16.2.26 Further advice should be sought from the Drainage Designer/Structural Engineer with regards to the construction of the pump station and its tolerance for ground movements. Noting that the pump station may result in a net 'unlading' of the ground, thereby reducing the stress on any underlying workings.

16.2.27 However, at this stage it would be prudent to assume that some localised treatment of workings will be required across the footprint of the pump station prior to construction.

Mine entries

16.2.28 As discussed in Section 5 there are two known mine entries within the site's boundary.

16.2.29 Mine entries have been located by means of excavating trial trenches. Co-ordinates have been obtained by a surveyor to BNG, and co-ordinates are:

- Shaft ref. 420426-005: 420280.39E / 426311.11N 141.018mAOD. (Unlined, c. 1.7m diameter).
- Shaft ref. 420426-006: 420270.00E / 426322.00N 139.440mAOD. (Unlined, c. 2.0m diameter).

16.2.30 Both shafts were found to be filled with Backfill comprising sandy slightly clayey Gravel of mudstone and occasional siltstone, brick and coal) which extends down the shaft to greater than the depth of excavation (up to 3.0m). With depth, the Shaft Backfill includes a portion of mudstone cobbles.

16.2.31 The MRA will expect Keepmoat's layout to assume a no-build "zones of influence" around each shaft based on the following calculation:

Zone of influence = 0.5 x assumed shaft diameter + drift/made ground depth

16.2.32 The zones of influence associated with each shaft are therefore:

Shaft Ref.	Diameter /m	Depth to bedrock/m	Zone of influence (circle of radius)/m	Approx. location
-005	1.7m	2.9m	3.8m	centre-southwest
-006	2.0m	2.9m	4.0m	centre-southwest

16.2.33 Review of the proposed development layout suggest that both shafts will be located beyond plot footprints in areas of highway/POS.

16.2.34 Consequently, the shafts should be made safe by means of capping at, or below, rockhead. The caps should be a least twice the internal diameter of the shafts and be designed by a competent structural engineer.

16.2.35 The shafts are expected to be deep (>50m, likely accessing known workings in the Silkstone Coal at 73m, and/or the Whinmoor Coal at 121m depth)

16.2.36 There should be no need to investigate the nature of backfill by drilling provided the shaft is capped at rockhead. However, if either shaft lies beneath an adoptable highway, Kirklees Council may require the uppermost 35m of backfill to be drilled and grouted.

16.2.37 It is possible that **further** unrecorded shafts (possibly including bell pits) may be present at this site, and consideration should be given to a geophysical survey, although success would be dependent on the "contrast" between shaft backfill and the surrounding ground (i.e. the survey is likely to be more successful if shaft backfill is significantly different material or less dense than the surrounding ground). Follow-up intrusive investigation (pitting) would be recommended to determine the cause of any anomalies identified by the geophysics.

16.2.38 A topsoil strip could also be considered and will be required anyway across the proposed build footprints prior to construction.

16.2.39 Given the absence of loose superficial deposits, it is considered unlikely that such mine entries would have been lined.

16.2.40 Proposals to treat the mineworkings and shafts will need to be discussed with both the Local Authority (most notably Highways), the Mining Remediation Authority and NHBC well in advance of starting works on site.

16.2.41 Any shafts encountered during the development of this site should be made safe by treatment in accordance with an appropriate Specification (Lithos can prepare this) and a Mining Remediation Authority Permit to Enter or Disturb Mining Remediation Authority Mining Interests.

16.3 Earthworks regrade and/or ground improvement

16.3.1 Given existing topography (much of the site is sloping, with gradients of up to 1v:6h), some earthworks regrade is anticipated, with the need for underbuild and retaining walls.

16.3.2 Careful consideration will need to be given to earthworks design, and implications for slope stability, retaining walls, foundations, highway gradients and drainage

16.3.3 Any digital terrain modelling undertaken, or commissioned, by Keepmoat should consider implications for the foundation recommendations outlined below.

16.3.4 Natural ground underlying this site is often clayey, therefore consideration should be given to the implication of undertaking earthworks in poor/wet weather when the ground surface is likely to become difficult to cross with heavy machinery.

16.3.5 Wherever possible, Lithos recommend that excavated soils are retained on site. However, if this is not possible the comments in Section 13.8 should apply.

16.4 Foundation recommendations

General

16.4.1 A proposed layout has been made available which shows 97 plots, including two apartment buildings, has been provided which is reproduced in Drawing 5685/2.

16.4.2 Foundation recommendations assume that development will be of 'traditional' two/three storey construction and that line loads will not exceed 90kN/m run. If this is not the case significant alteration to these recommendations will be required.

16.4.3 Further investigation should be commissioned if the apartment blocks include significantly higher line loads (say >120kN/m run) are proposed. Such investigation would include cable percussion boreholes and geotechnical analysis (triaxial and oedometer testing) of recovered, undisturbed samples.

16.4.4 It should be noted that if alternative foundations are required for the apartment block in the northwest (i.e. piles socketed into bedrock) then the comments in Section 16.2.7 should be carefully considered.

16.4.5 It is assumed that final development levels will not differ significantly from ground levels existing at the time of investigation. Any digital terrain modelling undertaken, or commissioned, by Keepmoat should consider implications for the foundation recommendations outlined below.

16.4.6 It is likely that some plot foundations will need to be revised following levels regrade across parts of the site.

16.4.7 Made ground is not considered a suitable foundation material and foundations should therefore be taken through these materials into underlying natural strata of adequate bearing capacity.

16.4.8 Keepmoat or their groundworker should seek further advice from Lithos if unexpected ground conditions are encountered in foundation or sewer excavations, including any conflict between soft ground associated with a backfilled trial pit excavation and the line of a proposed footing.

16.4.9 Sub-surface concrete in contact with the made and natural ground should be Design Sulphate Class DS-1, with the site allocated an ACEC Classification of AC-1.

Strip/trench fill footings

16.4.10 It is considered that shallow strip or deepened trench fill footings will be the most suitable foundation solution for two or three storey houses constructed at the site. Footings will be founded in firm clay or competent rock.

16.4.11 Reinforcement, as a precaution against differential settlement, is recommended only where foundation excavations encounter significant lateral and vertical variations in strata. One layer of B385 mesh placed 75mm above the base of the footing is likely to provide suitable reinforcement, but further advice should be sought from the Structural Engineer.

16.4.12 Foundations will be required to be placed below a line drawn up at 45° from the base of any service or similar excavation.

16.4.13 Deepened foundations should be stepped in accordance with NHBC Standards, Chapter 4.3.

16.4.14 In order to minimise softening and swelling of cohesive soils or loosening of granular soils, it is recommended that footings are cast as soon as formation level is reached (or alternatively formation could be blinded using concrete with as low a water:cement ratio as possible).

16.4.15 In addition to the above, Keepmoat should review proposed plot designs and layouts, since deeper excavations for trench fill are likely to be unstable where the centre-lines of parallel trenches are closer than about 2m (assuming 600mm widths). Keepmoat should supervise their groundworker to ensure footings are excavated in a controlled and safe manner.

16.4.16 **Cohesive Residual Soils:** Atterberg tests suggest that natural cohesive soils at the site are of medium shrinkability. A minimum founding depth of 900mm (not accounting for any existing or proposed vegetation) is therefore required for all soils on the site where strip footings are proposed.

16.4.17 In accordance with NHBC Standards, founding depths in cohesive soils should be taken from original or finished ground level, whichever is the lower, to the underside of the footing.

16.4.18 Foundations should be deepened near trees in accordance with NHBC Standards Chapter 4.2. It is estimated that up to 40% of the site may be affected by trees.

16.4.19 The current layout suggests some plots will be built on ground from which hedgerows will be removed. Whilst the hedgerows at the site are relatively low (<2.5m height) and appear to have been maintained at that height by trimming, it is often difficult to definitively prove that they have not desiccated soils to significant depth. In theory, if mature Hawthorn is removed from within the footprint of a plot, founding depth (in medium shrinkability clay) would be >2.5m.

16.4.20 Trench fill foundations should be designed in accordance with NHBC Standards, Chapter 4.2. Heave precautions (a suitable approved compressible void former) should be used on the internal face of all external walls where the foundation is within the zone of influence of trees and greater than 1.5m deep.

16.4.21 Any trench fill foundation deeper than 2.5m will need to be designed by a Chartered Engineer, whose status is accepted by NHBC (NHBC Standards, Technical Requirement R5); however, it is likely that the presence of bedrock will result in few, if any, foundations being deeper than 2.5m.

16.4.22 It would therefore be prudent to prepare a detailed foundation schedule and seek approval from NHBC in order to determine likely foundation abnormals.

16.4.23 A safe bearing capacity of at least 150kPa, allowing a maximum foundation line load of 90kN/m run, can be assumed if the following are true:

- A foundation length of 8m
- A foundation breadth of 0.6m
- A foundation thickness of 225mm
- A foundation depth of (at least) 0.9m depth

- An undrained shear strength of 55kPa for the Residual Soils (typical minimum recorded at anticipated founding depth)

16.4.24 Assuming the foundation geometry detailed above, minimal settlements would be anticipated. This is considered likely to be acceptable, but further advice should be sought from the Structural Engineer responsible for foundation design.

16.4.25 **Bedrock:** The Coal Measures bedrock is generally considered to have a safe bearing capacity of at least 250kPa and minimal settlements would be anticipated.

16.4.26 Where rock is encountered at shallow depth foundations should be placed entirely on rock and not partially on rock and partially on soil. This may, depending on surface gradient, necessitate significant deepening of foundations.

16.5 Floor slabs

16.5.1 Suspended floor slabs should be utilised where the depth of made ground or engineered stone exceeds 600mm in accordance with NHBC Standards Chapter 5.1 (to negate potential settlement problems). The made ground on this site is non-shrinkable, therefore the slabs could be cast in-situ.

16.5.2 It is estimated that the thickness of made ground is likely to exceed 600mm beneath less than 20% of the plots, indeed the bulk of made ground is positioned in areas of POS/beneath highways due to the presence of two mine entries.

16.5.3 Where shallow foundations are within the influence of existing or proposed trees (and underlain by shrinkable soils), NHBC require a suspended floor slab, with sub-floor void. The floor slab is most commonly a precast block and beam construction, but alternatively could comprise a suspended timber floor, or a slab cast on a suitable compressible void former. Ground-bearing and cast in-situ suspended slabs (other than those cast on a void former) are not acceptable where foundations are within the influence of trees.

16.5.4 In accordance with NHBC Standards Chapter 4.2, a minimum void height of 250mm should be adopted for a precast block and beam (or suspended timber) floor; this includes a 150mm ventilation allowance. If a suspended, cast in-situ slab (on a void former) is proposed, a minimum clear void height of 100mm should be adopted; of course, the actual thickness of the void former will be significantly greater.

16.5.5 Ventilation should be provided to precast and timber suspended floors in accordance with NHBC Standards Chapter 5.2.

16.5.6 Beyond the influence of existing or proposed trees, it is considered that the natural ground is generally suitable for the use of ground bearing floors. However, ground bearing slabs should not be cast on topsoil. Where plots are elevated for design reasons, the depth of engineered stone below a ground bearing slab should not exceed 600mm, in accordance with NHBC guidance.

16.5.7 The natural ground beneath this site includes cohesive soils and is therefore subject to seasonal variation in moisture content. If ground slabs were constructed on desiccated soil, heave of the slab would occur on re-hydration of the ground. If any significantly desiccated soil is present, a suspended floor slab, with sub-floor void will be required.

16.5.8 It should be noted that NHBC have suffered a significant number of claims resulting from the use of ground bearing floor slabs. Consequently, if ground bearing slabs are proposed, care should be taken to ensure correct and careful construction. For example, if fill to the internal face of the foundation excavation is not properly compacted, subsequent settlement can result in cracking of the slab.

16.5.9 Floor slab design should be finalised/take account of the results of the gas monitoring and protection measures required, which will be detailed in Lithos' gas risk assessment, to be issued on completion of monitoring in October 2026.

16.6 Designated concrete mixes

16.6.1 Designated mixes are considered in BRE SD1[15] and BS 8500[16]. However, in addition to soil chemistry (sulphate class), there are a number of other considerations relating to structural design that need to be taken into account when determining an appropriate concrete mix.

16.6.2 Consequently, Keepmoat should seek advice from their appointed Structural Engineer.

16.7 Excavations

16.7.1 Based on the results of the investigation it is considered unlikely that major groundwater flows will be encountered in shallow excavations. Nonetheless, groundwater should be controlled in accordance with CIRIA Report R113[17].

16.7.2 Excavations should remain stable in the short term but if left open for any significant period of time may require shoring most notably in granular soils and made ground.

16.7.3 Bedrock was encountered from as shallow as about 2.0m. Based on the exploratory hole logs, excavation greater than around 3m to 4m is likely to prove difficult across much of the site and any deep excavations such as those that may be required for drainage etc will encounter hard rock; larger plant (Lithos' trial pits were excavated using an 8-tonne tracked 360 excavator) a breaker and/or rock ripping attachments might be required.

16.8 Drainage

16.8.1 Based on observations made during the investigation, soakaways constructed into bedrock (from c. 2m to 3m depth) might provide a suitable drainage solution for surface water run-off at the site, although shallow soils are **predominantly Cohesive** and are unlikely to be suitable. To date, no confirmatory testing to determine infiltration rates has been carried out.

16.8.2 Alternative SuDS options (see CIRIA C753[18] for further details) include:

- Pervious Pavements – provide a surface suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate into subsurface storage, with subsequent infiltration or controlled discharge. Pavement could be porous (water able to infiltrate across entire surface material; e.g. reinforced grass), or permeable (water infiltrates via joints between concrete blocks).
- Swales – linear grassed features in which surface water can be stored or conveyed. Where suitable, swales can be designed to allow infiltration.
- Basins - a ground depression designed to store surface water that is normally dry, except during and immediately following a rainfall event. There are two types:
  - Infiltration basin –designed to store runoff and infiltrate it gradually into the ground.
  - Detention (aka attenuation) basin – an outlet restricts flows, so that the basin fills and provides attenuation.
- Ponds – designed to have permanent pool of water, but with capacity to provide temporary storage-controlled discharge.

[15] *BRE Special Digest 1 (2005) – Concrete in aggressive ground.*
[16] *BS 8500-1&2:2015+A2:2019. Concrete. Complementary British Standard to BS EN 206. Method of specifying and guidance for the specifier (1) & Specification for constituent materials and concrete (2).*
[17] *CIRIA Report R113 (1986) - Control of Groundwater for Temporary Works.*
[18] *CIRIA C753 (2015) – The SuDS Manual.*

16.8.3 Yorkshire Water have published a guide[19] for developers and designers outlining their design requirements for surface water attenuation assets. However, further to changes in drainage policy over recent years, independent water authorities (including IWNL, ICOSA, LEEF etc) now adopt more housing schemes than the traditional authorities such as Yorkshire Water. Consequently, CIRIA C753 has become the more commonly used guidance for the design of SuDS features (including attenuation assets).

16.8.4 With respect to detention basins and soakaway tanks, whilst CIRIA C753 does not include explicit guidance on the frequency\duration of groundwater monitoring, it is generally accepted that water table levels should be taken from borehole monitoring wells over 4 consecutive seasons, for at least 3 points in the basin\tank area. The detention basin should be designed to ensure that there is a minimum of 1m of unsaturated soil between the maximum groundwater level and the lowest part of the structure.

16.8.5 Whilst not required by most Independent Authorities, the Yorkshire Water guide also discusses required access to flow control chambers, large diameter (i.e. >900mm) surface water storage pipes, and surface water storage tanks.

16.8.6 It is recommended that the developer contact the traditional Water Authority with respect to capacity in existing foul and surface water sewers in the vicinity of the development area. However, surface water can go to watercourse and in terms of hierarchy should before sewer. If that is the case, consultation may include the Environment Agency (Main River), or Internal Drainage Board (only limited UK coverage), or Local Authority as Lead Local Flood Authority. Landowner Rights (riparian) are always required for watercourse discharge.

16.9 Highways

16.9.1 The natural soils present at shallow depth (anticipated formation) are predominantly cohesive. Based on visual inspection of the natural materials and the recorded plasticity indices at the site, published guidance[20] and tables[21] indicate that the Cohesive Residual Soils would be expected to provide a CBR value of at least 2%. This value should be verified prior to or during construction.

16.9.2 Whilst the CBRs estimated above should be achievable, significant deterioration during/after periods of significant rainfall and/or site trafficking is likely. Consequently, it would be prudent to consider flexibility in the groundworks programme to enable highway construction during prolonged dry/warm weather (typically between May and September) when formation will be least vulnerable to deterioration. Alternatively, a minimum 200mm thickness of suitable granular fill (i.e. a "blanket" of 6F2) could be placed along the line of proposed highways to protect formation during the construction phase.

16.10 External works

16.10.1 Any digital terrain modelling undertaken, or commissioned, by Keepmoat should be made available to their Engineering Designer prior to issue of an External Works Drawing.

16.10.2 When designing retaining walls, consideration should be given to Clause 10.2.3 of NHBC standards which states that flexible retaining walls such as gabion and timber structures should not be used to provide support to homes, garages, roads, drives, car parking areas or drainage systems.

[19] *Design Requirements for Surface Water Attenuation Assets, February 2017.*
[20] *CD225 Design for new pavement foundations Revision 1 (Design Manual for Roads and Bridges)*
[21] *The Structural Design of Bituminous Road, TRRL Laboratory Report 1132 (Table C1, page 36)*

17 REDEVELOPMENT ISSUES

17.1 General

17.1.1 This report has presented options with respect to foundation solutions, treatment of contamination, re-use of topsoil etc that are considered technically feasible and in line with current good practice. Consequently, Lithos would expect to obtain regulatory approval for whichever option is adopted, although this cannot be guaranteed. Copies of this report should be forwarded to the relevant regulatory authorities (Warranty Provider & Local Authority) for their comment/approval.

17.1.2 Even after an appropriate preliminary investigation and ground investigation, with exploratory holes on a closely spaced grid (say trial pits at 30m centres), a geoenvironmental appraisal is typically based on inspection of the ground underlying less than 0.5% of the total site area (and much less at depths in excess of about 3.5m). Consequently, there is always a possibility that unanticipated ground conditions will be encountered during the construction phase.

17.1.3 If unexpected ground is encountered during the construction phase, the Contractor should immediately seek further advice from the Engineer.

17.2 Remediation strategy

17.2.1 Given the absence of any significant contamination, a remediation strategy is not considered necessary. Nonetheless, some preparatory works will be required, most notably:

- General site clearance of surface materials and vegetation
- Topsoil strip & stockpile
- Separate strip, stockpile & segregation of Made Ground Topsoil for placement across area(s) of POS
- Break-up of slabs and hardstand
- Provision of 200mm thickness of topsoil in all garden and landscaped areas
- Treatment (capping) of mine entries, including grouting of uppermost 35m if required by Kirklees Council highways
- (possible) localised treatment of mineworkings beneath proposed pump station

17.2.2 It should be ensured that the groundworker understands the need for good materials management. Most notably the importance of not mixing different materials within a given stockpile; i.e. there should be separate stockpiles of: Topsoil; Made ground Topsoil; Made ground Arisings excess clean, natural soil arisings; general construction waste etc.

17.2.3 Further characterisation of stockpiled materials is likely to be required if off-site disposal is proposed. See also comments in Section 13.8 regarding asbestos.

17.2.4 No areas of gross contamination were encountered during the site investigation. However, if any buried drums, "oily", odorous, brightly coloured etc. materials are encountered, further advice should be sought from Lithos.

17.3 Management of topsoil

17.3.1 In order to manage surface water and silt it is recommended that a phased approach is taken to site clearance and construction; prior to construction, Topsoil and vegetation form a natural barrier and limit surface water (and silt) run off. This is a reasonably large site, and it would be prudent to retain Topsoil and vegetation until construction is due to commence in a given sub-area (other than along the line of proposed roads & sewers).

17.3.2 NHBC Conditions require garden areas to be provided with topsoil to a thickness of not less than 100mm. Topsoil thicknesses in excess of 400mm should generally be avoided.

17.3.3 Prior to placement of topsoil, the underlying subsoil should be loosened by ripping or rotovating. Stones and other objects greater than 50mm should be removed from the prepared surface, and the loosened subsoil should be roughly levelled so that an even depth of topsoil can be achieved.

17.3.4 Subsequent trafficking over the loosened subsoil should be minimised.

17.3.5 Topsoil should not be placed during or immediately after heavy rain.

17.3.6 After spreading, any large, compacted lumps should be broken down to produce a fine tilth suitable for planting, turfing and seeding (< 10mm maximum aggregate size).

17.4 Good practice guidance

17.4.1 The construction phase groundworker should follow good environmental practice to minimise the risks of spillage, leakage etc with reference, but not limited, to the following documents:

- CIRIA C741 [22]
- EA Pollution Prevention Guidelines [23]:
  - PPG6 - Working at construction and demolition sites
  - PPG2 - Above ground oil storage tank
  - PPG7 – The safe operation of refuelling facilities
  - PPG21 – Incident Response Planning

17.5 New utilities

17.5.1 It is strongly recommended that all statutory service bodies are consulted at an early stage with respect to the ground conditions within which they will lay services in order to enable them to assess at an early stage any potential abnormal costs.

17.5.2 This site is greenfield, and no previous or current usage of the site or its immediate surroundings is likely to have resulted in ground contamination. Furthermore, no significant made ground was encountered in any of the exploratory holes during the ground investigation.

17.5.3 Consequently, the use of **'standard' polyethylene** water supply pipes should be acceptable, although Keepmoat should consult the adopting Water Authority at the earliest opportunity to confirm this.

17.6 Health & safety issues - construction workers

17.6.1 Access into excavations etc. must be controlled and undertaken in accordance with the CDM Regulations 2015, most notably Regulation 22, to mitigate risk of collapse or asphyxiation.

17.6.2 Before site operations are started, the necessary COSHH statements and Health & Safety Plan should be drafted in accordance with the CDM regulations.

[22] *CIRIA C741 (2015) - Environmental Good Practice on Site*

[23] *Whilst this has formally been withdrawn it can still be accessed via the EA archives and provides useful information on managing risks.*

17.6.3 The bulk of the made ground will be retained on site. This made ground contains contaminants at concentrations above the guidance threshold values for an end use that includes domestic gardens. Workers involved in excavations for foundations, drainage, utilities etc are likely to come into direct contact with the made ground.

17.6.4 Although workers will only be exposed to the contaminated soil for a relatively short time, the contaminants represent a risk, and simple precautionary measures are required, i.e. good personal hygiene and basic personal protective equipment.

17.6.5 Consequently, during the remediation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land".

17.7 Potential development constraints

17.7.1 Topography is likely to require some relatively localised regrade, construction of retaining structures and/or underbuild of plots.

17.7.2 Some deterioration of the surface is likely to be caused by trafficking, especially after topsoil has been stripped and during/after periods of significant rainfall. Consequently, it would be prudent to consider placement of a minimum 200mm thickness of suitable granular fill (i.e. a "blanket" of 6F2) along the line of proposed highways and any temporary haul roads to protect formation during the construction phase.

17.7.3 Consideration could also be given to flexibility in the groundworks programme to take advantage of any prolonged dry\warm weather (typically between May and September) to enable footings to be cast and blockwork brought up to DPC level well in advance of the build programme (i.e. so it is never necessary to dig deep footings in winter/early spring, when the groundwater table is likely to be higher).

17.7.4 Sterile 'no build' zones will be required around the two mine shafts. The no-build zone should be derived by assuming a 45° line from the outer edge of the shaft cap at rockhead, running up to the finished ground level.

18 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

18.1 General

18.1.1 The site comprises a single parcel of c. 3.5 hectares located between Cliffe Lane and Farrand Lane in Gomersall, about 8km southeast of Bradford city centre.

18.1.2 Consideration is being given to development of the site with 90 'traditional' two/three storey residential dwellings, plus two apartment blocks, and associated gardens, areas of POS and adoptable roads and sewers.

18.1.3 Ground conditions predominantly comprise a veneer of Topsoil over Cohesive (locally granular) Residual Soils with Coal Measures bedrock from between 2m and 3m depth. An area of Granular Made Ground (clayey Gravel – up to 0.6m deep) has been encountered in the location of two MRA recorded mine entries which have been located by trial trenching.

18.2 Mining

18.2.1 Much of the site is located in a MRA Coal Mining Development High Risk Area, with the remainder of the site being in a Development Low Risk Area.

18.2.2 BGS mapping suggests that the Middleton little Coal outcrops across the northwest and underlies much of the area at shallow depth, but Lithos' investigation suggests that this coal seam is absent/washed out beneath the site.

18.2.3 The Middleton Main Coal (typically 0.4m thick, locally up to 1.7m thick) is present from 17.6m and 28.3m depth. Of 7 'deep' probeholes drilled to this seam, 5 encountered some evidence of unrecorded mineworkings. However, a sufficient thickness of competent cover is present between the coal seam and rockhead in all of Lithos' rotary probeholes.

18.2.4 Two known mine entries are located in the centre-southwest which have been located and surveyed in.

18.2.5 The mine entries will require treatment, comprising capping at rockhead. Kirklees Council Highways may also require the uppermost 35m to be pressure grouted should the shafts remain beneath/adjacent to adoptable highways.

18.2.6 There may also be a need for localised treatment of underground workings in the northwesternmost corner, beneath a proposed pump station subject to final designs.

18.3 Hazardous gas

18.3.1 The HSA website radon map indicates that the site is in an area where **3% to 5%** of homes are estimated to be above the action level, and **basic** radon protection measures are required in new dwellings.

18.3.2 The site is underlain by (moderately) shallow coal and workings, and an area of known landfill is recorded from 200m to the northwest; there is a risk of hazardous gasses migrating to plots. Consequently, monitoring wells have been installed in 5 probeholes and monitoring for hazardous gasses is underway; a Hazardous Gas Risk Assessment will be issued on completion of the monitoring in October 2026.

18.4 Contamination & remediation

18.4.1 Granular Made Ground should be isolated beneath a clean cover of 600mm, comprising 500mm of subsoil and 100mm of Topsoil, where it remains beneath gardens and/or areas of POS/landscaping. Alternatively, the Granular Made Ground is considered chemically and geotechnically suitable to be redistributed beneath plot footprints, concrete oversite, or areas of Hardstand where it will be isolated from end users.

18.4.2 Site-won Topsoil is chemically and physically suitable for re-use in gardens and areas of POS/landscaping.

18.4.3 Site-won Made Ground Topsoil is considered chemically suitable for re-use across areas of POS, but **not** in private gardens. Made Ground Topsoil should be carefully stripped and stockpiled separately to 'natural' Topsoil from the wider site. It would be prudent to allow for further sampling and testing of the Made Ground Topsoil (following stockpiling) to improve confidence in the materials suitability for re-use.

18.5 Foundations

18.5.1 Two/three storey plots could be founded on 'traditional' strip footings founding in competent Residual Soils or on bedrock.

18.5.2 Residual Soils are predominantly cohesive and foundation design should consider the effect of trees and hedgerows on founding depths.

18.5.3 Further consideration will need to be given to the apartment blocks if higher line loads (say >120kN/m^2) or a limited tolerance to settlement are associated with these builds. Should piles be required for the apartment in the northwest then further consideration should also be given to risks associated with piling over treated or untreated workings.

18.6 Flooding

18.6.1 The site lies in Flood Zone 1, where the risk of flooding from rivers or the sea is classified as low.

18.7 Drainage

18.7.1 Based on observations made during the investigation, soakaways constructed in bedrock might provide a suitable drainage solution for surface water run-off at this site, but soakaways constructed in the predominantly cohesive Residual Soils are unlikely to prove effective.

18.8 Highways

18.8.1 Based on visual inspection of the shallow natural materials and published guidance, the natural Residual Soils should provide a CBR value of at least 2%. This value should be verified prior to or during construction.

18.8.2 Where made ground is present it should be excavated and either replaced with suitable aggregate, or screened, to allow selection of suitable material, before being replaced in engineered layers. Where the made ground is re-engineered it is considered that a CBR value of at least 3% should be achievable. However, this should be verified by field trials.

18.9 Further works

18.9.1 If deep infrastructure is proposed (eg. the pump-station in the northwestern corner), rotary cored boreholes may be required to provide further information (spacing of bedding, fractures, strength etc).

18.9.2 Soakaway testing in order to assess suitability of the ground for house and highway surface water drainage. This would likely comprise an 'initial sweep' at relatively wide spacings probably with only 1 or 2 fills. It should be noted that if the initial soakaway tests yield satisfactory results, in order to obtain approvals from the LLFA, Highways etc, the drainage designer is likely to require further testing: (a) within 25m of proposed chamber locations; and (b) to include 3 fills.

18.9.3 If the initial soakaway tests yield satisfactory results, it may be necessary to:

- Undertake further testing in order to obtain approvals from the LLFA etc: (a) within 25m of proposed chamber locations; and (b) to include 3 fills.
- Install groundwater monitoring wells to depths of around 5m in at least 3 boreholes. Given the anticipated depth to bedrock, these boreholes might need to be advanced by rotary probing.
- The wells should then be monitored on at least 7 occasions; monthly for 3 months, and then bi-monthly for a further 8 months.

Appendix A

General Notes

01 - Environmental setting
Generic notes – geoenvironmental investigations

General

Third party information obtained from the British Geological Survey (BGS), the Coal Authority, the Local Authority etc is presented in the "Search Responses" Appendix of this Geoenvironmental Report.

Geology, mining & quarrying

In order to establish the geological setting of a site, Lithos refer to BGS maps for the area, and the relevant geological memoir. Further information is sourced by reference to current and historical OS plans.

In July 2011, the Coal Authority (CA) formalised their requirements in relation to planning applications and introduced some new terminology. The CA, using its extensive records has prepared plans for all coalfield Local Planning Authorities, which effectively refines the defined coalfield areas into High Risk and Low Risk areas. **High Risk** areas are likely to be affected by a range of legacy issues that pose a risk to surface stability, including: mine entries; shallow coal workings; workable coal seam outcrops; mines gas; and previous surface mining sites. **Low Risk** areas comprise the remainder of the defined coalfield, and are areas where no known defined risks have been recorded; although there may still be unrecorded issues. Where a site lies within either a High or Low Risk area, a mining report is obtained from the CA.

Landfills

Reference is made to publicly available Government held digital data via **QGIS** (an Open Source Geographic Information System), data from Landmark or Groundsure, and sometimes the Environment Agency and the Local Authority with respect to known areas of landfilling within 250m of the proposed development site.

Historical OS plans are also inspected for evidence of backfilled quarries, railway cuttings, colliery spoil tips etc.

Radon

Radon is a colourless, odourless gas, which is radioactive. It is formed in strata that contain uranium and radium (most notably granite), and can move though fissures eventually discharging to atmosphere, or the spaces under and within buildings. Where radon occurs in high concentrations, it can pose a risk to health.

In order to assess potential risks associated with radon gas, Lithos refer to BRE Report BR211[1], and the UK Health Protection Agency (HPA) website. In December 2022, the British Geological Survey (BGS), deployed a revised dataset which increased accuracy and also the number of properties falling within radon affected areas. This revised dataset is now referenced by maps on the HSA website.

Advice on the limitation of exposure of the population to radon in buildings was originally published in 1990 by the National Radiological Protection Board (NRPB), which joined the HPA in 2005; the HPA updated NRPB advice in July 2010[2].

The HPA recommended that the NRPB radon Action Level for homes be retained, and a new Target Level for radon in homes be introduced. The values of the Action Level and Target Level, expressed as the annual average radon concentration in the home, are 200 Bqm^{-3} and 100 Bqm^{-3} respectively. The Target Level was to provide an objective for remedial action in existing homes and preventive action in new homes.

The term 'radon Affected Area' is defined as those parts of the country with >1% of homes estimated to be above the Action Levels. The level of protection needed is site-specific and can be determined by reference to this mapping on the Public Health England website, which indicates the highest radon potential within each 1km grid square. Each 1km grid square is classified on the basis of the percentage of existing homes within that grid square estimated to have radon concentrations above the Action Level. There are 6 'bands': <1%; 1 to 3%; 3 to 5%; 5 to 10%; 10 to 30%; and >30%.

The NRPB advised that action should be taken to reduce radon concentrations in existing homes if the radon concentration exceeded the Action Level of 200 Bqm^{-3} in room air averaged over a year; ten times the average UK domestic radon concentration. NRPB advice informed changes in the requirements for radon protection in new buildings.

- **Basic** preventive measures are required in new buildings, extensions, conversions and refurbishments if the probability of exceeding the Action Level is **>3%** in England and Wales, and >1% in Scotland and Northern Ireland.
- Provision for further preventive (**Full**) measures is required in new buildings if the probability of exceeding the Action Level is **>10%**.

At present Building Regulations Approved Document C advocates basic measures for the probability banding 3% to 10%, and full measures if >10%. However, HPA would like to see all new build include basic measures.

Action & Target Levels should also be applied to non-domestic buildings with public occupancy exceeding 2,000 hrs/yr and to all schools.

Hydrogeology

Reference is made to publicly available Government held digital data via QGIS, and Landmark or Groundsure with respect to:

- Groundwater quality
- Recorded pollution incidents
- Licensed groundwater abstractions

From April 2010 the EA's Groundwater Protection Policy uses aquifer designations that are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply), but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey. The maps are split into two different types of aquifer designation:

- Superficial (Drift) - permeable unconsolidated (loose) deposits. For example, sands and gravels
- Bedrock - solid permeable formations e.g. sandstone, chalk and limestone

The maps display the following aquifer designations:

Principal aquifers: These are layers of rock or superficial deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary aquifers: These include a wide range of rock layers or superficial deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into three types:

- **Secondary A** - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
- **Secondary B** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers
- Secondary undifferentiated - In most cases, this is because the rock type in question has previously been designated as both a minor and non-aquifer in different locations due to the variable characteristics.

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1 BRE Report BR211, 2023: "Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects".

2 Limitation of Human Exposure to Radon, Documents of the Health Protection Agency - Radiation, Chemical and Environmental Hazards, RCE-15. July 2010.

Unproductive strata: These are rock layers or superficial deposits with low permeability that have negligible significance for water supply or river base flow.

The EA maps only display the principal and secondary aquifers as coloured areas. All uncoloured areas on the map will be unproductive strata. However, for uncoloured areas on the superficial (drift) designation map it is not possible to distinguish between areas of unproductive strata and areas where no superficial deposits are present; to do this, it is necessary to consult the published geological survey maps.

For the purposes of the EA's Groundwater Protection Policy the following default position applies, unless there is site specific information to the contrary:

- If no superficial (drift) aquifers are shown, the bedrock designation is adopted
- In areas where the bedrock designation shows unproductive strata (the uncoloured areas) the superficial designation is adopted
- In all other areas, the more sensitive of the two designations is used (e.g. If secondary superficial overlies principal bedrock, an overall designation of principal is assumed)

The EA have also designated groundwater Source Protection Zones, which are based on proximity to a groundwater source (springs, wells and abstraction boreholes). The size of a Source Protection Zone is a function of the aquifer, volume of groundwater abstracted and the effective rainfall, and may vary from tens to several thousand hectares.

Hydrology

Reference is made to publicly available Government held digital data via QGIS, and Landmark or Groundsure with respect to:

- Surface water quality
- Recorded pollution incidents
- Licensed abstractions (groundwater & surface waters)
- Licensed discharge consents
- Site susceptibility to flooding

The EA have set **water quality** targets for all rivers. These targets are known as River Quality Objectives (RQOs). The water quality classification scheme used to set RQO planning targets is known as the River Ecosystem scheme. The scheme comprises five classes (RE1 to RE5) which reflect the chemical quality requirements of communities of plants and animals occurring in our rivers.

General Quality Assessment (GQA) grades reflect actual water quality. They are based on the most recent analytical testing undertaken by the EA. There are 6 GQA grades (denoted A to F) defined by the concentrations of biochemical oxygen demand, total ammonia and dissolved oxygen.

The susceptibility of a site to **flooding** is assessed by reference to a Flood Map on the Environment Agency's website. These maps show natural floodplains - areas potentially at risk of flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas. There are two different kinds of area shown on the Flood Map:

1. Dark blue areas (Flood Zone 3) could be flooded by the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year, or by a river by a flood that has a 1% (1 in 100) or greater chance of happening each year
2. Light blue areas (Flood Zone 2) show the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Where there is no blue shading (Flood Zone 1), there is less than a 0.1% (1 in 1000) chance of flooding occurring each year.

The maps also show all flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, or floods from the sea with a 0.5% (1 in 200) chance of happening each year, together with some, but not all, older defences and defences which protect against smaller floods.

The Agency's assessment of the likelihood of flooding from rivers and the sea at any location is based on the presence and effect of all flood defences, predicted flood levels, and ground levels.

It should also be noted that as the floodplain shown is the 1 in 100 year, areas outside this may be flooded by more extreme floods (e.g. the 1 in 1000 year flood). Also, parts of the areas shown at risk of flooding will be flooded by lesser floods (e.g. the 1 in 5 year flood). In some places due to the shape of the river valley, the smaller floods will flood a very similar extent to larger floods but to a lesser depth.

If a site falls within a floodplain, it is recommended that a flood survey be undertaken by a specialist who can advise on appropriate mitigating measures; i.e. raising slab levels, provision of storage etc. In accordance with Chapter 10 of the National Planning Policy Framework, a site-specific flood risk assessment is required for: proposals of 1 hectare or greater in Flood Zone 1, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and any new development in Flood Zones 2 and 3.

COMAH & explosive sites

Lithos obtain information from Landmark or Groundsure with respect to Control of Major Accident Hazards (COMAH) or explosive sites within 1km of the proposed development site. Lithos' report refers to any that are present, and recommends that the Client seeks further advice from the HSE.

Areas around COMAH sites (chemical plants etc) are zoned with respect to the implementation of emergency plans. The HSE are a statutory consultee to the local planning authority for all COMAH sites. The COMAH site may have to revise its emergency action plan if development occurs. This might be quite straightforward or could entail significant expenditure. Consequently, the COMAH site may object to a proposed development (although it is the Local Authority who have final say, and they are likely to place more weight on advice from the HSE).

Preliminary conceptual site model

The site's environmental setting (and proposed end use) is used by Lithos to assess the significance of any contamination encountered during the subsequent ground investigation.

Assessment of contaminated land is based on an evaluation of pollutant linkages (source-pathway-receptor). Contaminants within the near surface strata represent a potential source of pollution. The environment (most notably groundwater), site workers and end users are potential receptors.

Potential pollutant linkages are shown on a preliminary conceptual site model (pCSM). A CSM is essentially a cross-section through a site that reflects both the surface topography and underlying geology, and shows surface features of interest. The most significant sources of contamination are then superimposed onto this cross-section together with potential receptors (human health & controlled waters), and plausible pathways between the two. In addition to environmental issues, the CSM should also highlight geotechnical issues.

A pCSM is prepared after consideration of all available "desk study" data, and before design of the ground investigation. Data reviewed should include historical plans (with superimposition on a current-day plan), previous SI reports, geological maps etc. The pCSM, in conjunction with knowledge of site constraints (buildings, services, slopes etc) is used to design the ground investigation.

The revised CSM takes account of data obtained during the ground investigation, including the distribution of made ground, the nature and distribution of contamination etc.

02 - Ground investigation fieldwork
Generic notes – geoenvironmental investigations

General

Lithos Ground Investigations are undertaken in accordance with current UK guidance including:

- BS5930:2015 "Code of practice for site investigation"
- Eurocode 7: BS EN 1997-1:2004. Geotechnical design - Part 1: General rules
- Eurocode 7: BS EN 1997-2:2007. Geotechnical design - Part 2: Ground investigation and testing
- BS10175:2013 "Code of practice for the identification of potentially contaminated sites"
- "Technical Aspects of Site Investigation" – EA R&D Technical Report P5-065/TR (2000)
- "Development of appropriate soil sampling strategies for land contamination" – EA R&D Technical Report P5-066/TR (2001)
- Contaminated Land Reports 1 to 6, most notably CLR Report No. 4 "Sampling strategies for contaminated land"
- "Guidance on the protection of housing on contaminated land" – NHBC & EA R&D Publication 66 (2000)
- AGS: 1996 "Guide to the selection of Geotechnical Soil Laboratory Testing"

Exploratory hole locations

Exploratory hole locations are selected by Lithos, prior to commencement of fieldwork, to provide a representative view of the strata beneath the site and to target potential contaminant sources identified during the preliminary investigation (desk study). Additional exploratory locations are often determined by the site engineer in light of the ground conditions actually encountered; this enables better delineation of the depth and lateral extent of organic contamination, poor ground, relict structures etc.

Investigation techniques

Ground conditions can be investigated by a number of techniques; the procedures used are in general accordance with BS5930: 2015 and BS1377: 1990. Techniques most commonly used by Lithos include:

- Machine excavated **trial pits**, usually equipped with a backactor and a 0.6m wide bucket. Allows a thorough inspection of the ground; especially the uppermost 1m or so (but able to reach depths of up to c. 4m), with the recovery of representative, disturbed samples. Also used to conduct soakaway testing.
- **Window or windowless** sampling boreholes (**dynamic sampling**). Constraints associated with existing buildings, operations and underground service runs can render some sites partly or wholly inaccessible to a mechanical excavator. In such circumstances, window sampling is often the most appropriate technique. A window sampling drilling rig can be manoeuvred in areas of restricted access and results in minimal disturbance of the ground (a 150mm diameter tarmac/concrete core can be lifted and put to one side). However, it should be noted that window sampling allows only a limited inspection of the ground (especially made ground with a significant proportion of coarse material).
- **Cable percussive** (Shell & Auger) boreholes, typically using 150mm diameter tools and casing. Enables the recovery of soil samples and data from greater depth than is possible via trial pitting or a mini-percussive drill rig. Also enables the installation of better/deeper monitoring wells (cf use of a mini-percussive drill rig) due to the utilisation of temporary steel casing during drilling.
- **Rotary percussive** open-hole probeholes are typically drilled using a tri-cone rock roller or polycrystalline diamond compact (PDC) bit with air as the flushing medium. Probeholes are generally lined through made ground with temporary steel casing to prevent hole collapse. Often used to penetrate bedrock to investigate abandoned shallow mineworkings
- **Rotary cored** boreholes. A rock core is cut by a bit, passes up into the inner barrel and, at the end of the coring run, the core barrel assembly is lifted to the surface. Core drilling is relatively expensive, but essential if quality data is required to assess issues associated with deep excavation, rock slope stability etc.

Where installed, gas\groundwater monitoring **wells** typically comprise a lower slotted section, surrounded by a filter pack of 10 mm non-calcareous gravel and an upper plain section surrounded in part by a bentonite seal and in part by gravel or arisings. The top of the plain pipe is cut off below ground level and the monitoring well protected by a square, stopcock type manhole cover set in concrete, or the plain pipe is cut off just above ground level and the well protected by 100mm diameter steel borehole helmet set in concrete. Monitoring well details, including the location of the response zone and bentonite seal are presented on the relevant exploratory hole logs.

In-situ testing

Relative densities of granular materials given on the trial pit logs are based on visual inspection only, they do not relate to any specific bearing capacities.

The relative densities of granular materials encountered in cable percussive boreholes are based on Standard Penetration Test (SPT) results. SPTs are carried out boreholes, in accordance with BS 1377 1990, Part 9 Section 3.3. Where full penetration (600mm) is not possible, N values are calculated by linear extrapolation and are shown on the logs as N* = x. The strength of cohesive deposits is determined using a hand shear vane.

Shear strength test results (hand vane readings) reported on trial pit logs are considered to be more reliable than those reported on window sample logs. Significant sample disturbance occurs during window sampling and consequently shear strength results on disturbed window samples are generally lower than results obtained during trial pitting, in-situ or in large excavated blocks.

Sampling

Typically Lithos collect at least three soil samples from each exploratory hole, although in practice a greater number are often taken. The collection of a sufficient number of samples provides a sound basis upon which to schedule laboratory analysis, ensuring:

- A sufficient number of samples from each (common) site material are tested
- Horizontal and vertical coverage of the site is adequate, thereby providing a robust data set for use in the conceptual ground model
- Any localised, significant, but non-pervasive conditions are considered

Made ground and natural soils encountered in the field during a ground investigation often contain a significant proportion of coarse grained material (e.g. brick etc). Soil samples obtained during most investigations are often only truly representative of the in-situ soil mass where there is an absence of particles coarser than medium gravel; i.e the entire soil mass would pass a 20mm sieve.

Representative bulk samples of the **soil mass** are retrieved from coarse soils for specific geotechnical tests (most notably grading and compaction); this typically requires the collection of at least 10kg of soil, and occasionally >50kg. However, in the context of assessing land contamination, it is generally accepted that samples should be representative of the **soil matrix** of the stratum from which they are taken. Consequently, truly representative samples of coarse soils for subsequent contaminant analysis are not obtained - only the finer fraction is placed in sample containers. Coarse constituents not sampled would typically comprise any 'particles' with an average diameter greater than about 20mm (i.e. coarse gravel, cobble and boulder).

At present, neither ISO/IEC 17025 nor MCERTS specify sample pre-treatment with respect to stone removal. Unsurprisingly therefore UKAS accredited testing laboratories do not adopt the same approach to stones[1] – some crush and test the "as received" soil, whilst others sieve out stones and analyse only the residual soil (the sieve size used varies depending on the laboratory).

In essence, samples taken from coarser soils for contaminant analysis are "screened" by the geoenvironmental engineer in the field, and often sieved again by the laboratory during sample preparation. Geoenvironmental engineers do not typically re-calculate soil mass contaminant concentrations by taking account of the unsampled coarse fraction. Likewise, laboratories that remove stones typically report contaminant concentrations based on the dry weight of soil passing the sieve. In the context of land contamination and human health risk assessment, this is considered reasonable, because it is the soil matrix which is of greatest concern. Stones are unlikely to:

- Provide a significant source for plant uptake (consumption of vegetables)
- Remain on vegetables after washing (consumption of vegetables)
- Be eaten (accidentally by an adult, or deliberately by a child)
- Be whipped-up by the wind for dust generation (inhalation)
- Stick to the skin for any length of time (dermal contact)
- Yield toxic vapour (inhalation)

Consequently, Lithos instruct labs to remove all stones >10mm, and to report the results as dry-weight based on the mass of matrix tested. However, the laboratory are given site-specific instruction where coarse stones are coated in say oil, or impregnated with mobile contaminants such as diesel. Where the stones are predominantly natural, or inert (e.g. brick, concrete etc), removal will clearly result in higher reported concentrations, than if the stones were crushed and added to the matrix.

Where the stones include a significant proportion of contaminant-rich material (e.g. slag, fragments of galvanised metal etc) an argument could be made for crushing and analysing. However, provided the stones are stable (i.e. unlikely to disintegrate or degrade) they should not pose a significant risk to human health for the reasons stated above.

Sometimes it is necessary to obtain samples that are not representative of the wider soil matrix, for example when investigating localised, significant, but non-pervasive conditions. Any such unrepresentative samples are annotated with the suffix '*' (eg 2D*, or 4G*). Lithos' site engineer describes both the unrepresentative sample, and the soil mass from which it was been taken.

Sample Containers (for contaminant analysis). Samples of soil for contaminant testing are placed into appropriate containers (see below). Soil samples for organic analysis are stored in cool boxes, at a temperature of approximately 4ºC, until delivery to the selected laboratory.

Anticipated testing	Container(s)
Asbestos identification	1000ml plastic tub
pH & metals	1000ml plastic tub or 250ml glass jars
non-volatile organics	250ml glass jars
Speciated TPH	250ml & 50ml glass jars
VOCs (incl. naphthalene and\or GRO)	50ml glass jar

Sample Containers (for geotechnical analysis). The majority of samples are only scheduled for PI and sulphate testing, for which 500g of sample is required (a full 0.5-litre plastic tub). However, bulk bags are taken where scheduling of compaction or grading tests is proposed.

Groundwater

Where encountered during fieldwork, groundwater is recorded on exploratory hole logs. If monitoring wells are installed, groundwater levels are also recorded on one or more occasions after completion of the fieldwork. Long-term monitoring of standpipes or piezometers is always recommended if water levels are likely to have a significant effect on earthworks or foundation design.

It should be borne in mind that the rapid excavation rates used during a ground investigation may not allow the establishment of equilibrium water levels. Water levels are likely to fluctuate with season/rainfall and could be substantially higher at wetter times of the year than those found during this investigation.

Description of strata

Soils encountered during a Lithos investigation are described (logged) in general accordance with BS 5930:2015. The descriptions and depth of strata encountered are presented on the exploratory hole logs and summarised in the Ground Conditions section within the main body of text. The materials encountered in the trial pits are logged, samples taken, and tests performed on the in-situ materials in the excavation faces, to depths of up to 1.2m; below this depth these operations are conducted at the surface on disturbed samples recovered from the excavation.

[1] *Mark Perrin. Stoned – Sample Preparation for Soils Analysis. Ground Engineering, April 2007.*

03 – Geotechnical laboratory testing
Generic notes – geoenvironmental investigations

General

Soil samples are delivered to the laboratory for testing along with a schedule of testing drawn up by Lithos. All tests are carried out in accordance with BS 1377:1990. The following laboratory testing is routinely carried out on a selection of samples:

- Atterberg limits & moisture contents
- Soluble sulphate & pH

Where soft, cohesive soils are encountered, one-dimensional consolidation tests are scheduled in order to assess settlement characteristics, and unconsolidated undrained triaxial compression tests to assess shear strength.

The additional tests are typically only scheduled where significant earthworks regrade is anticipated:

- Grading
- Compaction tests
- Particle density

Test results are presented as received in an Appendix to the Geoenvironmental Report.

Atterberg limits & moisture content

The Liquid and Plastic Limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average Plasticity Index (PI) for each "type" of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth. Lithos typically only consider a soil to be shrinkable if the proportion finer than 63µm is >35%. PI results are compared against guidance given in the NHBC Standards, Chapter 4.2 (revised April 2003), which advocates the use of modified Plasticity Index (I'p), defined as:

I'p = Ip * (%< 425µm/100)

i.e. if PI is 30%, but the soil contains 80% < 425µm, then: I'p = 30 * 80/100 = 24%.

It should be noted that in accordance with the requirements of BS 1377, the % passing the 425µm sieve is routinely reported by testing labs. Lithos apply engineering judgment where PI results are spread over a range of classifications. Consideration is given to:

- The average values for each particular soil type (ie differentiate between residual soil and alluvium)
- The number of results in each class and
- The actual values

Unless the judgment strongly indicates otherwise, Lithos typically adopts a conservative approach and recommends assumption of the higher classification.

Soluble sulphate and pH

Sulphates in soil and groundwater are the chemical agents most likely to attack sub-surface concrete, resulting in expansion and softening of the concrete to a mush. Another common cause of concrete deterioration is groundwater acidity.

The rate of chemical attack depends on the concentration of aggressive ions and their replenishment at the reaction surface. The rate of replenishment is related to the presence and mobility of groundwater.

Lithos refer to BRE Special Digest 1 (SD1) "Concrete in aggressive ground. Part 1: Assessing the aggressive chemical environment" (2005). SD 1 provides definitions of:

- The nature of the site (greenfield, brownfield or pyritic)
- The groundwater regime (static, mobile or highly mobile)
- The design sulphate class (DS class) and
- The aggressive chemical environment for concrete (ACEC class)

Lithos reports clearly state each of the above for the site being considered.

The concentrations of sulphate in aqueous soil/fill extracts are determined in the laboratory using the gravimetric method. The results are expressed in terms of SO_4 for direct comparison with BS 5328:1997. The pH value of each sample was determined by the electrometric method.

SD1 also discusses determination of "representative" sulphate concentration from a number of tests. Essentially if <10 samples of a given soil-type have been tested, the highest measured sulphate concentration should be taken. If >10 samples have been tested, the mean of the highest 20% of the sulphate test results can be taken. With respect to groundwater, the highest sulphate concentration should always be taken.

With respect to pH (soil & groundwater) the value used is the lowest value if <10 samples have been tested and the mean of the lowest 20% if >10 samples have been tested.

Oedometer (Consolidation) tests

Oedometer tests measure a soil's consolidation properties, and are performed by applying different loads to a soil sample and measuring the deformation response. Typically the sample is subject to 5 incremental pressures (4 loading & 1 unloading), and the convention is for each subsequent pressure to be double the previous pressure. BS1377 suggests the **initial** pressure should be:

a) For stiff soils the effective overburden pressure*
b) For firm soils "somewhat less" than the effective overburden pressure
c) For soft soils "appreciably less" than the effective overburden pressure, usually 25 kPa or less
d) For very soft soils very low, typically 5 kPa or 10 kPa

* Effective **overburden pressure** (kNm^{-2}) = depth (m) x soil bulk unit weight (kNm^{-3})

Results from these tests are used to predict how a soil in the field will deform in response to a change in effective stress.

Triaxial tests

This test measures the mechanical properties of a soil by placing the sample between two parallel platens which apply stress in one (usually vertical) direction, with fluid used to apply a confining pressure in the perpendicular directions. During the test, the surrounding fluid is pressurized, and then stress on the platens is increased until the material in the cylinder fails.

From triaxial test data, it is possible to extract fundamental material parameters, including its angle of shearing resistance, apparent cohesion, and dilatancy angle. These parameters are then used in computer models to predict how the material will behave in a larger-scale engineering application.

Quick (single stage, Unconsolidated, Undrained tests) are most appropriate for foundation design. This is because load is applied relatively quickly, and shear strength of the clay will be lowest initially; after the applied load causes some consolidation of the ground (after drainage results in dissipation of short-term excess pore water pressure), the in-situ clays will become progressively stronger and hence the factor of safety will increase. Confining pressure is specified as equivalent to overburden pressure (kNm^{-2}).

Foundations on granular soils would use effective shear strength parameters (c' and phi') to assess safe bearing capacity, as the soil would fully drain quickly. These effective shear strength parameters could be determined from Consolidated Undrained (or sometimes the more expensive Consolidated Drained) triaxial tests, but often correlations to the SPT are used.

Unconsolidated Undrained triaxial tests are most appropriate for assessment of the stability of fill slopes on clays. Similar to foundations, the application of load gradually increases the strength of the clays and hence the critical case is the short term undrained condition.

Consolidated Undrained (or sometimes **Consolidated Drained**) triaxial tests are most appropriate for assessment of the stability of cut slopes in clays. This is because unloading of the ground leads to short term reduction in pore pressures that approximately balance the unloading, hence the soil strength is largely unchanged. Over time the reduced pore pressures suck water in, which leads in to the progressive increase in pore pressure and loss of strength. The fully drained state is critical, which must be modelled using effective strength parameters and a reasonable estimate of the long term water table conditions.

Slopes formed in granular soils would use effective shear strength parameters (c' and phi') to assess safe bearing capacity, as the soil would fully drain quickly. These effective shear strength parameters could be determined from Consolidated Undrained (or sometimes the more expensive Consolidated Drained) triaxial tests, but often correlations to the SPT are used.

Determination of analytical suite

An assessment of potential contaminants associated with the former usages of the site is undertaken with reference to CLR 8 "Potential contaminants for the assessment of land" and the relevant DETR Industry Profile(s).

Common contaminants

Common **Inorganic** Contaminants include:

- Metals, most notably cadmium, copper, chromium, mercury, lead, nickel, and zinc
- Semi-metals, most notably arsenic, selenium, and (water soluble) boron
- Non-metals, most notably sulphur
- Inorganic anions, most notably cyanides (free & complex), sulphates, sulphides, and nitrates

With respect to the terminology used by most analytical laboratories:

Total cyanide = Free cyanide + Complex cyanide

Total cyanide (CN) is determined by acid extraction; whereas free cyanide is the water soluble fraction. Complex cyanide is "bound" in compounds and is hard to breakdown. Laboratory determination of complex CN involves subjecting the sample to UV digestion for determination of both free and total CN.

Thiocyanate (SCN) is a different species combined with sulphur.

Elemental sulphur (S) and free sulphur are the same. Total sulphur is all forms, including that present in sulphates (SO_4), sulphides etc.

There are 2 forms of chromium (Cr), chromium VI and chromium III. Chromium VI is the more toxic of these. In soils, total chromium is determined by a strong aqua regia acid digestion. Chromium VI is an empirical method based on a water extract test.

Common **Organic** Contaminants include hydrocarbons, phenols, and polychlorinated biphenyls.

Petroleum is a mixture of hydrocarbons produced from the distillation of crude oil, and includes aliphatics (alkanes, alkenes and cycloalkanes), aromatics (benzene and derivatives) and hydrocarbon-like compounds containing minor amounts of oxygen, sulphur or nitrogen. Petroleum hydrocarbons can be grouped based on the carbon number range:

- GRO – Gasoline Range Organics (typically C_6 to C_{10}). Also referred to as PRO – Petroleum Range Organics
- DRO – Diesel Range Organics (typically C_{10} to C_{28})
- LRO - Lubricating Oil Range Organics (typically C_{28} to C_{40})
- MRO – Mineral Oil Range Organics (typically C_{18} to C_{44})

However, it should be borne in mind that the terms "GRO" and "DRO" analysis are purely descriptive terms, the exact definition of which varies. Total Petroleum Hydrocarbons (TPH) is also a poorly defined term; some testing laboratories regard TPH as hydrocarbons ranging from C_5-C_{40}, whereas others define TPH as C_{10}-C_{30}.

The composition of a TPH plume migrating through the ground can vary significantly; this is primarily dictated by the nature of the source (e.g. petrol, diesel, engine oil etc). Furthermore, different hydrocarbons are affected differently by weathering processes, and this can result in further variation in the chemical composition of the TPH.

Gasoline contains light aliphatic hydrocarbons (especially within the C_4 to C_5 range) that are volatile. The aromatic hydrocarbons in gasoline are primarily benzene, toluene, ethylbenzene and xylenes, referred to as BTEX. Small amounts of polycyclic aromatic hydrocarbons (PAHs) such as benzo(a)pyrene may also be present. Diesel and light fuel oils have higher molecular weights than gasoline. Consequently, they are less volatile and less water soluble. About 25 to 35% is composed of aromatic hydrocarbons. BTEX concentrations are generally low.

Heavy Fuel Oils are typically dark in colour and considerably more viscous than water. They contain 15 to 40% aromatic hydrocarbons. Polar nitrogen, sulphur and oxygen-containing compounds (NSO) compounds are also present. Lubricating Oils are relatively viscous and insoluble in groundwater. They may contain 10 to 30% aromatics, including the heavier PAHs. NSO compounds are also common.

Polycyclic Aromatic Hydrocarbons (PAHs) have two or more fused benzene rings as a structural characteristic. PAH compounds are present in both petrol and diesel, although in significantly lower concentrations than in coal tars. Certain PAH compounds are carcinogenic (benzo(a)pyrene) and\or mobile in the environment (naphthalene).

Volatile Organic Compounds (VOCs) are organic chemicals, and most are liquids that readily evaporate on exposure to air. Examples include benzene, toluene, xylene, chloroform etc. Semi-Volatile Organic Compounds (sVOCs) include phenol and benzo(a)pyrene, and have relatively low boiling points. Both groups of chemicals are readily absorbed through skin and some, such as benzene, are believed to be linked to tumour growth.

Phenols are compounds that have a hydroxyl group (-OH) attached to an aromatic ring (ie include a benzene ring and an –OH group). Most are colourless solids. A solution of phenol in water is known as carbolic acid, and is a powerful antiseptic. However, phenol vapour is toxic, and skin contact can result in burns.

Polychlorinated Biphenyls (PCBs) were used in pre-1974 transformers as dielectric fluids. PCB's are of increasing toxicity relative to the degree of chlorination. Acute symptoms of PCB poisoning are irritation of the respiratory tract leading to coughing and shortness of breath. Nausea, vomiting and abdominal pain are caused by ingestion of PCB's.

Dioxins and furans (polychlorinated dibenzodioxins and polychlorinated dibenzofurans) are some of the most toxic chemicals known; in the environment, they tend to bio-accumulate in the food chain. Dioxin is a general term that describes a group of hundreds of chemicals that are highly persistent in the environment. The most toxic compound is 2,3,7,8-tetrachlorodibenzo-p-dioxin or TCDD.

Dioxin is formed by burning chlorine-based chemical compounds with hydrocarbons. The major source of dioxin in the environment comes from waste-burning incinerators and also from backyard burn-barrels. Dioxin pollution is also affiliated with paper mills which use chlorine bleaching in their process and with the production of Polyvinyl Chloride (PVC) plastics and with the production of certain chlorinated chemicals (like many pesticides).

Methods of analysis (organic compounds)

TPH by GC-FID is an analytical technique which only detects hydrocarbons (aliphatic and aromatic) in the range C_{10} to C_{40} (volatiles, heavy tars, humic material and sulphur are not detected). The laboratory can provide a broad, 'banded' breakdown of the TPH results into gasoline range organics (GRO), diesel range organics (DRO) and heavier lubricating oil range organics (LRO), or fully speciated results with the reporting of hydrocarbon concentrations in 14 specific carbon bandings based upon behavioural characteristics, e.g. aliphatic C_6 to C_8, aromatic C_{10} to C_{12} etc.

Speciated VOC (by GC-MS) analysis quantifies the concentrations of 30 USA-EPA priority compounds. These include chlorinated alkanes and alkenes (in the molecular weight range chloroethane to tetrachloroethane); trimethylbenzenes; dichlorobenzenes; and the 4 BTEX compounds (benzene, ethyl-benzene, toluene & xylene).

Speciated sVOC by (GC-MS) analysis quantifies the concentrations of a variety of organic compounds, including the 16 USA-EPA priority PAHs, phenols, 7 USA EPA priority PCB congeners, herbicides & pesticides.

Note: PAHs are hydrocarbons and consequently (where present) will be picked-up when scheduling TPH by GC-FID.

Note: Risk assessment models require physiochemical properties (solubilities, toxicities etc) of compounds in order to model their behaviour in the environment. These physiochemical properties cannot be derived from a single "TPH", "GRO" or "DRO" value. However, the carbon banded fractions can be used in risk assessment models.

Current UK guidance

The UK approach to contaminated land is set out in Land Contamination Risk Management (2020). The approach is based upon risk assessment, where risk is defined as the combination of the probability of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

In the context of land contamination, there are three essential elements to any risk: (1) a contaminant source; (2) a receptor (eg controlled water or people); and (3) a pathway linking (1) and (2). Risk can only exist where all three elements combine to create a pollutant linkage. Risk assessment requires the formulation of a conceptual model which supports the identification and assessment of pollutant linkages.

Lithos adopt a tiered approach to risk assessment, consistent with UK guidance and best practice. The initial step of such a risk assessment (or Tier 1) is the comparison of site data with appropriate UK guidance levels, Lithos risk-derived screening values, or remedial targets. It should be noted that exceedance of Tier 1 does not necessarily mean that remedial action will be required.

Soil screening values used by Lithos

In March 2002 DEFRA and the Environment Agency published a series of technical papers (R&D Publications CLR 7, 8, 9 & 10) outlining the UK approach to the assessment of risk to human health from land contamination. In 2008 CLR 7, 9 & 10 and all corresponding SGV and Tox reports were withdrawn and superseded by new guidance including:

- Guidance on Comparing Soil Contamination Data with a Critical Concentration - CL:AIRE and CIEH, May 2008
- Evaluation of models for predicting plant uptake of chemicals from soil - Science Report – SC050021/SR
- Human health toxicological assessment of contaminants in soil - Science Report: SC050021/SR2
- Updated technical background to the CLEA model - Science Report: SC050021/SR3
- CLEA Software Handbook, Science report: SC050021/SR4
- Compilation of data for priority organic pollutants for derivation of Soil Guideline Values - Science Report: SC050021/SR7

In December 2013 Defra published the results of research project SP1010 – Development of Category 4 Screening Levels (C4SLs) for Assessment of Land Affected by Contamination. The objective of this project was to provide technical guidance in support of Defra's revised Statutory Guidance for Part 2A of the Environmental Protection Act 1990 (Part 2A). The revised Statutory Guidance, published in April 2012, introduced a new four-category system for classifying land under Part 2A, where Category 1 includes land where the level of risk is clearly unacceptable, and Category 4 includes land where the level of risk posed is acceptably low. Project SP1010 aimed to deliver:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- Demonstration of the methodology, via derivation of C4SLs for 6 substances – arsenic, cadmium, chromium IV, lead, benzene & benzo(a)pyrene.

The methodology for deriving both the previous Soil Guideline Values and the Category 4 Screening Levels is based on the Environment Agency's Contaminated Land Exposure Assessment (CLEA) methodology. Development of C4SLs has been achieved by modifying the toxicological and\or exposure parameters used within CLEA (while maintaining current exposure parameters).

Part 2A Statutory Guidance was developed on the basis that C4SLs could be used under the planning regime. Defra anticipate that, where they exist, C4SLs will be used as generic screening criteria, and Lithos consider C4SLs to be suitable for use as Tier 1 Screening Values. Lithos have discussed this matter with both NHBC and YALPAG (collection of Yorkshire & Lincolnshire local authorities) and received confirmation that they are satisfied with this approach.

The CLEA conceptual site model assumes a source located in a sandy loam, with 6% soil organic matter (SOM) - equivalent to 3.5% total organic carbon (TOC). However, many organic contaminants are more mobile when the SOM is lower, and consequently comparison of soil results with revised, lower screening values may be required. Other CLEA default characteristics adopted by Lithos are:

Sandy Loam characteristics (source)	Default values adopted
Total porosity (fraction)	0.53
Water filled porosity (fraction)	0.33
Air filled porosity (fraction)	0.2

Lithos have derived Screening Values for five different CSMs (scenarios); these are:

A - Residential with gardens, but no cover (or only up to 300mm)

B - Residential with gardens and 600mm 'clean' cover

C - Residential apartments with landscaping (i.e. no home grown produce)

D - Commercial/industrial with landscaping

E – Importation of soil cover

The **exposure** pathways considered for each scenario are detailed in the table below.

Scenario	Land use	Pathways	Justification
A	Residential with garden, but no cover (or only up to 300mm)	• Direct ingestion of soil • Dermal contact • Consumption of vegetables & soil attached to vegetables • Inhalation of indoor vapours and dust • Inhalation of outdoor vapours and dust	Minimal cover – insufficient to break any pathways therefore all exposure pathways are relevant.
B	Residential with garden minimum 600mm cover	• Inhalation of indoor vapours • Inhalation of outdoor vapours	The 600mm cover removes the risk from all pathways other than inhalation.
C	Residential apartments with landscaped areas and minimum 300mm cover	• Direct ingestion of soil • Dermal contact • Inhalation of indoor vapours and dust • Inhalation of outdoor vapours and dust	All pathways applicable due to possible exposure from landscaped areas. However consumption of home grown produce not included as unlikely to be grown in landscaped areas. Where vegetables are to be grown site specific QRA may be required.

Scenario	Land use	Pathways	Justification
D	Commercial/ industrial with landscaped areas no cover	• Direct ingestion of soil • Dermal contact • Inhalation of indoor vapours and dust • Inhalation of outdoor vapours and dust	All pathways applicable due to possible exposure from landscaped areas. Assumed the commercial development consists of offices to provide a conservative assessment.
E	Importation of soil for cover in garden and landscaped areas	• Direct ingestion of soil • Dermal contact • Consumption of vegetables & soil attached to vegetables • Inhalation of outdoor vapours and dust	Material used as cover to break existing pathways therefore all direct and indirect pathways relevant; however cover is **not** placed below plots therefore indoor inhalation is not relevant.

Lithos have assumed the source of contamination is directly below the building foundation; i.e. a depth to source of 0.15m as opposed to the CLEA default of 0.65m. This assumption provides for a more conservative approach than the UK default.

Lithos have derived Tier 1 values for a number of inorganic and organic determinands in the context of the five Scenarios A to E. The Tier 1 values are **not** intended to be used when considering potential risks associated with:

- Existing land uses in the context of Part 2A of the Environment Protection Act 1990;
- End uses such as allotments, sports fields, children's playgrounds, care homes, hospitals etc; or
- Groundwater and surface water

Inorganic Tier 1 values for scenarios A to E

Inorganic contaminant	Tier 1 assessment criteria (mg/kg) for Scenarios A to E							Comments/notes
	SGV*	C4SL*	A	B	C	D	E	
As	32	37	37	Use (A) in SI Report for initial "screen" If >5 x A, then consider increase of cover to 1,000mm	40	640	37	C4SL adopted
Cd	10	26	26		149	410	26	C4SL adopted
Cr			4,000		4,000	28,767	4,000	Assumes Cr is CrIII
Pb	450	200	200		314	2,330	200	C4SL adopted
Ni	130		109		123	892	109	Assessment of health risk only
Se	350		434		596	13,018	434	
Hg	170		199		244	3,603	199	Assumes in an inorganic compound
Vn			584		586	4,994	584	
B			5		5	5	5	Based on phytotoxic risks as plants are the more sensitive receptor (Cu is pH dependant)
Cu			100		100	100	100	
Zn			200		200	200	200	

Organic Tier 1 values for scenarios A to E

Organic contaminant (all sourced via CLEA)	Tier 1 assessment criteria (mg/kg) for Scenarios A to E							Comments/notes
	SGV*	C4SL*	A	B	C	D	E	
Benzene	0.33	0.87	0.7	<1^	<1^	63	<1	<1 based on professional judgement and lower than calculated value.
Toluene	610		836	2,048	1,912	5,000	<1	Scenario D based on professional judgement and lower than calculated value.
Ethyl Benzene	350		379	592	566	5,000	<10	
Xylenes	240		535	590	585	5,000	<10	Scenario E based on professional judgement and lower than calculated value.
Phenol	420		1,434	3,360	2,264	5,000	<10	
PCBs			2	8	2	38	N/A	Based on toxicity of EC7
Benzo(a)pyrene		5	5	25	5	76	5	C4SL adopted. Scenario B 5 times scenario A
Naphthalene			37	37	37	422	<10	Scenario E based on professional judgement and lower than calculated value
Gasoline Range Organics			22	23	23	2178	626	See 3-step assessment of TPH below ^Based on professional judgement and lower than calculated value
Diesel Range Organics			215	218	215	^5,000	1,429	
Lubricating Range Org			3,299	5,000	3,829	^5,000	3,299	

* *For a residential end use*

The significance of PAHs can be determined by considering indicator compounds. In most cases benzo(a)pyrene (BaP) is adopted as an indicator due to the amount of toxicological data available and has been used by various authoritative bodies to assess the carcinogenic risk of PAHs in food. A surrogate marker approach can be used to estimate the toxicity of a mixture of PAHs in soil using toxicity data for individual indicator compounds within that mixture. Exposure to the surrogate marker is assumed to represent exposure to all PAHs in that matrix. The surrogate marker approach relies on a number of assumptions:

- Surrogate marker (BaP) must be present in all soil samples
- Profile of the different PAH relative to BaP should be similar in all samples
- PAH profile in the soil samples should be similar to that used in the pivotal toxicity study[1]

To assess the PAH profile in a soil sample, the ratio of the seven genotoxic PAHs (benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, chrysene, dibenz[a,h]anthracene and indeno[1,2,3-c,d]pyrene), relative to BaP, should be calculated. The ratio relative to BaP should lie within an order of magnitude above and below the mean ratio to BaP.

[1] SP1010 Appendix E, Provisional C4SIs for benzo(a)pyrene as a surrogate marker for PAHs, CL:AIRE 2013

Naphthalene should also be considered separately against its generic screen. Whilst classed as a PAH, naphthalene is more volatile and mobile in the environment than most other PAHs. As such the significance of naphthalene cannot be considered within the surrogate marker approach.

Similarly, **TPH** cannot be assessed as a single "total" value, and reference has been made to the Environment Agency's document P5-080/TR3, "The UK approach for evaluating human health risks from petroleum hydrocarbons in soils". This document supports the assumptions and recommendations made by the US Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG). The TPHCWG have broken down "TPH" into representative constituent fractions or "EC Bandings". The TPHCWG have derived a series of physiochemical and toxicological parameters for each of the bandings.

The significance of speciated TPH results can be assessed by following the 3 steps outlined in the tables below.

Step	Result	Action
1. Consider indicator compounds: Are BTEX, naphthalene, benzo(a)pyrene above their respective Tier 1 values?	Yes	Remediation or dQRA required
	No	Proceed to Step 2
2. Consider individual TPH fractions: are they above respective screening values?	Yes	Remediation or dQRA required
	No	Proceed to Step 3
3. Assess Cumulative effects: Is the calculated Hazard Index for each source >1	Yes	Remediation or dQRA required
	No	TPH compounds pose no significant risk

The equation used to assess cumulative effects in step 3 is shown below.

$$HI = \sum_{F_i=1}^{16} HQ\ F_i = \frac{Measured\ concentration\ F_i\ (mg\,kg^{-1})}{SGV\ F_i\ (mg\,kg^{-1})}$$

where HI = Hazard Index
HQ = Hazard Quotient
F_i = Fraction $_i$
SGV = Soil Guideline Value

Statistical Assessment

Current UK guidance is provided by CL:AIRE[2], and uses two-way confidence intervals and graphical summaries, to assist assessors when determining whether or not a dataset is adequate to answer the question posed; e.g. "is existing site topsoil suitable for retention & re-use?". To answer such a question, it is necessary to recover and test a large number of samples (a minimum of 10; ideally 20+) in order to undertake meaningful statistical analysis.

However, in the context of site investigation to assess the significance of contamination on brownfield sites which are typically underlain by **heterogenous made ground**, some remediation is almost always required (placement of soil cover, excavation of gross contamination etc). Consequently, in such circumstances, it is not necessary to demonstrate that made ground soils are "clean" and therefore there is no need to test large numbers of samples and undertake statistical analysis. Sample results can simply be compared directly with appropriate screening values (e.g. Lithos Tier 1 values).

The CL:AIRE (2020) guidance replaces the withdrawn "Guidance on Comparing Soil Contamination Data with a Critical Concentration" (2008).

The old approach to statistical analysis was based on a definitive yes/no answer which required limited consideration of the dataset and Conceptual Site Model. It was widely accepted that this did not allow sites or risk to be adequately assessed. The updated approach requires a comprehensive understanding of the datasets within the context of the Conceptual Site Model.

Current guidance requires that:

- A robust CSM is in place which identifies source areas, averaging areas and averaging zones
- Sampling locations are relatively evenly spread across the site and were selected using simple or stratified random sampling with no targeting being undertaken
- The field data and CSM do not suggest the presence of a hotspot of contamination which should be treated as a separate zone
- The samples are all taken from a similar same depth and within the same material type across the zone being assessed
- A minimum of 10 samples have been taken. It should be appreciated that confidence in a dataset increases as the number of samples obtained and tested from a zone increases.

The statistical analysis assumes a homogenous distribution of strata and contamination and therefore the dataset will be normally distributed (symmetric, log symmetric or fat tailed).

A normally distributed dataset is assessed using a number of statistical tools to generate a Dot and Box Plot which includes summary statistics and confidence intervals. The review of statistical data enables the assessor to make a decision, with an associated level of confidence, where the true mean of the sample population lies in relation to the critical concentration.

It is essential when using statistics to assess sample data that all decisions relate back to the conceptual site model. Statistics cannot indicate if contamination on a site is likely to present a risk to the end user, this is the role of the 'competent person' i.e. Lithos.

However, broadly speaking the following applies:

- Mean and UCL below the critical concentration – no further assessment required.
- Mean below the critical concentration, but UCL above – consider the CSM and likely sources.
- Mean and UCL above the critical concentration – further assessment required, remediation likely depending on the CSM.
- LCL, Mean & UCL above the critical concentration – further assessment required, remediation likely.

[2] *CL:AIRE, 2020.Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration.*

Other screening values used by Lithos

Tier 1 risk assessment of **hazardous gas** is undertaken through reference to the following documents (and further information is presented in Generic Note No. 5 – Hazardous Gas):

- Approved Document C, Building Regulations 2000
- Boyle & Witherington (2007) – Guidance on evaluation on development proposals on sites where methane and carbon dioxide are present, incorporating "traffic lights". Report Ref. 10627-R01-(02), for NHBC
- CIRIA C665 (2007) – Assessing risks posed by hazardous ground gases to buildings
- BS 8485:2015 – Code of Practice for the characterisation & remediation from ground gas in affected developments

With respect to the assessment of potential **phytotoxic effects** of contaminants, Lithos refer to The Sewage Sludge in Agriculture: Code of Practice 2018 for copper and zinc (at pH 5.5 to 6.0). The CLEA derived Tier 1 value is adopted for nickel due to its human health effects.

The potential risk to **building materials** is considered through reference to relevant BRE Digests, with particular emphasis on BRE Special Digest 1, 'Concrete in aggressive ground', 2005.

With respect to the interpretation of the **calorific values**, at present there are no accepted methods to assess whether a sample is combustible and under what circumstances it might smoulder. Some guidance is given in ICRCL Note 61/84 "Notes on the fire hazards of contaminated land" which states that: "*In general … it seems likely that materials whose CV's exceed 10MJ/kg are almost certainly combustible, while those with values below 2MJ/kg are unlikely to burn*".

Tier 1 **groundwater risk assessments** are always site specific and compare leachate or groundwater concentrations with the appropriate water quality standard based on the CSM and consideration of relevant water quality impacts and assessments.

Waste classification & WAC

In the context of waste soils generated by remediation and\or groundworks activities on brownfield sites, the following definitions (from the Landfill Regulations 2002) apply:

- Inert (e.g. uncontaminated 'natural' soil, bricks, concrete, tiles & ceramics)
- Non-Hazardous (e.g. soil excavated from a contaminated site which contains dangerous substances, but at concentrations below prescribed thresholds)
- Hazardous (e.g. soil excavated from a contaminated site which contains dangerous substances at concentrations above prescribed thresholds)

Dangerous substances include compounds containing a variety of determinants commonly found in contaminated soils on brownfield sites, for example arsenic, lead, chromium, benzene etc.

Landfill operators require Waste Acceptance Criteria (WAC) laboratory data, if soil waste is classified as **hazardous**. However, subject to WAC testing it may be possible to classify it as stable, non-reactive hazardous waste, which can be placed within a dedicated cell within the non-hazardous landfill.

Lithos typically only include WAC analysis in site investigation proposals and reports, if significant off-site disposal (of soil classified as hazardous waste) is anticipated, for example where redevelopment proposals include basement construction etc. If off-site disposal of soils classified as hazardous waste during redevelopment is anticipated, then WAC analysis should be scheduled at an early stage in the remediation programme. However, organic compounds (BTEX, TPH, PAH etc) are the most common contaminants that result in soils being classed as hazardous, and these contaminants can often be dealt with by alternative technologies (e.g. by bioremediation or stabilisation) and consequently retention on site is often possible.

It should be noted that **non-hazardous** soil waste can go to a non-hazardous landfill facility; no further testing (e.g. WAC) is required.

Possible action in event of Tier 1 exceedance

Should any of the Tier 1 criteria detailed above be exceeded, then three potential courses of action are available. (The first is only applicable in terms of human health, but the second and third could also be applied to groundwater or landfill gas).

1. Undertake further statistical analysis following the approach set out in Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration, 2020 (see above) in order to determine whether contaminant concentrations of inorganic contaminants within soil\fill actually present a risk (only applicable to assessing the risk to human health).
2. Carry out a more detailed quantitative risk assessment in order to determine whether contamination risks actually exist.
3. Based on a qualitative risk assessment, advocate an appropriate level of remediation to "break" the pollutant linkage - for example the removal of the contaminated materials or the provision of a clean cover.

Prior to undertaking any statistical analysis the issue of the **averaging area** requires further consideration. Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration, 2020 provides some guidance on averaging areas noting that they are the area within which a receptor may be exposed to contamination but leaving the site assessor to determine the appropriate averaging area for their site.

Lithos consider the entire site needs to be characterised by reference to the Conceptual Site Model. Consequently, Lithos gather and analyse sample results by fill type, and\or by former use in a given sub-area of the site, before undertaking statistical analysis; i.e. the averaging area is associated with the extent of a particular fill type, or an area affected by spillage\leakage.

In terms of brownfield redevelopment, this is considered a more appropriate methodology which provides a more representative sample population for statistical analysis. As such the entire site is considered in terms of the proposed end use, be this residential with, or without gardens.

Analysis by soil\fill type is appropriate for essentially immobile contaminants associated with a particular fill type, for example arsenic in colliery spoil, metals in ash & clinker, sulphate in plaster-rich demolition rubble etc.

Analysis by former use is appropriate where more mobile contaminants have entered the ground, for example diesel associated with leakage from a former fuel tank, downward migration of leachable metals through granular materials, various soluble contaminants present in a wastewater leaking into the ground via a fractured sewer etc. In these circumstances, it may be appropriate to undertake statistical analysis of sample results from a variety of different soil\fill types. However, consideration would have to be given to factors such as porosity which might influence impregnation of a mobile contaminant into the soil mass, i.e. contamination would normally be more pervasive and significant in granular soils than cohesive soils

05 – Hazardous gas
Generic notes – geoenvironmental investigations

General

Hazardous gas is considered to be any mixture of potentially explosive, toxic or asphyxiating gases, most notably methane, carbon dioxide and oxygen (deficiency). In addition, radon, a naturally occurring radioactive gas is also considered. Further information about radon is included in Notes 01 – Environmental Setting.

Assessment of potential risks associated with hazardous gas are based on a review of data obtained from the Landmark Information Group, the Environment Agency and the Local Authority and the British Geological Survey. Reference is also made to historical OS plans, which are inspected for evidence of backfilled quarries, railway cuttings, colliery spoil tips etc.

Where landfilling has occurred within 250m of the site boundary, the Local Planning Authority may request a landfill gas investigation in accordance with the Town and Country Planning General Development Order, 1988.

Sources

Potential sources of hazardous gas include:

- Landfill sites
- Made ground, especially where significant depths are present
- Shallow mineworkings associated with coal extraction
- Geological strata, including peat, organic silts, coal and limestone (reaction with acidic waters), granite (radon)
- Groundwater can sometimes act as a "carrier" for hazardous gas
- Leakages from pipelines or storage tanks
- Sewers, septic tanks and cess pits

Generation

Wherever biodegradable material is deposited, landfill gas (principally a mixture of methane and carbon dioxide) is likely to be generated by microbial activity. Carbon dioxide is an asphyxiant and toxic; methane is flammable and a mixture containing between 5% and 15% methane by volume in air is explosive. Landfill gas in the ground is unlikely in itself to pose a significant risk, though it may damage vegetation. However, infiltration of landfill gas into confined spaces (e.g. cellars, services, etc) may give rise to considerable risk.

There is no typical figure for the length of time that landfill gas will be evolved, but at many sites significant gas generation continues for at least 15 years after the last deposit of waste.

Migration

Gas migration from a landfill site may occur in several ways. It may migrate through adjacent strata; the distance of migration being dependent on the pressure gradients, volume of gas and permeability of the strata. Where there are faults, cavities and fissures within the strata, gas may move considerable distances. Other migration pathways for gas include man-made features such as mine shafts, roadways and underground services.

Gas migration is influenced by a number of climatic factors, such as atmospheric pressure variations, water table level variations and the influence of a covering of snow or ice over the surface of the site and surrounding area.

Gas monitoring procedure

Lithos adopt a standard gas monitoring procedure, in accordance with CIRIA guidance. This procedure involves the measurement, in the following order of:

- Atmospheric temperature, pressure and ambient oxygen concentration
- Gas emission rate
- Methane, oxygen and carbon dioxide concentrations using an infra-red gas analyser
- Standing water level using a dipmeter.

In addition, ground conditions at each sampling location are recorded together with prevailing weather conditions and any other observations such as any vandalism. Where samples of gas are required for laboratory analysis, Gresham Tubes or multi-layer Tedlar / ALTEF sampling bags are used. Gas concentrations in the well are typically recorded immediately before and after retrieval of a sample.

Current guidance

CIRIA Report 151 (1995) identified that there was inadequate guidance on trigger concentrations for ground gases. CIRIA concluded that the most important aspect of a gas regime below or adjacent to a site was the surface emission rate, i.e. how quickly the gas is coming out of the ground. The lower the surface emission rate the lower the risk. CIRIA Report C665 (2007) advocated two methodologies for characterising sites:

A – All developments except low rise housing. The advocated methodology is that proposed by Wilson & Card, 1999

B – Low rise housing. An alternative (traffic light) methodology, derived by Boyle and Witherington, 2006 for NHBC

Both methodologies refer to Gas Screening Values (GSV); previously referred to as limiting borehole gas volume flow. However, the NHBC traffic light guidance will be withdrawn in July 2025, and consequently Lithos typically now only refer to Situation A methodology.

Relevant UK guidance includes:

- BS8485:2015+A1:2019 – Code of Practice for the characterisation & remediation from ground gas in affected developments.
- BS8576:2013 Guidance on investigations for ground gas – permanent gases and volatile organic compounds
- Wilson, Card & Haines (CIEH, 208) The Local Authority Guide to Ground Gas
- CIRIA C665 (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings
- CIRIA C735 (2014) Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases
- CL:AIRE (October 2021) Good Practice for Risk Assessment for Coal Mine Gas Emissions
- CL:AIRE Research Bulletin RB17 (November 2012) A Pragmatic Approach to Ground Gas Risk Assessment
- CL:AIRE Research Bulletin RB13 (February 2011) The Utility of Continuous Monitoring in Detection & Prediction of 'Worst-Case' Ground Gas Concentration
- BRE\Environment Agency Report BR 414 (2001) – "Protective Measures for housing on gas-contaminated land".
- YALPAG (December 2016) - Verification Requirements for Gas Protection Systems - Technical Guidance for Developers, Landowners and Consultants.
- Environment Agency Report LFTGN 03 - Guidance on the management of landfill gas, June 2014
- NHBC Foundation (April 2023) Hazardous Ground Gas – an Essential Guide for Housebuilders (NF94)

Situation A Methodology (All development)s

(Wilson & Card, 1999) revised Table 28 of CIRIA 149 in terms of borehole gas volume flow rate (now GSV) in order to achieve a more consistent design of protection measures. This was done to reflect the importance of recognising the gas surface emission rate. Wilson & Card then developed a method for classifying gassing sites (Table 1 below), which took into account the combined gas concentration and GSV.

Characteristic Situation	Gas Screening Value, CH_4 or CO_2 (l/hr)	Additional limiting factors	Typical source of generation
1	<0.07	Methane not to exceed 1% v/v and carbon dioxide not to exceed 5% v/v	Natural soils with low organic content
2	<0.7	Borehole air flow rate not to exceed 70 litre/hr otherwise increase to Characteristic Situation 3	Natural soil, high peat/organic content
3	<3.5		Old landfill, inert waste, mineworkings flooded.
4	<15	Quantitative Risk Assessment required to evaluate scope of protection measures.	Mineworkings – susceptible to flooding, completed landfill, inert waste
5	<70		Mineworkings unflooded, inactive
6	>70		Recent landfill site

Notes: Borehole flow rate = volume of gas (regardless of composition) which is escaping from well (l/hr). Gas Screening Value (litre/hour) = gas concentration (%) / 100 x borehole flow rate (l/hr). To facilitate design implementation, the limiting values for both methane and carbon dioxide are identical.

Appendix B

Drawings



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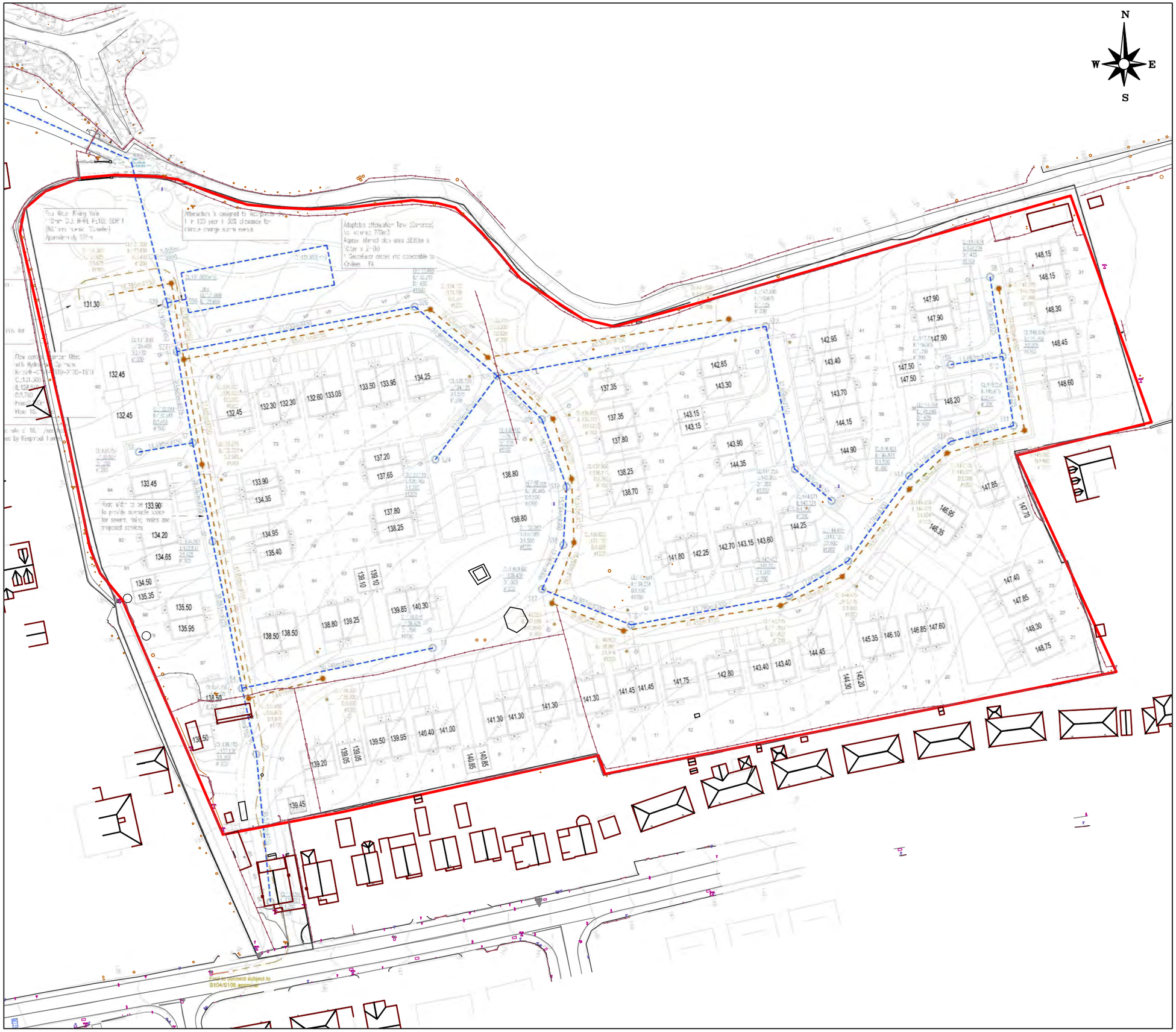
CLIENT	KEEPMOAT HOMES YORKSHIRE WEST
JOB TITLE	CLIFFE LANE, GOMERSAL
DRAWING TITLE	SITE LOCATION PLAN
DRAWN	EW
DATE	17 02 2026
CHECKED	AG
DATE	17 02 2026
STATUS	FOR COMMENT ☐ DRAFT ☐ FOR APPROVAL ☐ FINAL ☑
SCALE	1:25,000
SHEET	A4
DRAWING NO.	5685/1
REVISION	



NOTES

APPROXIMATE SITE BOUNDARY

REPRODUCED FROM ARP ASSOCIATES DRAWING 'DRAINAGE FEASIBILITY - CLIFFE LANE, GOMERSALL', REF. 272/165/SK01, DATED NOVEMBER 2025

REV.	DESCRIPTION	DATE

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CLIENT

KEEPMOAT HOMES YORKSHIRE WEST

JOB TITLE

CLIFFE LANE, GOMERSAL

DRAWING TITLE

PROPOSED SITE LAYOUT

DRAWN	DATE	STATUS
GLM	17/04/2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	17/04/2026	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1,000	A3	5685/2	



NOTES

- GRASS & OVERGROWN AREAS
- TREES/HEDGEROWS
- BUILDING
- APPROXIMATE SITE BOUNDARY

REV.	DESCRIPTION	DATE

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CLIENT

KEEPMOAT HOMES YORKSHIRE WEST

JOB TITLE

CLIFFE LANE, GOMERSAL

DRAWING TITLE

SITE FEATURES

DRAWN	DATE	STATUS
EW	25 02 2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	25 02 2026	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:??	A3	5685/3	















N
W E
S

NOTES

- GRASS & OVERGROWN AREAS
- TREES/HEDGEROWS
- BUILDING
- APPROXIMATE SITE BOUNDARY
- LOCATION & ORIENTATION OF PHOTOGRAPH

REV.	DESCRIPTION	DATE

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CLIENT

KEEPMOAT
HOMES
YORKSHIRE WEST

JOB TITLE

CLIFFE LANE,
GOMERSAL

DRAWING TITLE

SITE PHOTOGRAPHS

DRAWN	DATE	STATUS
EW	26 02 2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	26 02 2026	DRAFT ☐
		FINAL ☑

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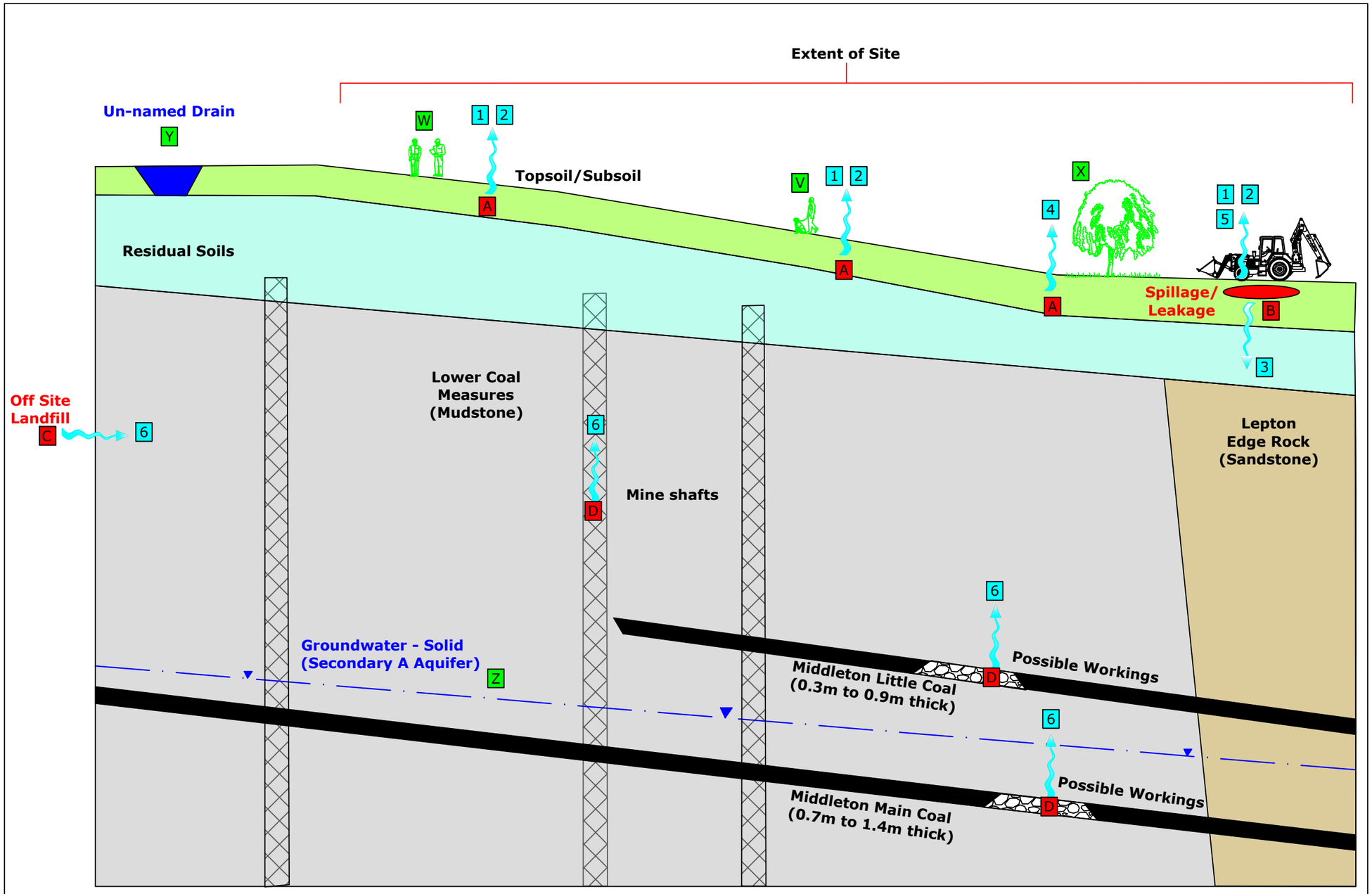

SOURCES	PATHWAYS	RECEPTORS
A AGRICULTURE (INORGANICS)	1 DERMAL CONTACT	V END USERS (RESIDENTS)
B LEAKAGE/SPILLAGE (ORGANICS)	2 INGESTION/INHALATION	W SITE WORKERS
C LANDFILL (OFF-SITE)	3 LEACHING OF CONTAMINANTS	X VEGETATION
D SHALLOW COAL/MINEWORKINGS	4 UPTAKE BY PLANTS	Y SURFACE WATERS
	5 VOLATILISATION	Z GROUNDWATER
	6 MIGRATION OF GAS	

NOTES

REV.	DESCRIPTION	DATE

LITHOS CONSULTING

info@lithos.co.uk
www.lithos.co.uk

Tel 01937 545330

CLIENT

KEEPMOAT
HOMES
YORKSHIRE WEST

JOB TITLE

CLIFFE LANE,
GOMERSAL

DRAWING TITLE

PRELIMINARY CONCEPTUAL SITE MODEL

DRAWN	DATE	STATUS
EW	26 02 2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	26 02 2026	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
Not to scale	A3	5685/5	A



NOTES

- TRIAL PIT LOCATION
- PROBEHOLE LOCATION
- GRASS & OVERGROWN AREAS
- TREES/HEDGEROWS
- BUILDING
- APPROXIMATE SITE BOUNDARY

EXPLORATORY HOLE LOCATIONS HAVE BEEN SURVEYED IN (COORDINATES & GROUND LEVEL) ON COMPLETION

REV.	DESCRIPTION	DATE

LITHOS CONSULTING

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Tel 01937 545330

CLIENT

KEEPMOAT HOMES YORKSHIRE WEST

JOB TITLE

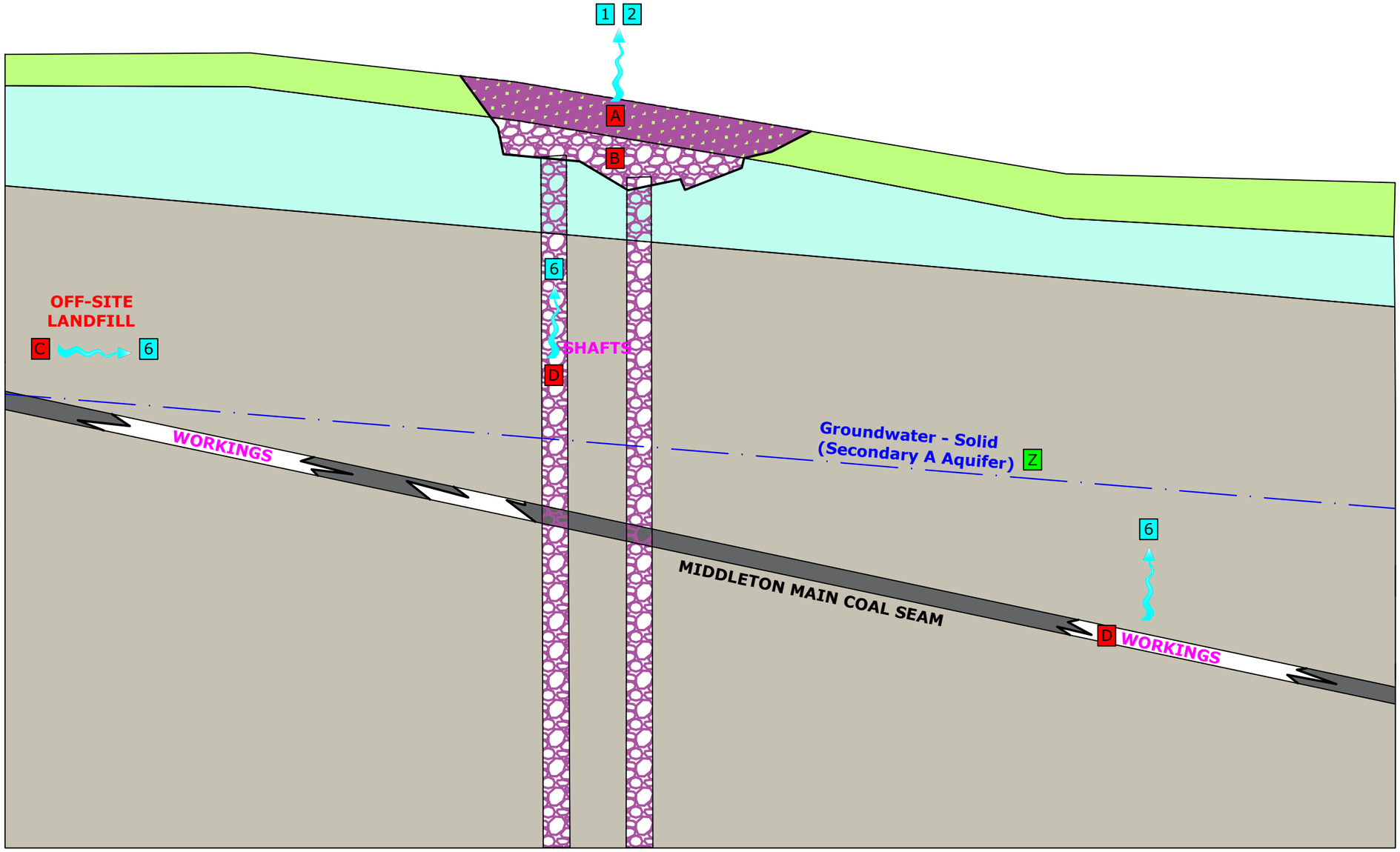
CLIFFE LANE, GOMERSAL

DRAWING TITLE

EXPLORATORY HOLE LOCATIONS

DRAWN	DATE	STATUS
EW	25 02 26	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	25 02 26	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1000	A3	5685/6	



KEY
TOPSOIL
GRANULAR MADE GROUND
RESIDUAL SOILS
COAL MEASURES (BEDROCK)

SOURCES
A INORGANICS (ARSENIC - T/S)
B INORGANICS (ARSENIC - M/G)
C LANDFILL (OFF-SITE)
D COAL & MINEWORKINGS

PATHWAYS
1 DERMAL CONTACT
2 INGESTION/INHALATION
6 MIGRATION OF GAS

RECEPTORS
V END USERS (RESIDENTS)
W SITE WORKERS
X VEGETATION
Y SURFACE WATERS
Z GROUNDWATER

NOTES

REV.	DESCRIPTION	DATE

LITHOS CONSULTING

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www.lithos.co.uk

Tel 01937 545330

CLIENT

KEEPMOAT
HOMES
YORKSHIRE WEST

JOB TITLE

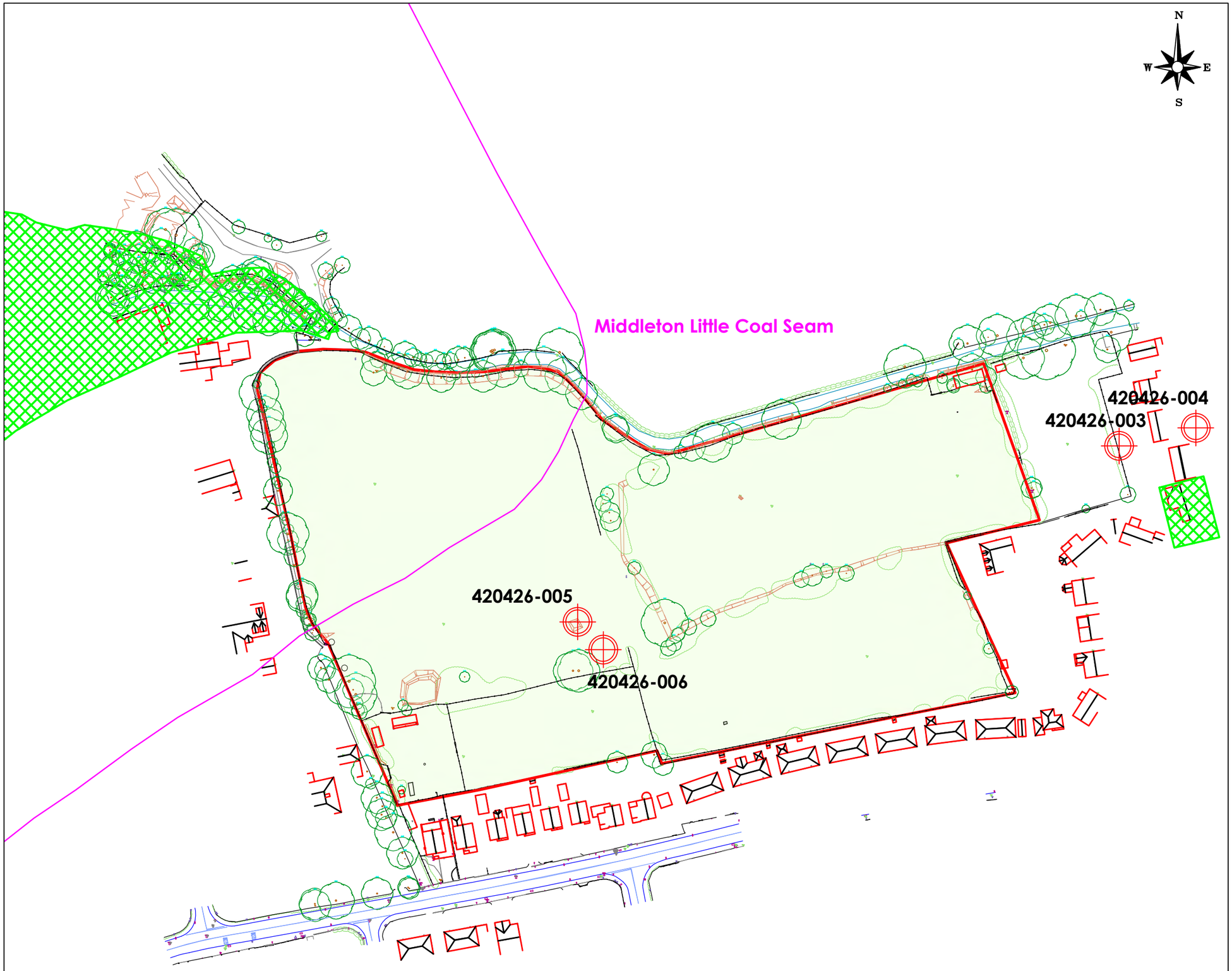
CLIFFE LANE,
GOMERSAL

DRAWING TITLE

REVISED CONCEPTUAL SITE MODEL

DRAWN	DATE	STATUS
GLM	17/04/2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	17/04/2026	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
Not to scale	A3	5685/7	A



NOTES

- FUEL STORAGE TANKS
- MINE SHAFT (FROM CA MINING REPORT)
- COAL OUTCROP (CONJECTURED) (FROM BGS PLANS)
- APPROXIMATE SITE BOUNDARY

REV.	DESCRIPTION	DATE

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CLIENT

KEEPMOAT HOMES YORKSHIRE WEST

JOB TITLE

CLIFFE LANE, GOMERSAL

DRAWING TITLE

MINING FEATURES

DRAWN	DATE	STATUS
EW	17 02 2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	17 02 2026	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1500	A3	5685/8	



NOTES

- MONITORING WELL LOCATION
- GRASS & OVERGROWN AREAS
- TREES/HEDGEROWS
- BUILDING
- APPROXIMATE SITE BOUNDARY

EXPLORATORY HOLE LOCATIONS HAVE BEEN SURVEYED IN (COORDINATES & GROUND LEVEL) ON COMPLETION

REV.	DESCRIPTION	DATE

CLIENT

KEEPMOAT HOMES YORKSHIRE WEST

JOB TITLE

CLIFFE LANE, GOMERSAL

DRAWING TITLE

MONITORING WELL LOCATIONS

DRAWN	DATE	STATUS
EW	13 04 2026	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	13 04 2026	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1500	A4	5685/9	

Appendix C

Commission

From:	Adam Clarke
To:	Adam Gombocz
Cc:	Billy Freeman
Subject:	Gomersal - SI Quote
Date:	17 December 2025 10:41:21
Attachments:	image362450.jpg image352527.gif image326003.png image282169.png image849825.png image621739.png

Hi Adam

As discussed, we've had an offer accepted on the above site, with a period of 8 weeks to carry out further due diligence – luckily this commences from signing of heads of terms, so looking as though this 8 weeks won't kick in until mid January at earliest.

As such, I wanted to get a head start on the SI given this will be the longest lead in due to CA permit / rig availability. Could you provide a quote for a full investigation to allow us to arrive at a robust position on abnormal costs.

Link to Geodyne report received as part of bid; looking at the date on this I suspect you've already seen it & quoted previously for supplementary SI - https://we.tl/t-bNsSt1irer

Suspect we'll need gas monitoring given their investigation didn't target the source of the gas risk & just had shallow wells....as such this is going to be outstanding on completion of the 8 weeks, but hopefully should have some comfort that it won't be any risk of it being any worse than CS3?

I attach our appraisal layout, drainage & levels strategy & cut fill to further advise the SI. Could probably do with a monitoring well where the tank is and a view on how hard the bedrock is where we're going to be in significant cut.....may also impact the rock cover calculation in this area? There also seems to be a lot of mention of ironstone gravels/nodules within the logs.....is this a concern on here?

Thanks

Adam

Adam Clarke
Engineering Manager | Yorkshire West

t. 0113 388 6600 | m. 07920190561 | keepmoat.com

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Registered in England no. 2207338

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002/5685/AG/GLM

18th December 2025

Mr A Clarke
Keepmoat Homes Yorkshire West
South Central
Global Avenue
Beeston
Leeds
LS11 8PG

LITHOS CONSULTING

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Dear Adam

Cliffe Lane, Gomersal

Further to your recent invitation, please find attached our proposal for undertaking a site investigation on the above land. We understand that proposed development will include 90 residential plots; predominantly 'traditional' two/three storey builds with two apartment blocks. Development plans have been provided which show areas of up to c. 4.0m cut and fill and the location of a proposed attenuation tank.

The site comprises a single parcel of rough grassland previously used for livestock grazing which covers about 3.5 hectares.

A third party exploratory ground investigation report has already been issued by GeoDyne (report ref. 39175-2, dated July 2020), a copy of which has been provided. It is understood that Keepmoat Homes does not have reliance on this document.

Brief review of internet data and the GeoDyne report supplied suggests the site:

- Has remained essentially undeveloped throughout its history with the exception of historical coal mining (two known shafts being located within the site's boundary);
- Is located c. 200m south of an area of historical landfill;
- Is not within a groundwater source protection zone;
- Is in an area where the risk of encountering UXO is considered low; and
- Predominantly lies within a Coal Mining Development High Risk Area.

Ground conditions comprise a veneer of Topsoil over Cohesive Residual Soils (firm Clays) with Lower Coal Measures Siltstone and Mudstone bedrock from shallow depth. The Middleton Little Coal Seam is mapped by the BGS as outcropping across the northwest and underlying much of the site at shallow depth, although GeoDyne did not encounter evidence of this seam during their investigations.

The scope of works outlined in this letter should enable us to assess abnormal development issues, associated with the ground. However, the nature of site investigation is such that it is not always possible to foresee all the potential issues. Consequently, it is sometimes necessary to recommend additional work, but where this occurs we will inform you immediately, provide costs, and seek your further instruction. We have reviewed available internet data and our geological maps in order to minimise the likelihood of further work.

We will need a Promap or topo survey in CAD format, to provide a base plan for technical drawings etc. If you do not have one, we could obtain for an E\O of £ .

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CHAS Accredited Contractor CHAS.co.uk
CQMS Safety Scheme
Constructionline A UK GOVERNMENT CERTIFICATION SERVICE
MEMBER OF THE AGS WWW.AGS.ORG.UK

Our site investigation will be undertaken in accordance with UK good practice (as outlined in BS5930, BS10175, LCRM etc) and the **Keepmoat** Scope of Works issued in January 2020. Your document advocates a minimum of one exploratory hole per detached plot or pair of semi-detached units, with at least one soil sample taken from each exploratory hole for contamination testing. As agreed, this proposal has not been produced in full accordance with the Keepmoat Scope of Works, dated January 2020 but based on our engineering judgment and experience of the area it is still considered to be a robust scope of works. Our Report may not be fully compliant with Eurocode 7 (EC7) and will not purport to be a Ground Investigation Report, nor a Geotechnical Design Report as defined by EC7. Our ground appraisal is intended to assist others as they proceed with design of the proposed development.

This proposal allows for the following works:

Desk study: We will complete a more detailed review of the GeoDyne report and obtain 'new' environmental search data and historical maps (obtained from Landmark or Groundsure) for review in order to determine whether past land uses have had any effect on the proposed development. In addition, published geological plans of the area will be examined.

Given the site's location within a Coal Mining High Risk Area, a 'new' Consultant's mining report will be obtained. There are two also recorded mine entries and we will obtain MRA data relating to these.

We will also visit site to undertake a walkover survey.

Fieldwork: We have allowed for 7 days drilling of rotary open probeholes (about 14 positions) and two day's trial pitting (about 25 pits, or a 35m grid spacing), plus an extra day's machine hire to re-locate the known mine entries and carry out an excavatability test at the location of the proposed attenuation tank. All works will be logged and supervised by an experienced Geoenvironmental Engineer.

This proposal has been put together without a recent site visit. If ground conditions are found to be significantly wet/boggy at the time of the investigation, it may be necessary to hire additional resources (bog mats, tracked excavators, tractors, stone etc) in order for works to continue. We will discuss the requirement for any such items and associated costs with you prior to ordering.

Trial pitting will enable us to determine the:

- Nature of any made ground
- Nature, distribution and thickness of shallow soils
- Suitability of the ground for soakaways
- Suitability of the ground for founding structures and highways

If the pitting encounters significant thicknesses of made ground or very soft/loose deposits (neither considered likely), cable percussion boreholes may be required to obtain geotechnical data from greater depth. We will advise you of any need for boreholes within 2 days of completion of the pitting.

Representative soil samples of natural and man-made ground, including any contaminated samples, will be taken during the works. In-situ shear strengths of any cohesive soils encountered will be determined by the use of a hand-held shear vane.

The mechanical excavator will also be used to **expose** the known mine entries (which have already been positioned by GeoDyne). At this stage, we have assumed that the co-ordinates provided for he shafts by GeoDyne are accurate and that we will locate the features more or less instantly. In the event that positions have been recorded inaccurately and we have to extend our trenches to 'search' for the mine entries then these works may run into extra days on site. In this event, allow an e/o cost of £ per day allowing for provision of the excavator and attendance of Lithos' Engineer.

Once located, the mine entries will be accurately described, measured, and surveyed (diameter, depth of rockhead, nature of backfill, presence of any linings etc); samples of shaft backfill will also be recovered for testing of pH and sulphates to inform shaft cap concrete classification.

We will also test the **excavatability** of soils and shallow bedrock at the position of the proposed attenuation tank by advancing at least one trial pit in this location until the excavator refuses in bedrock, or reaches its maximum reach (c. 5m).

Given the time of year/weather conditions, anticipated ground, and the need to investigate excavatability we have allowed for pits to be dug using a tracked 360° excavator of at least 13 tonnes weight. In the absence of a site visit, we have assumed that it will be possible to access the site with a low-loader and larger tracked plant. However, we may need to reassess and/or revise this quotation this following the initial site walkover.

We will make every effort to compact arisings and 'sweep' them over each trial pit or trench. However, you should be aware that on completion of the investigation, "graves" of spoil (each about 3m long by 1m wide) unsuitable for trafficking, will be left up to 400mm proud at each trial pit location. At this stage, no allowance has been made for any further reinstatement such as removal of excess arisings, replacement of turf etc.

Based on anticipated ground, **soakaways** are considered unlikely to provide a satisfactory solution for surface water drainage, but testing would remove any ambiguity with respect to Yorkshire Water queries. However, no allowance has been made for soakaway testing at this stage. If required, or considered feasible based on the ground actually encountered, soakaway tests could be undertaken for an additional fee of about £ (Allowing for provision of a tractor towed water bowser and attendance of a second engineer).

The site is underlain by the Middleton Little and Middleton Main Coal Seams at shallow to intermediate depths and therefore we have allowed for the drilling of **rotary probeholes** to check whether old mineworkings are present and pose a significant risk to surface stability of the site.

If a potential risk is perceived to exist, further probeholes may be required to delineate the extent of workings in order to obtain fixed price quotations for the necessary consolidation works. Furthermore, we have assumed that it will be possible to advance the 14 probeholes within6 days but there is a chance that it may take longer in which case we will inform you before leaving site, and seek your further instruction. Each day of additional drilling would cost £ (inclusive of supervision) provided it were instructed whilst the drilling rig was still on site.

It will be necessary to submit an application (with the associated fee) to the Coal Authority (CA) for 'Permission to enter CA mining interests'; and we have allowed for this. You should note that the CA have updated the application process and as of 4th October 2021, developers (clients) must submit a signed copy of the **CA's T&Cs** (copy enclosed) before the CA will commence work on permit issue which can take up to 4 weeks. Lithos can perform the role of Agent.

Given the proximity of surrounding housing (within 50m of much of the general site area), and in accordance with CA requirements we have had to assume that more than half of the probeholes will need to be advanced using water as the flushing medium (as reinforced by recent CA guidance on managing the risk of hazardous gas). Our drilling sub-contractor will need to locate the wash outs close to the site, and procure a standpipe and licence from Yorkshire Water.

With reference to the control, management and disposal of surplus water and flush arising from the works, (and in order to avoid additional costs associated with the provision of a telehandler to transfer a weir tank between boreholes, and the provision of a pump to transfer surplus water from the weir tank to an approved disposal point), we have made provision for a sand bag bund at the foot of the drilling mast, at each borehole to contain the majority of the drill cuttings. However, we have assumed that potentially discoloured surplus water will be allowed to flow and settle into the field.

At this stage, we have assumed that overnight security will not be required, but this will be reviewed following a site visit. If required, security would be an E\O of £ per night.

We have allowed for all exploratory holes, including the exposed mine entries to be picked-up by a **surveyor** (co-ordinates/ground levels will be included on the logs).

Given the likely presence of shallow coal and mineworkings, and areas of made ground and historic landfill in the surrounding area, we have allowed for the installation of wells in 8 shallow probeholes and monitoring for hazardous **gas** (and any shallow groundwater).

The generation potential of this gas source is considered likely to be low. Therefore, in accordance with CIRIA Report C665, we have initially allowed for **9 visits** over a **6-month period**. A hazardous gas risk assessment will be issued on completion of monitoring.

We strongly recommend that gas wells be decommissioned after monitoring has been completed. Decommissioning involves removal of the metal covers, unscrewing the upper 1m to 2m of pipework and filling the void / remaining well with bentonite.

Decommissioning of monitoring wells removes the potential for groundwater pollution caused by accidental spillages during the construction phase, prevents gas migration into sub-floor voids and removes 'obstructions' to farm machinery. Subject to your instruction, we will decommission accessible wells after the last monitoring visit for an E\O price of £ +VAT. We will contact you to seek instruction following issue of our gas risk assessment.

Testing: This will comprise routine **geotechnical** soils analysis, including 15 moisture content & Atterberg limits, and pH & water-soluble sulphates.

This site is greenfield and therefore we could obtain in-situ CBR values from plate tests on site. However, at this stage, we will simply estimate CBR values from strata descriptions and classification test results.

The site is understood to be essentially Greenfield, and therefore testing of potentially **contaminated** samples should only be required if made ground is encountered in the exploratory holes. However, we have allowed for analysis of Topsoil (12 samples) to confirm its suitability for re-use. The test suite

If more significant made ground is encountered, we will inform you immediately and provide costs for the recommended chemical testing.

Within in our proposal we have allowed for the screening (ID) of 12 samples for asbestos. In the event that positive IDs are reported, it is likely that we will need to schedule further analysis (asbestos quantification), in order to determine the significance of the results. Asbestos quantification is currently a relatively expensive test and consequently we have not allowed for it at this stage. We will inform you immediately after receipt of results if we consider asbestos quantification is required.

The visible contaminants, sharps and the clay/sand/silt content of 4 Topsoil samples will be determined to check compliance with BS3882 requirements.

Reporting & timescales: In order to provide you with sufficient information to enable assessment of abnormal costs at the earliest opportunity we will issue a concise overview report within 3 days of fieldwork completion.

On completion of the desk study, fieldwork and laboratory testing a comprehensive, factual and interpretative report will be issued. This will contain exploratory hole logs, laboratory test results, copies of all relevant correspondence and drawings of the site. The report will include qualitative risk assessment with respect to both controlled waters and human health. The report will also include consideration of foundation types.

At the time of writing, fieldwork could be commenced within 4 weeks of receipt of your written instruction to proceed. Our comprehensive geoenvironmental appraisal report will be issued within 5 weeks of fieldwork completion. This report will comment on issues associated with hazardous gas, but the gas risk assessment will not be issued until monitoring is completed.

This report will include a **mining risk assessment** in accordance with Coal Authority guidance.

Invoicing: The attached proposal provides a breakdown of the costs associated with this project. This breakdown is for information only and the proposal can be regarded as a lump sum price of **£** plus VAT. Variation will only occur in the event that a given item is not undertaken or that substantial additional works are recommended, in which case we will inform you immediately, provide costs for the required works, and seek your prior consent. Revision of the costings provided may be required if works are not instructed within **3 months** of the date this proposal was issued.

Our proposal allows for submission of a single piece of correspondence with NHBC and\or the local authority to address any queries they may have. Any further meetings, correspondence etc, would be chargeable.

We will submit invoices for this project on completion of each Item(s) instructed.

Please note if following instruction of the works outlined in this proposal, it is necessary to subsequently **postpone or cancel**, this should be done at least 3 working days before Lithos are due to commence intrusive investigation on site. We reserve the right to charge a cancellation fee in the event of later notification to cover plant / drill rig costs and abortive consultancy time. The cancellation fee will not exceed £ plus VAT.

Health, safety & welfare: The works outlined above will be carried out in accordance with Lithos' task- and site- specific Risk Assessments and Method Statements.

Details of welfare will be included within the Method Statements. However, this investigation is expected to last for at least 6 working days and therefore this proposal includes for provision of a Welfare Unit, with the benefit of full canteen facilities, hot water with full size sink, toilet and drying room.

Immediately prior to commencement of fieldwork, a site compound will be established in a location to be agreed with Keepmoat, comprising a welfare cabin for site staff, secured with heras fencing; equipment and plant will be stored here overnight.

Utility plans are required in order to protect operatives from the hazards associated with striking buried services and avoid potentially substantial disruption\repair costs. We will make every effort not to damage any services (including review of utility plans and use of a CAT detector). However, Lithos cannot accept liability for damage to any underground services that are not accurately marked on plans made available to us prior to commencement of our field investigation, or have not been accurately marked on the ground by a responsible third party (e.g. utility company, site owner).

Most developers have copies of the necessary utility plans (including electricity, gas, water, drainage & telecom), and it would be appreciated if you could forward these prior to the proposed fieldworks. However, if you do not have the necessary plans, Lithos will obtain them direct from each of the utility companies.

It is possible that the site is underlain by "private" services to livestock troughs etc which will not be shown on statutory utility plans. Consequently, it would be appreciated if copies of plans showing these services could be made available to our field engineer, and\or someone with site knowledge could advise us with respect to safe locations for our exploratory holes.

Under the **CDM** Regulations 2015, Lithos must be provided with pre-construction information already in your possession, or information that can reasonably be obtained through sensible enquiry. This information must be relevant to the project, have an appropriate level of detail, and be proportionate to the nature of the risks.

If no other designers or contractors have been appointed, Lithos could perform the role of Principal Contractor but only for the duration of the site investigation outlined in this proposal. If you require us to perform the role of Principal Contractor, please make this clear in your instruction. It should be noted that we are not suitably qualified to perform this role where other designers or contractors are also appointed.

Whilst it is anticipated that the site investigation outlined in this proposal will be undertaken several months before any development is commenced, our works may be considered to constitute part of 'the construction works' and consequently you may need to notify the HSE that works which involve breaking ground are being commissioned. It would be appreciated if you could forward a copy of the **F10** prior to commencement of investigation fieldwork.

Further work: In addition to the investigation outlined above, the following further works may ultimately be required:

- If deep infrastructure is proposed (and pitting encounters hard rock at shallow depth), **rotary cored** boreholes may be required to provide further information (spacing of bedding, fractures, strength etc).
- **Soakaway** testing in order to assess suitability of the ground for house and highway surface water drainage. This would likely comprise an 'initial sweep' at relatively wide spacings probably with only 1 or 2 fills. It should be noted that if the initial soakaway tests yield satisfactory results, in order to obtain approvals from the LLFA, Highways etc, the drainage designer is likely to require further testing: (a) within 25m of proposed chamber locations; and (b) to include 3 fills.
- The two **mine entries** should be drilled to their full depth, or a depth of 50m (whichever is shallower) to determine their depth and the nature of backfill material prior to designing the shaft cap; this would typically be carried out during future Drill & Grout works (if ultimately required).

Terms & conditions: Keepmoat and Lithos have an agreed Appointment document, and this work will be undertaken in accordance with that. However, if the Appointment term expires or remains unsigned, works will be undertaken in accordance with our Standard Terms and Conditions, a copy of which are enclosed.

It is hoped the above is sufficient for your present needs. However, should you require any further information, please contact the undersigned.

Yours sincerely

George Morton
Principal Engineer
for and on behalf of
LITHOS CONSULTING LIMITED

1 DEFINITIONS AND INTERPRETATION

1.1 In this Agreement, unless the context otherwise requires, the following words and expressions have the following meanings:

"Agreement" means these Terms (entitled "Terms and Conditions for the Appointment of Lithos Consulting"), the Proposal, any document recording your unequivocal acceptance of the Proposal and any other documents or parts of other documents expressly referred to in any of the foregoing;

"Documents" means all documents of any kind and includes plans, drawings, reports, programmes, specifications, Bills of Quantities, calculations, letters, e-mails, faxes, memoranda, films and photographs (including negatives), or any other form of record prepared or provided or received by, or on behalf of us, and whether in paper form or stored electronically or on disk, or otherwise;

"Intellectual Property" includes all rights to, and any interests in, any patents, designs, trade marks, copyright, know-how, trade secrets and any other proprietary rights or forms of intellectual property (protectable by registration or not) in respect of any technology, concept, idea, data, programme or other software (including source and object codes), specification, plan, drawing, schedule, minutes, correspondence, scheme, programme, design, system, process logo, mark, style, or other matter or thing, existing or conceived, used, developed or produced by any person;

"Project" means the project described in the Proposal and any enquiry from you on which we have based our Proposal;

"Proposal" means the offer document prepared by us in response to an enquiry or otherwise, in connection with the proposed provision of the Services;

"Services" means the work and services relating to the Project to be provided by us pursuant to the Agreement and as set out in the Proposal and includes any additions or amendments thereto made in accordance with these Terms;

"Terms" means these terms entitled "Lithos Consulting Terms of Appointment" as amended from time to time.

1.2 Words importing the singular only shall also include the plural and vice versa, where the context requires.

1.3 Words importing persons or parties shall include firms, corporations and any organisation having legal capacity and vice versa, where the context requires; and words importing a particular gender include all genders.

1.4 The sub-headings to the clauses of these Terms are for convenience only and shall not affect the construction of the Agreement.

1.5 A reference to legislation includes that legislation as from time to time amended, re-enacted or substituted and any Orders in Council, orders, rules, regulations, schemes, warrants, by-laws, directives or codes of practice issued under any such legislation.

1.6 In the event of conflict between the documents forming part of the Agreement, the Proposal shall prevail, followed by the Terms.

2 APPOINTMENT

2.1 You agree to engage us and we agree to provide the Services in accordance with the provisions of this Agreement.

3 OUR OBLIGATIONS

3.1 We shall perform the Services using the reasonable standard of skill and care normally exercised by qualified members of our profession, performing similar services under similar conditions.

3.2 We shall use all reasonable endeavours to perform the Services in accordance with relevant environmental and safety legislation.

4 YOUR OBLIGATIONS

4.1 Throughout the period of this Agreement you shall afford to us, or procure for our benefit, access to any site where access is required for the performance of the Services.

4.2 You accept responsibility for ensuring that we are notified in writing of all special site and/or plant conditions, including without prejudice to the generality of the foregoing, the existence and precise location of all underground services, cables, pipes, drains or underground buildings, constructions or any hazards, which you shall clearly mark on the ground or identify on accurate location plans supplied to us prior to the commencement of the Services. You shall also inform us in writing of any relevant operating procedures including any site safe operating procedures and any other regulations relevant to the carrying out of the Services. You shall indemnify us against all costs, losses, claims, demands and expenses arising as a result of any non-disclosure in this respect, including but not limited to indemnification against any action brought by the owner of the land or otherwise.

4.3 If you discover any conflict, defect or other fault in the information or designs provided by us pursuant to the Agreement, you will advise us in writing of such defect, conflict or other fault and we shall have the right to rectify the same or where necessary, to design the solution for rectification of any works carried out by others pursuant the conflicting, defective or in any other way faulty information or designs.

5 COPYRIGHT

5.1 The copyright in all Intellectual Property prepared by or on behalf of us in connection with the Project for delivery to you shall remain vested in us.

5.2 You shall have a non-exclusive licence to copy and use such Intellectual Property for purposes directly related to the Project. Such licence shall enable you to copy and use the Intellectual Property but solely for your own purposes in connection with the Project and such use shall not include any licence to reproduce any conceptual designs or professional opinions contained therein nor shall it include any license to amend any drawing, design or other Intellectual Property produced by us.

5.3 Should you wish to use such Intellectual Property in connection with any other works or for any other purpose not directly related to the Project or wish to pass any Intellectual Property to any third party, you must obtain our prior written consent. The giving of such consent shall be at our absolute discretion and shall be upon such terms as we may require. We shall not be liable to you for the use by any person of such Intellectual Property for any purpose other than that for which the same were prepared by or on our behalf.

5.4 Ownership of any proposals submitted to you that are not subsequently confirmed as part of the Services to be provided for you remain with us and such proposals must not be used as the basis for any future work undertaken by you or a third party and no liability can be accepted howsoever arising from such proposals.

5.5 In the event of you being in default of payment of any fees or other amounts due, we may suspend further use of the licence on giving no less than 2 calendar days' notice of the intention to do so. Use of the licence may be resumed on receipt of the outstanding amounts.

6 CONFIDENTIALITY

6.1 Neither you nor we shall at any time disclose to any person any confidential information concerning the business, affairs, customers, clients or suppliers of the other party or of any member of the group of companies to which the other party belongs, except as permitted by clauses 6.2 and 6.4.

6.2 Each party may disclose the other party's confidential information:

(a) to its employees, officers, representatives, contractors, sub-contractors or advisers who need to know such information for the purposes of exercising the party's rights or carrying out its obligations under or in connection with this Agreement. Each party shall ensure that its employees, officers, representatives, contractors, sub-contractors or advisers to whom it discloses the other party's confidential information comply with this paragraph 6; and

(b) as may be required by law, to a court of competent jurisdiction or any governmental or regulatory authority.

6.3 Neither you nor we shall use any other party's confidential information for any purpose other than to exercise our rights or perform our respective obligations under or in connection with this Agreement.

6.4 Subject to the above and our privacy policy which can be found on www.lithos.co.uk, we shall be permitted to use information related to the Services we provide in connection with the Project for the purposes of marketing its services and in proposals for work of a similar type.

7 ASSIGNMENT

7.1 You may assign the benefit of this Agreement on two occasions with our prior written consent (not to be unreasonably withheld) and any additional assignments shall be with our prior consent.

7.2 We may at any time assign, mortgage, charge, subcontract, delegate, declare a trust over or deal in any other manner with any or all of our rights and obligations under this Agreement.

8 INSURANCE

8.1 We shall maintain a professional indemnity insurance policy covering our liabilities for negligence under this Agreement, with a limit of indemnity of £5,000,000 (FIVE MILLION POUNDS) any one claim, save for pollution and contamination claims and asbestos claims both of which carry £2,000,000 (TWO MILLION POUNDS) in the aggregate cover. This policy is annually renewable and whilst renewal is not automatic, we shall maintain such insurance at all times until six years from the date of the completion (or termination) of the Services under this Agreement, provided such insurance is available at commercially reasonable rates and terms.

8.2 If for any period such insurance is not available at commercially reasonable rates and terms, we shall inform you and shall obtain in respect of such period such reduced level of professional indemnity insurance as is available and as would be fair and reasonable in the circumstances for us to obtain.

9 PAYMENT

9.1 Invoices for services rendered will be submitted for payment in accordance with the Proposal.

9.2 You shall pay you any VAT properly chargeable on the Services and any amount expressed as payable to us under this Agreement is exclusive of VAT unless stated otherwise.

9.3 The due date for payment is the date of the invoice and the final date for payment is 28 days from the date of the invoice.

9.4 If you dispute the amount included for payment in an invoice then you must serve a written notice on us no later than 14 calendar days before the final date for payment. If no notice is given within the required timeframe the amount due shall be the amount stated in the invoice.

9.5 If you fail to pay any monies in accordance with the foregoing payment provisions, we shall be entitled to charge interest on any monies owed to us, such interest to be at a rate of 4% above the base rate of a clearing bank from time to time calculated from the final date for payment to the date of actual payment on a compound basis. The parties acknowledge that our liability under this clause 10.5 is a substantial remedy for the purposes of section 9(1) of the Late Payment of Commercial Debts (Interest) Act 1998.

10 LIMITATIONS ON LIABILITY

10.1 Unless otherwise agreed in writing, our total liability under or in connection with this Agreement whether in contract, tort, negligence, breach of statutory duty or otherwise (other than in respect of personal injury or death) shall be limited to and shall not exceed the lesser of either the level of insurance cover referred to within clause 8.1 above, or 20 times the total value of invoices issued to you for the Services.

10.2 No action or proceedings under or in respect of the Agreement whether in contract, tort, negligence, under statute or otherwise shall be commenced against us after the expiry of a period of six years from the date of the completion (or termination) of the Services under this Agreement.

10.3 Whilst we usually scan for potential exploratory locations with a Cable Avoidance Tool, we shall not be liable for any damage to underground services, cables, pipes, drains or underground buildings, constructions and the like which were either not marked on site or for which accurate plans were not provided.

10.4 We shall not be liable for the cost of rectifying any defect, conflict or other fault in the information or designs provided by us or for the cost of designing a solution for and rectifying any subsequent works carried out by others pursuant to the conflicting, defective or in any other way faulty information or designs, unless we have been advised in writing of the same by you and have been given the opportunity to rectify the same or where necessary, to design the solution for rectification of any subsequent works carried out by others pursuant to the same.

11 DELAY

We shall comply with any timescale agreed for completion of the Services unless delayed or prevented by circumstances beyond our reasonable control and in the event of any such circumstances arising we undertake to complete the Services within a reasonable period, but will not be liable to you for any delay as a result.

12 TERMINATION

12.1 The Agreement may be terminated by either of us in the event of the other making a composition or arrangement with its creditors, becoming bankrupt, or being a company, making a proposal for a voluntary arrangement for a composition of debts, or has a provisional liquidator appointed, or has a winding-up order made, or passes a resolution for voluntary winding-up (except for the purposes of a bona fide scheme of amalgamation or reconstruction), or has an administrator or an administrative receiver appointed to the whole or any part of its assets. Notice of termination must be given to the party which is insolvent by the other party.

12.2 If for any reason our Services are suspended for a period in excess of three calendar months then we shall be entitled to terminate our appointment under this Agreement in respect of the Services by no less than seven days written notice to you.

12.3 If you fail to pay in full any sum due under the terms of this Agreement by the final date for payment for that sum and no effective pay less notice is issued, we may serve written notice to you demanding payment within 14 days of such notice. If you fail to comply with such notice, we shall be entitled to terminate our employment under this Agreement forthwith.

12.4 Any termination of our appointment howsoever caused shall be without prejudice to our rights to require payment for all Services performed up to the date of such termination including but not limited to payment of a fair and reasonable proportion of any figure identified in the Proposal or otherwise for fees in respect of a particular service which Lithos has started, but not completed.

13 THIRD PARTY RIGHTS

The Agreement shall not confer and shall not purport to confer on any third party any benefit or any right to enforce any term of this Agreement for the purposes of the Contracts (Rights of Third Parties) Act 1999 or otherwise.

14 COLLATERAL WARRANTIES & LETTERS OF RELIANCE

We shall consider and may consent to a request from you for us to enter into a collateral warranty or letter of reliance with a third party with regard to the Services provided under this Agreement. The giving of such consent shall be at our absolute discretion and providing we agree to our standard form of collateral warranty or letter of reliance (subject to any reasonable changes to be approved by us at our absolute discretion) and in return for payment of a fee (to be notified at the time of the request).

15 NOTICES

15.1 Any notice provided for in the Agreement shall be in writing and shall be deemed to be properly given if delivered by hand or sent by pre-paid first class post to the address of the relevant party as may have been notified by each party to the other or, in the absence of notification, to our respective registered office addresses.

15.2 Such notice shall be deemed to have been received on the day of delivery if delivered by hand or on the second working day after the day of posting if sent by pre-paid first class post.

16 ENTIRE AGREEMENT

16.1 The Agreement constitutes the complete and entire agreement between us with respect to the Services and supersedes any prior oral and/or written warranties, terms, conditions, communications and representations, whether express or implied and any claim against us in respect of the Services can only be made in contract under the provisions of this Agreement and not otherwise under the law or tort or otherwise.

16.2 No amendments, modifications or variation of this Agreement shall be valid unless made in writing and agreed to by us; such agreement must be recorded in writing by at least one of us.

16.3 We shall not be bound by any standard or printed terms or conditions furnished by you in any of your documents unless we specifically state in writing separately from such documents that we intend such terms and conditions to apply.

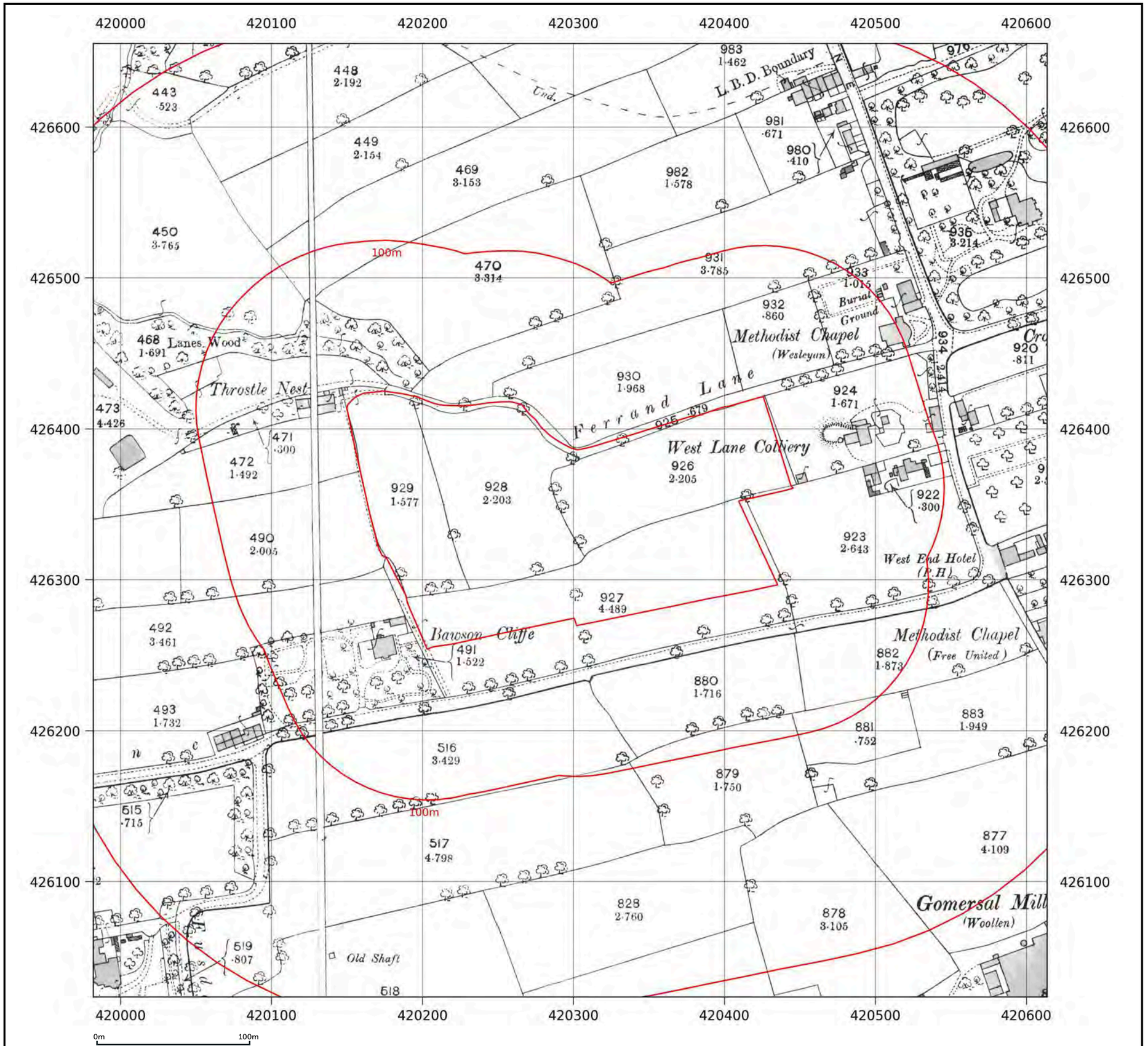
17 DISPUTES, JURISDICTION AND GOVERNING LAW

17.1 This Agreement shall be governed by and construed in accordance with English law and we irrevocably and unconditionally submit to the jurisdiction of the English Courts.

17.2 Where the Housing Grants, Construction and Regeneration Act 1996 applies, any dispute between us may be referred to adjudication in accordance with The Scheme for Construction Contracts Regulations 1998 or any amendment or modification thereof being in force at the time of the dispute, as applicable to England, Wales, Scotland and Northern Ireland.

Appendix D

Historical OS Plans



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Map legend available at:
knowledge.groundsure.com/hubfs/groundsure_legend.pdf

Map Insight

Site details:	5685 - Cliffe Lane, Gomersal
Client ref:	PO25886 / 5685 / EW
Report ref:	GS-EPI-B78-WZM-TTW
Grid ref:	420290.69, 426344.27
Production date:	29 January 2026

Map name:	County Series
Map date:	1894
Scale:	1:2,500
Printed at:	1:2,500

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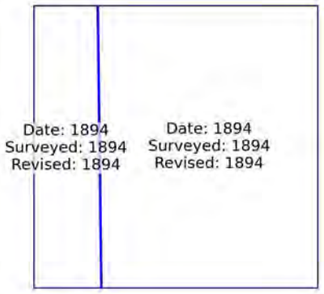

Contact us with any questions at:
info@groundsure.com
01273 257 755

Groundsure
LOCATION INTELLIGENCE

Ordnance Survey
Licensed Data

Map Insight

Site details:	5685 - Cliffe Lane, Gomersal
Client ref:	PO25886 / 5685 / EW
Report ref:	GS-EPI-B78-WZM-TTW
Grid ref:	420290.69, 426344.27
Production date:	29 January 2026

Map name:	National Grid
Map date:	1956
Scale:	1:1,250
Printed at:	1:2,000

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Date: 1956
Surveyed: 1956
Revised: 1956
Levelled: 1931

Date: 1956
Surveyed: 1956
Revised: 1956
Levelled: 1931

Date: 1956
Surveyed: 1956
Revised: 1956
Levelled: 1931

Date: 1956
Surveyed: 1956
Revised: 1956
Levelled: 1931

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420100 420200 420300 420400 420500

426500 426400 426300 426200 426100

100m

100m

FERRAND LANE

CLIFFE LANE

LATHAM LANE

CLIFFE MOUNT

LABURNUM GROVE

Sunday School

West Lane Methodist Church

West Lane Manse

Bawson Cliffe

Tanks

Chy

0m 100m

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Map legend available at:
knowledge.groundsure.com/hubfs/groundsure_legend.pdf

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LOCATION INTELLIGENCE

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Map Insight

Site details:	5685 - Cliffe Lane, Gomersal
Client ref:	PO25886 / 5685 / EW
Report ref:	GS-EPI-B78-WZM-TTW
Grid ref:	420290.69, 426344.27
Production date:	29 January 2026

Map name:	National Grid
Map date:	1968
Scale:	1:2,500
Printed at:	1:2,500

N
W E
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Date: 1968
Surveyed: 1956
Revised: 1967
Copyright: 1968
Levelled: 1962

Contact us with any questions at:
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01273 257 755

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Map legend available at:
knowledge.groundsure.com/hubfs/groundsure_legend.pdf

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LOCATION INTELLIGENCE
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Appendix E

Search Responses & other Correspondence

Groundsure LOCATION INTELLIGENCE

Enviro+Geo Insight

5685 - Cliffe Lane, Gomersal

Order Details

Date: 29/01/2026

Your ref: PO25886 / 5685 / EW

Our Ref: GS-8OU-JP4-G4Z-J3G

Site Details

Location: 420290 426344

Area: 3.53 ha

Authority: Kirklees Council ↗



Summary of findings p. 2 >

OS MasterMap site plan p.13 >

Aerial image p. 9 >

Insight User Guide ↗

Contact us with any questions at:
info@groundsure.com ↗
01273 257 755

Certified B Corporation

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
14 >	1.1 >	Historical industrial land uses >	2	4	38	49	-
18 >	1.2 >	Historical tanks >	0	0	12	25	-
20 >	1.3 >	Historical energy features >	0	1	15	9	-
21	1.4	Historical petrol stations	0	0	0	0	-
21	1.5	Historical garages	0	0	0	0	-
21	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped >	On site	0-50m	50-250m	250-500m	500-2000m
22 >	2.1 >	Historical industrial land uses >	2	6	51	81	-
28 >	2.2 >	Historical tanks >	0	0	29	35	-
30 >	2.3 >	Historical energy features >	0	3	23	14	-
32	2.4	Historical petrol stations	0	0	0	0	-
32	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill >	On site	0-50m	50-250m	250-500m	500-2000m
33	3.1	Active or recent landfill	0	0	0	0	-
33 >	3.2 >	Historical landfill (BGS records) >	0	0	0	1	-
34 >	3.3 >	Historical landfill (LA/mapping records) >	0	0	0	2	-
34 >	3.4 >	Historical landfill (EA/NRW records) >	0	0	1	1	-
35 >	3.5 >	Historical waste sites >	0	0	0	1	-
35 >	3.6 >	Licensed waste sites >	0	0	0	3	-
36 >	3.7 >	Waste exemptions >	0	0	0	1	-
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
37 >	4.1 >	Recent industrial land uses >	0	1	6	-	-
38	4.2	National Geographic Database (NGD) - Current or recent tanks	0	0	0	-	-
38	4.3	Current or recent petrol stations	0	0	0	0	-
38	4.4	Electricity cables	0	0	0	0	-
38	4.5	Gas pipelines	0	0	0	0	-

39	4.6	Sites determined as Contaminated Land	0	0	0	0	-
39	4.7	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
39	4.8	Regulated explosive sites	0	0	0	0	-
39	4.9	Hazardous substance storage/usage	0	0	0	0	-
39	4.10	Historical licensed industrial activities (IPC)	0	0	0	0	-
40	4.11	Licensed industrial activities (Part A(1))	0	0	0	0	-
40	4.12	Licensed pollutant release (Part A(2)/B)	0	0	0	0	-
40	4.13	Radioactive Substance Authorisations	0	0	0	0	-
40 >	**4.14 >**	**Licensed Discharges to controlled waters >**	0	0	0	3	-
41	4.15	Pollutant release to surface waters (Red List)	0	0	0	0	-
41 >	**4.16 >**	**Pollutant release to public sewer >**	0	0	0	1	-
42 >	**4.17 >**	**List 1 Dangerous Substances >**	0	0	0	1	-
42	4.18	List 2 Dangerous Substances	0	0	0	0	-
42 >	**4.19 >**	**Pollution Incidents (EA/NRW) >**	0	0	0	5	-
43	4.20	Pollution inventory substances	0	0	0	0	-
43	4.21	Pollution inventory waste transfers	0	0	0	0	-
43	4.22	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
44	5.1	Superficial aquifer	None (within 500m)				
45 >	**5.2 >**	**Bedrock aquifer >**	Identified (within 500m)				
47 >	**5.3 >**	**Groundwater vulnerability >**	Identified (within 50m)				
48	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
48	5.5	Groundwater vulnerability- local information	None (within 0m)				
49 >	**5.6 >**	**Groundwater abstractions >**	0	0	2	0	6
52 >	**5.7 >**	**Surface water abstractions >**	0	0	0	0	3
53	5.8	Potable abstractions	0	0	0	0	0
53	5.9	Source Protection Zones	0	0	0	0	-
53	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	**Hydrology >**	On site	0-50m	50-250m	250-500m	500-2000m

54 >	6.1 >	Water Network (OS MasterMap) >	0	0	8	-	-
55 >	6.2 >	Surface water features >	0	0	5	-	-
55 >	6.3 >	WFD Surface water body catchments >	1	-	-	-	-
56 >	6.4 >	WFD Surface water bodies >	0	0	0	-	-
56 >	6.5 >	WFD Groundwater bodies >	1	-	-	-	-

Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
58	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
58	7.2	Historical Flood Events	0	0	0	-	-
58	7.3	Flood Defences	0	0	0	-	-
59	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
59	7.5	Flood Storage Areas	0	0	0	-	-
60	7.6	Flood Zone 2	None (within 50m)				
60	7.7	Flood Zone 3	None (within 50m)				

Page	Section	Surface water flooding >	
61 >	8.1 >	Surface water flooding >	1 in 100 year, 0.1m - 0.3m (within 50m)

Page	Section	Groundwater flooding >	
63 >	9.1 >	Groundwater flooding >	Negligible (within 50m)

Page	Section	Environmental designations >	On site	0-50m	50-250m	250-500m	500-2000m
64	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
65	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
65	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
65	10.4	Special Protection Areas (SPA)	0	0	0	0	0
65	10.5	National Nature Reserves (NNR)	0	0	0	0	0
66 >	10.6 >	Local Nature Reserves (LNR) >	0	0	0	0	1
66 >	10.7 >	Designated Ancient Woodland >	0	0	0	1	2
66	10.8	Biosphere Reserves	0	0	0	0	0
67	10.9	Forest Parks	0	0	0	0	0
67	10.10	Marine Conservation Zones	0	0	0	0	0
67 >	10.11 >	Green Belt >	1	0	0	0	0

67	10.12	Proposed Ramsar sites	0	0	0	0	0
68	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
68	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
68	10.15	Nitrate Sensitive Areas	0	0	0	0	0
68 >	10.16 >	Nitrate Vulnerable Zones >	1	0	0	1	0
70 >	10.17 >	SSSI Impact Risk Zones >	1	-	-	-	-
71	10.18	SSSI Units	0	0	0	0	0
Page	Section	**Visual and cultural designations >**	On site	0-50m	50-250m	250-500m	500-2000m
72	11.1	World Heritage Sites	0	0	0	-	-
73	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
73	11.3	National Parks	0	0	0	-	-
73 >	11.4 >	Listed Buildings >	0	0	1	-	-
74 >	11.5 >	Conservation Areas >	0	1	0	-	-
74	11.6	Scheduled Ancient Monuments	0	0	0	-	-
74	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	**Agricultural designations >**	On site	0-50m	50-250m	250-500m	500-2000m
75 >	12.1 >	Agricultural Land Classification >	Urban (within 250m)				
76	12.2	Open Access Land	0	0	0	-	-
76	12.3	Tree Felling Licences	0	0	0	-	-
76	12.4	Environmental Stewardship Schemes	0	0	0	-	-
76	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	**Habitat designations >**	On site	0-50m	50-250m	250-500m	500-2000m
77 >	13.1 >	Priority Habitat Inventory >	0	2	7	-	-
78	13.2	Habitat Networks	0	0	0	-	-
78	13.3	Open Mosaic Habitat	0	0	0	-	-
78	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	**Geology 1:10,000 scale >**	On site	0-50m	50-250m	250-500m	500-2000m
79 >	14.1 >	10k Availability >	Identified (within 500m)				
80 >	14.2 >	Artificial and made ground (10k) >	0	1	5	5	-

82	14.3	Superficial geology (10k)	0	0	0	0	-
82	14.4	Landslip (10k)	0	0	0	0	-
83 >	14.5 >	Bedrock geology (10k) >	3	2	6	30	-
85 >	14.6 >	Bedrock faults and other linear features (10k) >	1	0	4	14	-
Page	Section	Geology 1:50,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
87 >	15.1 >	50k Availability >	Identified (within 500m)				
88 >	15.2 >	Artificial and made ground (50k) >	0	1	0	2	-
89 >	15.3 >	Artificial ground permeability (50k) >	0	1	-	-	-
90	15.4	Superficial geology (50k)	0	0	0	0	-
90	15.5	Superficial permeability (50k)	None (within 50m)				
90	15.6	Landslip (50k)	0	0	0	0	-
90	15.7	Landslip permeability (50k)	None (within 50m)				
91 >	15.8 >	Bedrock geology (50k) >	3	2	3	20	-
93 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
93 >	15.10 >	Bedrock faults and other linear features (50k) >	1	0	2	13	-
Page	Section	Boreholes >	On site	0-50m	50-250m	250-500m	500-2000m
95 >	16.1 >	BGS Boreholes >	0	2	59	-	-
Page	Section	Natural ground subsidence >					
99 >	17.1 >	Shrink swell clays >	Very low (within 50m)				
101 >	17.2 >	Running sands >	Very low (within 50m)				
103 >	17.3 >	Compressible deposits >	Very low (within 50m)				
105 >	17.4 >	Collapsible deposits >	Very low (within 50m)				
106 >	17.5 >	Landslides >	Low (within 50m)				
108 >	17.6 >	Ground dissolution of soluble rocks >	Negligible (within 50m)				
Page	Section	Mining and ground workings >	On site	0-50m	50-250m	250-500m	500-2000m
110 >	18.1 >	BritPits >	0	0	4	3	-
112 >	18.2 >	Surface ground workings >	2	1	30	-	-
114 >	18.3 >	Underground workings >	2	1	11	0	22
115	18.4	Underground mining extents	0	0	0	0	-

116	18.5	Historical Mineral Planning Areas	0	0	0	0	-
116 >	18.6 >	Non-coal mining >	0	0	0	0	9
117	18.7	JPB mining areas	None (within 0m)				
117	18.8	The Coal Authority non-coal mining	0	0	0	0	-
118	18.9	Researched mining	0	0	0	0	-
118	18.10	Mining record office plans	0	0	0	0	-
118	18.11	BGS mine plans	0	0	0	0	-
118 >	18.12 >	Coal mining >	Identified (within 0m)				
119	18.13	Brine areas	None (within 0m)				
119	18.14	Gypsum areas	None (within 0m)				
119	18.15	Tin mining	None (within 0m)				
119	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
120	19.1	Natural cavities	0	0	0	0	-
120	19.2	Mining cavities	0	0	0	0	0
120	19.3	Reported recent incidents	0	0	0	0	-
120	19.4	Historical incidents	0	0	0	0	-
Page	Section	Radon >					
122 >	20.1 >	Radon >	Between 1% and 3% (within 0m)				
Page	Section	Soil chemistry >	On site	0-50m	50-250m	250-500m	500-2000m
124 >	21.1 >	BGS Estimated Background Soil Chemistry >	3	2	-	-	-
124	21.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
125	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects >	On site	0-50m	50-250m	250-500m	500-2000m
126	22.1	Underground railways (London)	0	0	0	-	-
126	22.2	Underground railways (Non-London)	0	0	0	-	-
127	22.3	Railway tunnels	0	0	0	-	-
127 >	22.4 >	Historical railway and tunnel features >	0	0	19	-	-
128	22.5	Royal Mail tunnels	0	0	0	-	-

128 >	22.6 >	Historical railways >	0	0	4	-	-
128	22.7	Railways	0	0	0	-	-
129	22.8	Crossrail 2	0	0	0	0	-
129	22.9	HS2	0	0	0	0	-

Recent aerial photograph



Capture Date: 30/05/2021

Site Area: 3.53ha

Recent site history - 2018 aerial photograph



Capture Date: 02/07/2018

Site Area: 3.53ha

Recent site history - 2012 aerial photograph



Capture Date: 26/03/2012

Site Area: 3.53ha

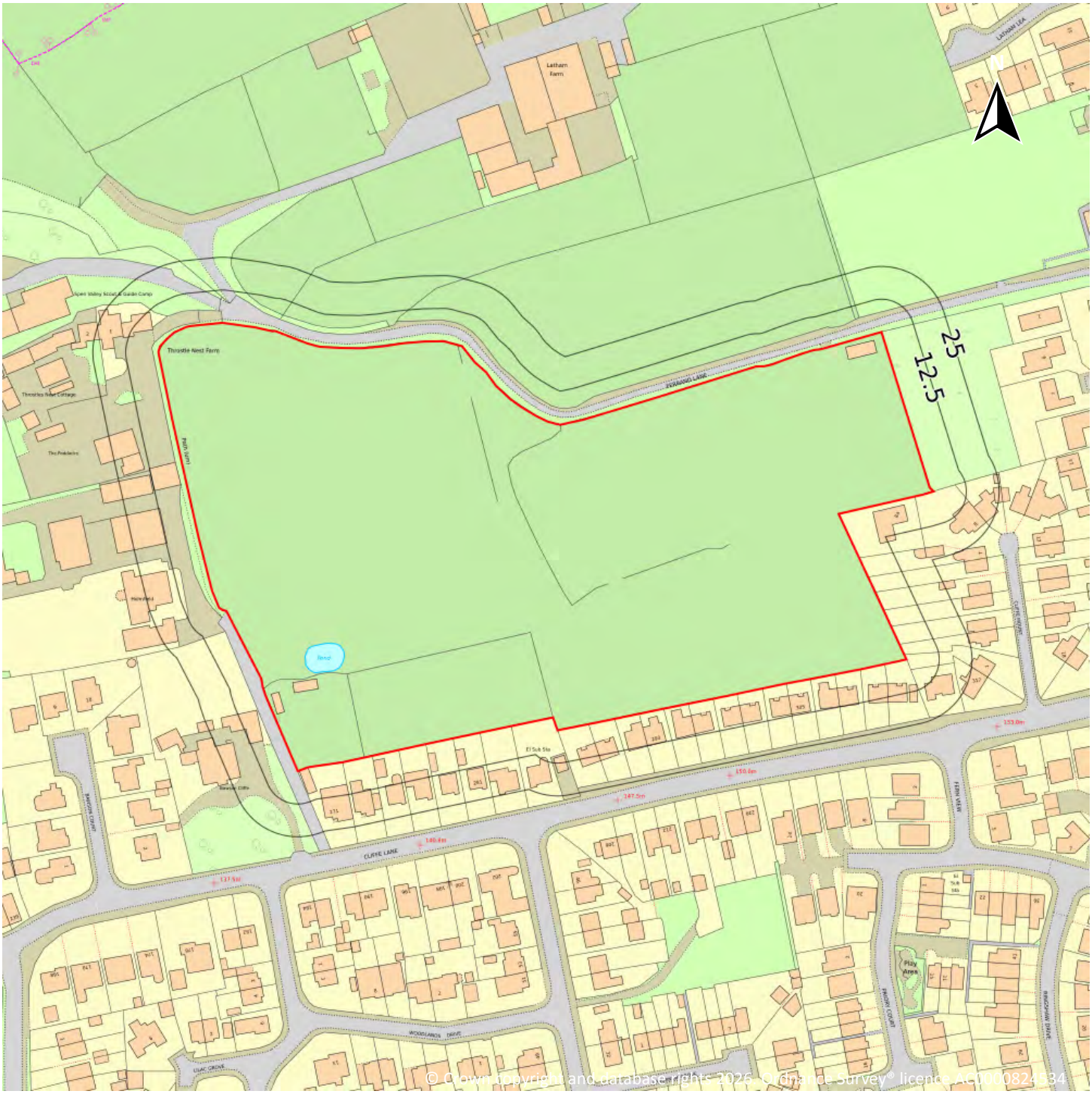
Recent site history - 1999 aerial photograph



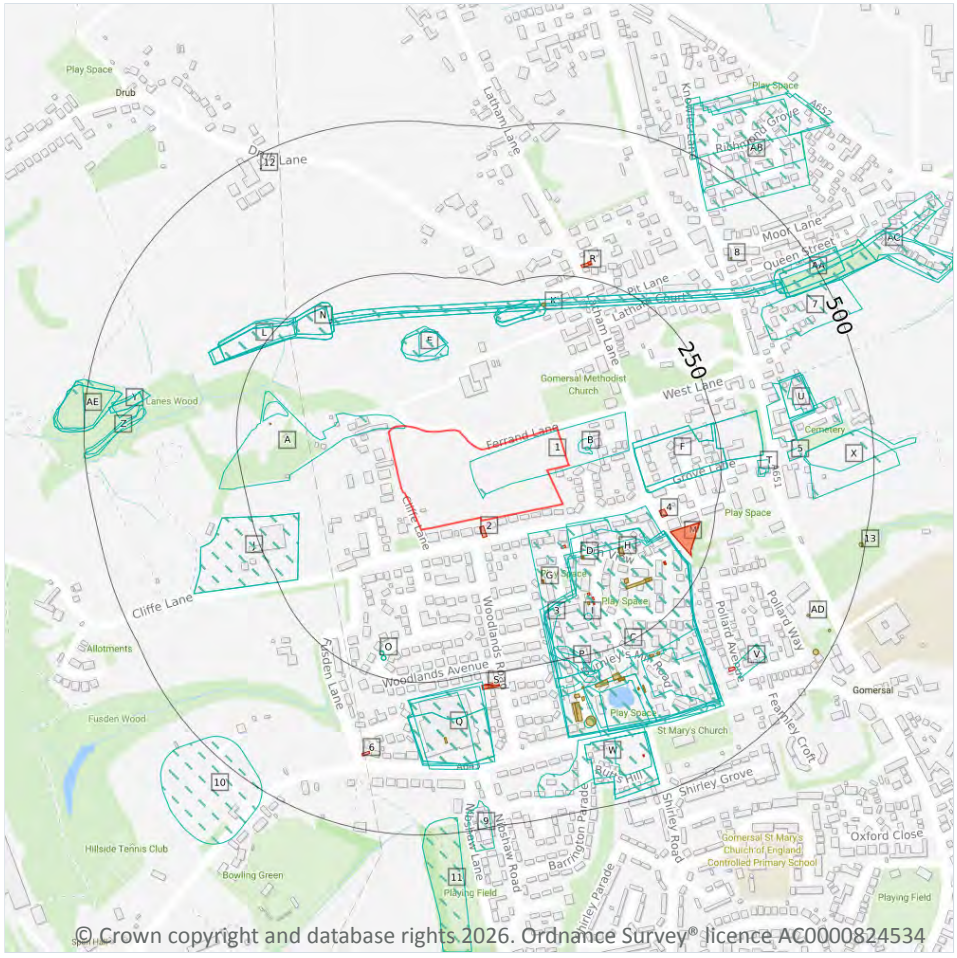
Capture Date: 10/07/1999

Site Area: 3.53ha

OS MasterMap site plan


N
125
Latham Farm
Throstle Nest Farm
Throstle Nest Cottage
The Paddocks
Public Path
Pond
Pond
Pond

1 Past land use



1.1 Historical industrial land uses

Records within 500m	93

Potentially contaminative land use features digitised from historical Ordnance Survey® mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
1	**On site**	**Colliery**	**1892**	**1469064**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Colliery**	**1892**	**1469111**
B	23m E	Unspecified Heap	1892	1466851
C	34m S	Unspecified Mills	1948	1544400
B	34m E	Unspecified Old Shaft	1905	1446458
C	36m S	Unspecified Mill	1974 - 1994	1504131
C	58m S	Worsted Mills	1966	1444079
C	82m S	Unspecified Mills	1955	1521545
C	90m S	Unspecified Commercial/Industrial	1938	1431977
E	108m N	Unspecified Heaps	1938 - 1948	1504908
E	108m N	Unspecified Heaps	1905	1575123
F	109m E	Unspecified Yards	1966	1532461
F	109m E	Unspecified Yards	1955	1566781
F	110m E	Unspecified Yards	1938 - 1948	1491097
F	110m E	Unspecified Yards	1892 - 1905	1513707
E	117m N	Unspecified Heap	1955	1530755
E	118m N	Unspecified Heap	1974 - 1985	1508481
3	157m S	Unspecified Heap	1955	1468496
A	168m W	Refuse Heap	1892	1435113
J	173m W	Nursery	1983	1498122
J	173m W	Nursery	1990	1511671
K	178m N	Tunnel	1905	1561765
K	178m N	Tunnel	1938 - 1948	1569977
L	178m NW	Cuttings	1948	1533040
L	178m NW	Cuttings	1905	1561093
L	178m NW	Cuttings	1938	1581451
K	183m N	Unspecified Heap	1905	1543267
K	183m N	Unspecified Heap	1938 - 1948	1571445
I	184m S	Chimney	1966	1475327

ID	Location	Land use	Dates present	Group ID
K	185m N	Tunnel	1966	1503501
K	185m N	Tunnel	1955	1560897
L	185m NW	Cuttings	1966 - 1967	1534585
N	185m NW	Cuttings	1974 - 1994	1493429
N	185m NW	Cuttings	1955	1540496
K	190m N	Unspecified Heap	1974 - 1985	1507601
K	191m N	Unspecified Heap	1966	1515457
K	191m N	Unspecified Heap	1955	1520954
O	208m S	Unspecified Old Shaft	1955	1446713
O	215m S	Unspecified Old Shaft	1938 - 1948	1541273
O	215m S	Unspecified Old Shaft	1905	1542358
L	219m NW	Cuttings	1955	1568548
L	220m NW	Cuttings	1974 - 1983	1520878
P	227m S	Refuse Heap	1955	1435381
P	227m S	Unspecified Ground Workings	1938 - 1948	1557103
P	260m S	Unspecified Pit	1938 - 1948	1577503
Q	264m S	Unspecified Mills	1948	1493306
Q	269m S	Unspecified Commercial/Industrial	1985 - 1994	1495779
Q	273m S	Unspecified Mills	1892 - 1905	1495008
P	274m SE	Unspecified Mills	1892	1549746
P	277m S	Unspecified Mill	1974 - 1994	1571125
P	288m SE	Unspecified Mills	1905	1530989
Q	300m S	Unspecified Depot	1966	1445521
Q	300m S	Unspecified Mills	1955	1485428
P	309m S	Mill Pond	1892 - 1905	1505306
T	309m E	Police Station	1966 - 1985	1517961
T	310m E	Police Station	1994	1527522
U	336m E	Unspecified Foundry	1948	1531362

ID	Location	Land use	Dates present	Group ID
P	353m S	Unspecified Tank	1974 - 1994	1581066
5	358m E	Police Station	1985	1480960
U	368m E	Unspecified Foundry	1966	1545248
U	368m E	Unspecified Foundry	1955	1570113
U	370m E	Unspecified Foundry	1938	1565779
U	375m E	Unspecified Foundry	1985	1488760
7	380m NE	Unspecified Depot	1974 - 1994	1536818
W	385m S	Unspecified Mill	1955	1567023
X	385m E	Burial Ground	1994	1490069
X	386m E	Burial Ground	1974 - 1985	1536609
V	387m SE	Mill Pond	1892 - 1905	1503030
W	392m S	Unspecified Mill	1905	1522581
W	392m S	Unspecified Mill	1938 - 1948	1531130
W	393m S	Unspecified Mill	1966	1546539
Y	396m W	Railway Sidings	1955	1489650
Z	399m W	Unspecified Ground Workings	1955 - 1983	1506392
Z	403m W	Unspecified Ground Workings	1948	1565221
Y	407m W	Railway Sidings	1938 - 1948	1499104
Y	407m W	Railway Sidings	1905	1580501
AA	426m NE	Cuttings	1955	1541427
AA	426m NE	Cuttings	1966 - 1994	1573907
AB	433m NE	Engineering Works	1966	1479002
AA	434m NE	Cuttings	1938 - 1948	1536171
AA	434m NE	Cuttings	1905	1555350
AC	434m NE	Railway Sidings	1905	1551294
AC	434m NE	Railway Sidings	1938 - 1948	1580215
AC	439m NE	Railway Sidings	1966	1512289
AE	442m W	Unspecified Heap	1938 - 1948	1513131

ID	Location	Land use	Dates present	Group ID
AE	442m W	Unspecified Heap	1905	1515886
9	454m S	Mill Pond	1892 - 1905	1575583
AE	454m W	Unspecified Heap	1955	1538908
AB	455m NE	Unspecified Works	1974 - 1994	1578478
10	464m SW	Tannery	1983 - 1990	1542979
11	474m S	Unspecified Heap	1966	1468495
AB	493m NE	Unspecified Works	1948 - 1955	1567895
AE	499m W	Unspecified Heap	1967 - 1983	1522307

This data is sourced from Ordnance Survey® / Groundsure.

1.2 Historical tanks

Records within 500m	**37**

Tank features digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
D	91m S	Unspecified Tank	1956 - 1957	244593
D	91m S	Unspecified Tank	1972	256432
D	91m S	Unspecified Tank	1995	245524
D	91m S	Unspecified Tank	1995	246864
G	115m S	Unspecified Tank	1995	248313
H	116m SE	Tanks	1956 - 1968	253752
H	159m SE	Tanks	1938	234449
I	165m S	Unspecified Tank	1956 - 1957	258184
H	170m SE	Tanks	1938	254817
H	183m SE	Tanks	1956 - 1988	261876

ID	Location	Land use	Dates present	Group ID
A	194m W	Unspecified Tank	1894	238270
K	201m N	Unspecified Tank	1968 - 1990	253837
C	286m SE	Tanks	1938	234448
C	288m SE	Unspecified Tank	1922	239284
P	291m S	Tanks	1908 - 1922	258607
P	296m S	Tanks	1908 - 1922	250064
P	300m S	Unspecified Tank	1938	239286
P	301m S	Unspecified Tank	1971 - 1988	248024
P	301m S	Unspecified Tank	1956 - 1957	250573
P	301m S	Unspecified Tank	1968	247632
P	310m S	Unspecified Tank	1956 - 1957	261176
P	316m S	Unspecified Tank	1971	238275
P	323m S	Cooling Tank	1956 - 1957	251640
P	324m S	Unspecified Tank	1971	239271
P	325m SE	Unspecified Tank	1957	239277
P	326m S	Unspecified Tank	1971	245396
P	326m S	Unspecified Tank	1956	245916
P	326m S	Unspecified Tank	1989	260517
P	326m S	Unspecified Tank	1995	259209
Q	342m S	Unspecified Tank	1956 - 1957	245796
P	349m S	Unspecified Tank	1971	238274
8	397m NE	Unspecified Tank	1908	238566
AD	440m SE	Unspecified Tank	1908	239281
AD	476m SE	Unspecified Tank	1922	239285
12	477m NW	Unspecified Tank	1992	238574
AD	482m SE	Unspecified Tank	1908	239280
13	490m E	Unspecified Tank	1938	239287

This data is sourced from Ordnance Survey® / Groundsure.

1.3 Historical energy features

Records within 500m	25

Energy features digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
2	9m S	Electricity Substation	1972 - 1995	147352
D	67m S	Electricity Substation	1972	152450
D	67m S	Electricity Substation	1995	151486
G	115m S	Electricity Substation	1972	144432
I	151m S	Electricity Substation	1972	143687
4	159m E	Electricity Substation	1971 - 1988	146899
I	160m S	Electricity Substation	1995	147027
I	170m S	Electricity Substation	1972	147464
I	171m S	Electricity Substation	1995	159173
I	171m S	Electricity Substation	1995	156176
M	182m E	Electricity Substation	1971	161201
M	182m E	Electricity Substation	1986 - 1988	161903
H	190m SE	Electricity Substation	1956	153580
H	190m SE	Electricity Substation	1971	156195
H	192m SE	Electricity Substation	1968	158763
H	192m SE	Electricity Substation	1957	153921
R	266m N	Electricity Substation	1972	161961
S	267m S	Electricity Substation	1971 - 1995	152784
S	269m S	Electricity Substation	1956	155132
S	270m S	Electricity Substation	1957	154748
R	273m N	Electricity Substation	1990	159383

ID	Location	Land use	Dates present	Group ID
6	372m S	Electricity Substation	1971	144427
V	383m SE	Electricity Substation	1971 - 1988	150833
W	432m S	Electricity Substation	1957	148149
W	432m S	Electricity Substation	1956	154617

This data is sourced from Ordnance Survey® / Groundsure.

1.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey® / Groundsure.

1.5 Historical garages

Records within 500m	0

Garages digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey® / Groundsure.

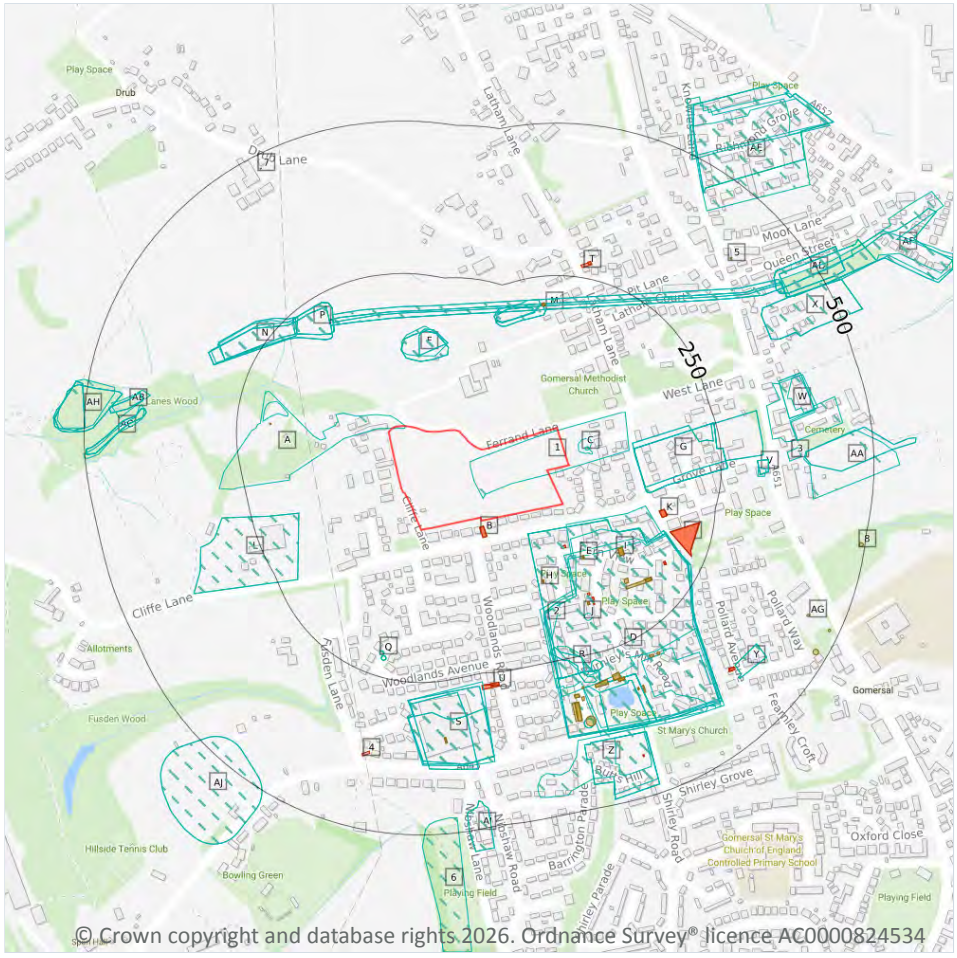
1.6 Historical military land

Records within 500m	0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey® / Groundsure / other sources.

2 Past land use - un-grouped



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2.1 Historical industrial land uses

Records within 500m	140

Potentially contaminative land use features digitised from historical Ordnance Survey® mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
1	**On site**	**Colliery**	**1892**	**1469064**
A	**On site**	**Colliery**	**1892**	**1469111**
C	23m E	Unspecified Heap	1892	1466851

ID	Location	Land Use	Date	Group ID
D	34m S	Unspecified Mills	1948	1544400
C	34m E	Unspecified Old Shaft	1905	1446458
D	36m S	Unspecified Mill	1994	1504131
D	36m S	Unspecified Mill	1974	1504131
D	36m S	Unspecified Mill	1985	1504131
D	58m S	Worsted Mills	1966	1444079
D	82m S	Unspecified Mills	1955	1521545
D	90m S	Unspecified Commercial/Industrial	1938	1431977
F	108m N	Unspecified Heaps	1948	1504908
F	108m N	Unspecified Heaps	1938	1504908
F	108m N	Unspecified Heaps	1905	1575123
G	109m E	Unspecified Yards	1966	1532461
G	109m E	Unspecified Yards	1955	1566781
G	110m E	Unspecified Yards	1892	1513707
G	110m E	Unspecified Yards	1948	1491097
G	110m E	Unspecified Yards	1938	1491097
G	110m E	Unspecified Yards	1905	1513707
F	117m N	Unspecified Heap	1955	1530755
F	118m N	Unspecified Heap	1974	1508481
F	118m N	Unspecified Heap	1985	1508481
2	157m S	Unspecified Heap	1955	1468496
A	168m W	Refuse Heap	1892	1435113
L	173m W	Nursery	1990	1511671
L	173m W	Nursery	1983	1498122
M	178m N	Tunnel	1948	1569977
M	178m N	Tunnel	1938	1569977
M	178m N	Tunnel	1905	1561765
N	178m NW	Cuttings	1948	1533040

ID	Location	Land Use	Date	Group ID
N	178m NW	Cuttings	1938	1581451
N	178m NW	Cuttings	1905	1561093
M	183m N	Unspecified Heap	1948	1571445
M	183m N	Unspecified Heap	1938	1571445
M	183m N	Unspecified Heap	1905	1543267
J	184m S	Chimney	1966	1475327
M	185m N	Tunnel	1966	1503501
M	185m N	Tunnel	1955	1560897
P	185m NW	Cuttings	1994	1493429
P	185m NW	Cuttings	1974	1493429
P	185m NW	Cuttings	1985	1493429
P	185m NW	Cuttings	1966	1534585
P	185m NW	Cuttings	1955	1540496
M	190m N	Unspecified Heap	1974	1507601
M	190m N	Unspecified Heap	1985	1507601
M	191m N	Unspecified Heap	1966	1515457
M	191m N	Unspecified Heap	1955	1520954
Q	208m S	Unspecified Old Shaft	1955	1446713
Q	215m S	Unspecified Old Shaft	1948	1541273
Q	215m S	Unspecified Old Shaft	1938	1541273
Q	215m S	Unspecified Old Shaft	1905	1542358
N	219m NW	Cuttings	1955	1568548
N	219m NW	Cuttings	1967	1534585
N	220m NW	Cuttings	1983	1520878
N	220m NW	Cuttings	1974	1520878
R	227m S	Refuse Heap	1955	1435381
R	227m S	Unspecified Ground Workings	1948	1557103
R	227m S	Unspecified Ground Workings	1938	1557103

ID	Location	Land Use	Date	Group ID
R	260m S	Unspecified Pit	1948	1577503
R	260m S	Unspecified Pit	1938	1577503
S	264m S	Unspecified Mills	1948	1493306
S	269m S	Unspecified Commercial/Industrial	1994	1495779
S	269m S	Unspecified Commercial/Industrial	1985	1495779
S	273m S	Unspecified Mills	1892	1495008
S	273m S	Unspecified Mills	1905	1495008
R	274m SE	Unspecified Mills	1892	1549746
R	277m S	Unspecified Mill	1994	1571125
R	277m S	Unspecified Mill	1974	1571125
R	277m S	Unspecified Mill	1985	1571125
R	288m SE	Unspecified Mills	1905	1530989
S	300m S	Unspecified Depot	1966	1445521
S	300m S	Unspecified Mills	1955	1485428
R	309m S	Mill Pond	1892	1505306
R	309m S	Mill Pond	1905	1505306
V	309m E	Police Station	1974	1517961
V	309m E	Police Station	1985	1517961
V	309m E	Police Station	1966	1517961
V	310m E	Police Station	1994	1527522
W	336m E	Unspecified Foundry	1948	1531362
R	353m S	Unspecified Tank	1994	1581066
R	353m S	Unspecified Tank	1974	1581066
R	353m S	Unspecified Tank	1985	1581066
3	358m E	Police Station	1985	1480960
W	368m E	Unspecified Foundry	1966	1545248
W	368m E	Unspecified Foundry	1955	1570113
W	370m E	Unspecified Foundry	1938	1565779

ID	Location	Land Use	Date	Group ID
W	375m E	Unspecified Foundry	1985	1488760
X	380m NE	Unspecified Depot	1994	1536818
X	380m NE	Unspecified Depot	1974	1536818
X	380m NE	Unspecified Depot	1985	1536818
Z	385m S	Unspecified Mill	1955	1567023
AA	385m E	Burial Ground	1994	1490069
AA	386m E	Burial Ground	1974	1536609
AA	386m E	Burial Ground	1985	1536609
Y	387m SE	Mill Pond	1892	1503030
Y	387m SE	Mill Pond	1905	1503030
Z	392m S	Unspecified Mill	1948	1531130
Z	392m S	Unspecified Mill	1938	1531130
Z	392m S	Unspecified Mill	1905	1522581
Z	393m S	Unspecified Mill	1966	1546539
AB	396m W	Railway Sidings	1955	1489650
AC	399m W	Unspecified Ground Workings	1955	1506392
AC	399m W	Unspecified Ground Workings	1983	1506392
AC	399m W	Unspecified Ground Workings	1974	1506392
AC	399m W	Unspecified Ground Workings	1967	1506392
AC	403m W	Unspecified Ground Workings	1948	1565221
AB	407m W	Railway Sidings	1948	1499104
AB	407m W	Railway Sidings	1938	1499104
AB	407m W	Railway Sidings	1905	1580501
AD	426m NE	Cuttings	1994	1573907
AD	426m NE	Cuttings	1974	1573907
AD	426m NE	Cuttings	1985	1573907
AD	426m NE	Cuttings	1966	1573907
AD	426m NE	Cuttings	1955	1541427

ID	Location	Land Use	Date	Group ID
AE	433m NE	Engineering Works	1966	1479002
AD	434m NE	Cuttings	1948	1536171
AD	434m NE	Cuttings	1938	1536171
AD	434m NE	Cuttings	1905	1555350
AF	434m NE	Railway Sidings	1948	1580215
AF	434m NE	Railway Sidings	1938	1580215
AF	434m NE	Railway Sidings	1905	1551294
AF	439m NE	Railway Sidings	1966	1512289
AH	442m W	Unspecified Heap	1948	1513131
AH	442m W	Unspecified Heap	1938	1513131
AH	442m W	Unspecified Heap	1905	1515886
AI	454m S	Mill Pond	1892	1575583
AI	454m S	Mill Pond	1905	1575583
AH	454m W	Unspecified Heap	1955	1538908
AE	455m NE	Unspecified Works	1994	1578478
AE	455m NE	Unspecified Works	1974	1578478
AE	455m NE	Unspecified Works	1985	1578478
AJ	464m SW	Tannery	1990	1542979
AJ	464m SW	Tannery	1983	1542979
6	474m S	Unspecified Heap	1966	1468495
AE	493m NE	Unspecified Works	1948	1567895
AE	498m NE	Unspecified Works	1955	1567895
AH	499m W	Unspecified Heap	1983	1522307
AH	499m W	Unspecified Heap	1974	1522307
AH	499m W	Unspecified Heap	1967	1522307

This data is sourced from Ordnance Survey® / Groundsure.

2.2 Historical tanks

Records within 500m	**64**

Tank features digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
E	91m S	Unspecified Tank	1957	244593
E	91m S	Unspecified Tank	1957	244593
E	91m S	Unspecified Tank	1972	256432
E	91m S	Unspecified Tank	1956	244593
E	91m S	Unspecified Tank	1995	245524
E	91m S	Unspecified Tank	1995	246864
H	115m S	Unspecified Tank	1995	248313
H	115m S	Unspecified Tank	1995	248313
I	116m SE	Tanks	1956	253752
I	116m SE	Tanks	1968	253752
I	116m SE	Tanks	1957	253752
I	116m SE	Tanks	1957	253752
I	159m SE	Tanks	1938	234449
J	165m S	Unspecified Tank	1957	258184
J	165m S	Unspecified Tank	1957	258184
J	166m S	Unspecified Tank	1956	258184
I	170m SE	Tanks	1938	254817
I	183m SE	Tanks	1986	261876
I	183m SE	Tanks	1988	261876
I	183m SE	Tanks	1986	261876
I	183m SE	Tanks	1968	261876
I	183m SE	Tanks	1957	261876
I	183m SE	Tanks	1957	261876

ID	Location	Land Use	Date	Group ID
I	183m SE	Tanks	1971	261876
I	183m SE	Tanks	1956	261876
A	194m W	Unspecified Tank	1894	238270
M	201m N	Unspecified Tank	1972	253837
M	202m N	Unspecified Tank	1990	253837
M	202m N	Unspecified Tank	1968	253837
D	286m SE	Tanks	1938	234448
D	288m SE	Unspecified Tank	1922	239284
R	291m S	Tanks	1908	258607
R	291m S	Tanks	1922	258607
R	296m S	Tanks	1908	250064
R	296m S	Tanks	1922	250064
R	300m S	Unspecified Tank	1938	239286
R	301m S	Unspecified Tank	1971	248024
R	301m S	Unspecified Tank	1956	250573
R	301m S	Unspecified Tank	1968	247632
R	301m S	Unspecified Tank	1986	248024
R	301m S	Unspecified Tank	1988	248024
R	301m S	Unspecified Tank	1986	248024
R	301m S	Unspecified Tank	1957	250573
R	301m S	Unspecified Tank	1957	250573
R	310m S	Unspecified Tank	1956	261176
R	311m S	Unspecified Tank	1957	261176
R	316m S	Unspecified Tank	1971	238275
R	323m S	Cooling Tank	1957	251640
R	323m S	Cooling Tank	1956	251640
R	324m S	Unspecified Tank	1971	239271
R	325m SE	Unspecified Tank	1957	239277

ID	Location	Land Use	Date	Group ID
R	326m S	Unspecified Tank	1989	260517
R	326m S	Unspecified Tank	1956	245916
R	326m S	Unspecified Tank	1971	245396
R	326m S	Unspecified Tank	1995	259209
S	342m S	Unspecified Tank	1957	245796
S	343m S	Unspecified Tank	1956	245796
R	349m S	Unspecified Tank	1971	238274
5	397m NE	Unspecified Tank	1908	238566
AG	440m SE	Unspecified Tank	1908	239281
AG	476m SE	Unspecified Tank	1922	239285
7	477m NW	Unspecified Tank	1992	238574
AG	482m SE	Unspecified Tank	1908	239280
8	490m E	Unspecified Tank	1938	239287

This data is sourced from Ordnance Survey® / Groundsure.

2.3 Historical energy features

Records within 500m	**40**

Energy features digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 22 >**

ID	Location	Land Use	Date	Group ID
B	9m S	Electricity Substation	1972	147352
B	10m S	Electricity Substation	1995	147352
B	10m S	Electricity Substation	1995	147352
E	67m S	Electricity Substation	1972	152450
E	67m S	Electricity Substation	1995	151486
E	67m S	Electricity Substation	1995	151486
H	115m S	Electricity Substation	1972	144432

ID	Location	Land Use	Date	Group ID
J	151m S	Electricity Substation	1972	143687
K	159m E	Electricity Substation	1971	146899
K	159m E	Electricity Substation	1986	146899
K	159m E	Electricity Substation	1988	146899
K	159m E	Electricity Substation	1986	146899
J	160m S	Electricity Substation	1995	147027
J	160m S	Electricity Substation	1995	147027
J	170m S	Electricity Substation	1972	147464
J	171m S	Electricity Substation	1995	159173
J	171m S	Electricity Substation	1995	156176
O	182m E	Electricity Substation	1971	161201
O	182m E	Electricity Substation	1986	161903
O	182m E	Electricity Substation	1988	161903
O	182m E	Electricity Substation	1986	161903
I	190m SE	Electricity Substation	1971	156195
I	190m SE	Electricity Substation	1956	153580
I	192m SE	Electricity Substation	1968	158763
I	192m SE	Electricity Substation	1957	153921
I	192m SE	Electricity Substation	1957	153921
T	266m N	Electricity Substation	1972	161961
U	267m S	Electricity Substation	1995	152784
U	267m S	Electricity Substation	1995	152784
U	269m S	Electricity Substation	1956	155132
U	270m S	Electricity Substation	1971	152784
U	270m S	Electricity Substation	1957	154748
T	273m N	Electricity Substation	1990	159383
4	372m S	Electricity Substation	1971	144427
Y	383m SE	Electricity Substation	1986	150833

ID	Location	Land Use	Date	Group ID
Y	383m SE	Electricity Substation	1988	150833
Y	383m SE	Electricity Substation	1986	150833
Y	384m SE	Electricity Substation	1971	150833
Z	432m S	Electricity Substation	1957	148149
Z	432m S	Electricity Substation	1956	154617

This data is sourced from Ordnance Survey® / Groundsure.

2.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey® / Groundsure.

2.5 Historical garages

Records within 500m	0

Garages digitised from historical Ordnance Survey® mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey® / Groundsure.

3 Waste and landfill



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Site Outline

Search buffers in metres (m)

- Historical landfill (EA/NRW)
- Historical landfill (BGS)
- Historical landfill (LA/OS)
- Historical waste sites
- Licensed waste sites
- Waste exemptions

3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	1

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

Features are displayed on the Waste and landfill map on **page 33 >**

ID	Location	Address	BGS Number	Risk	Waste Type
5	464m S	Nibshaw Lane, Gomersal, Cleckheaton, W Yorks	1142	No risk to aquifer	N/A

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	**2**

Landfill sites identified from Local Authority records and high detail historical mapping.

Features are displayed on the Waste and landfill map on **page 33 >**

ID	Location	Site address	Source	Data type
2	354m S	Refuse Tip	1961 mapping	Polygon
4	439m S	Refuse Tip	1961 mapping	Polygon

This data is sourced from the Ordnance Survey®/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	**2**

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on **page 33 >**

ID	Location	Details		
1	175m NW	Site Address: Land to the North of Cliffe Lane Gomersal, Dismantled Railway, Cleckheaton Licence Holder Address: New Lane, Cleckheaton	Waste Licence: Yes Site Reference: 4700/0020 Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 01/06/1977 Licence Surrender: 05/05/1994	Operator: - Licence Holder: John Crossland Limited First Recorded 01/01/1976 Last Recorded: 31/12/1990
B	495m S	Site Address: Nibshaw Lane, Gomersal, Cleckheaton, West Yorkshire Licence Holder Address: -	Waste Licence: - Site Reference: - Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: - Licence Issue: - Licence Surrender: -	Operator: Sellon Brotheers Limited Licence Holder: - First Recorded - Last Recorded: 31/07/1972

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	1

Waste site records derived from Local Authority planning records and high detail historical mapping.

Features are displayed on the Waste and landfill map on **page 33 >**

ID	Location	Address	Further Details	Date
B	492m S	Site Address: N/A	Type of Site: Ground Workings and Refuse Heap Planning application reference: N/A Description: N/A Data source: Historic Mapping Data Type: Polygon	1957

This data is sourced from Ordnance Survey®/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	3

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

Features are displayed on the Waste and landfill map on **page 33 >**

ID	Location	Details		
A	250m W	Site Name: Roundhill Turkey Farm Site Address: 100, Cliffe Lane, Gomersal, Cleckheaton, West Yorkshire, BD19 4EX Correspondence Address: 3, Fusden Way, Gomersal, Cleckheaton, West Yorkshire, BD19 4SZ	Type of Site: Household, Commercial & Industrial Waste T Stn Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MRC002 EPR reference: - Operator: Mr Clifford Crawshaw Waste Management licence No: 65025 Annual Tonnage: 4999	Issue Date: 21/10/1998 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued

ID	Location	Details		
A	250m W	Site Name: Roundhill Turkey Farm Site Address: 100, Cliffe Lane, Gomersal, Cleckheaton, West Yorkshire, BD19 4EX Correspondence Address: -	Type of Site: Household, Commercial & Industrial Waste T Stn Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 640020 EPR reference: EA/EPR/AP3094SV Operator: Clifford Crawshaw Waste Management licence No: 65025 Annual Tonnage: 4999	Issue Date: 21/10/1998 Effective Date: 21/10/1998 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired
A	250m W	Site Name: Roundhill Turkey Farm Site Address: 100, Cliffe Lane, Gomersal, Cleckheaton, West Yorkshire, BD19 4EX Correspondence Address: -	Type of Site: Household, Commercial & Industrial Waste T Stn Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: 654401 EPR reference: EA/EPR/AP3094SV Operator: Clifford Crawshaw Waste Management licence No: 65025 Annual Tonnage: 0	Issue Date: 21/10/1998 Effective Date: 21/10/1998 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m **1**

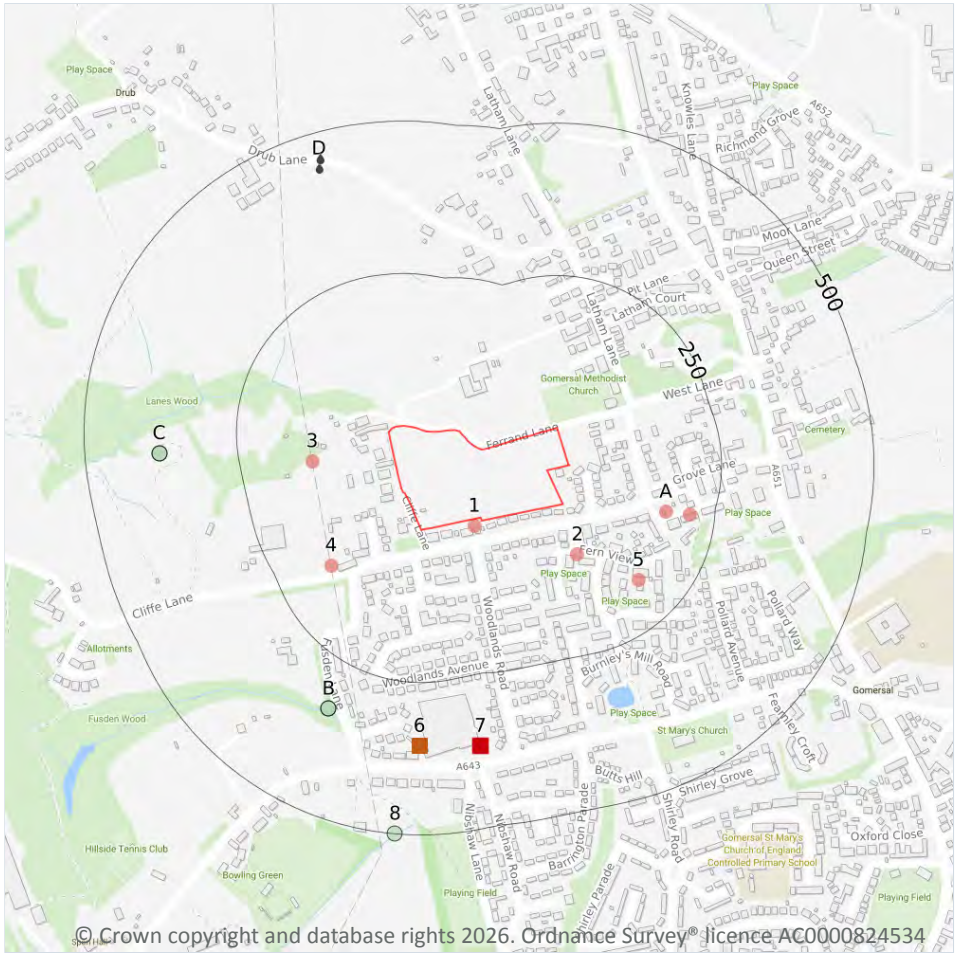
Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 33 >**

ID	Location	Site	Reference	Category	Sub-Category	Description
3	382m W	-	WEX424400	Disposing of waste exemption	On a farm	Burning waste in the open

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



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4.1 Recent industrial land uses

Records within 250m	7

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 37 >**

ID	Location	Company	Address	Activity	Category
1	11m S	Electricity Sub Station	West Yorkshire, BD19	Electrical Features	Infrastructure and Facilities
2	86m S	Electricity Sub Station	West Yorkshire, BD19	Electrical Features	Infrastructure and Facilities
3	133m W	Pylon	West Yorkshire, BD19	Electrical Features	Infrastructure and Facilities

ID	Location	Company	Address	Activity	Category
4	159m SW	Pylon	West Yorkshire, BD19	Electrical Features	Infrastructure and Facilities
A	169m E	Electricity Sub Station	West Yorkshire, BD19	Electrical Features	Infrastructure and Facilities
5	176m SE	Gantry	West Yorkshire, BD19	Travelling Cranes and Gantries	Industrial Features
A	210m E	Goldpress Badges	21, Reform Street, Gomersal, Cleckheaton, West Yorkshire, BD19 4JX	Clothing, Components and Accessories	Consumer Products

This data is sourced from Ordnance Survey®.

4.2 National Geographic Database (NGD) - Current or recent tanks

Records within 250m	0

Current or recent tanks identified from the Ordnance Survey® NGD.

This data is sourced from Ordnance Survey®.

4.3 Current or recent petrol stations

Records within 500m	0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.4 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.5 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.6 Sites determined as Contaminated Land

Records within 500m	0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.7 Control of Major Accident Hazards (COMAH)

Records within 500m	0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.8 Regulated explosive sites

Records within 500m	0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.9 Hazardous substance storage/usage

Records within 500m	0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.10 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.12 Licensed pollutant release (Part A(2)/B)

Records within 500m	0

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from Local Authority records.

4.13 Radioactive Substance Authorisations

Records within 500m	0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Licensed Discharges to controlled waters

Records within 500m	3

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 37 >**

ID	Location	Address	Details	
D	442m N	HUNSWORTH - DRUB LANE, CLECKHEATON, KIRKLEES, WEST YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: YWUCD2/22 Permit Version: 1 Receiving Water: TRIB OF RIVER SPEN	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 12/11/1997 Effective Date: 12/11/1997 Revocation Date: 02/04/2005

ID	Location	Address	Details	
D	455m N	HUNSWORTH - DRUB LANE, CLECKHEATON, KIRKLEES, WEST YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: WRA8669 Permit Version: 1 Receiving Water: TRIBUTARY OF NANN HALL BECK	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 11/03/2005 Effective Date: 01/04/2005 Revocation Date: 02/03/2010
D	455m N	HUNSWORTH - DRUB LANE, CLECKHEATON, KIRKLEES, WEST YORKSHIRE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: WRA8669 Permit Version: 2 Receiving Water: TRIBUTARY OF NANN HALL BECK	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 03/03/2010 Effective Date: 03/03/2010 Revocation Date: 14/04/2022

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to surface waters (Red List)

Records within 500m	**0**

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 Pollutant release to public sewer

Records within 500m	**1**

Discharges of Special Category Effluents to the public sewer.

Features are displayed on the Current industrial land use map on **page 37 >**

ID	Location	Address	Details	
6	354m S	T BURNLEY AND SONS, SPEN LANE, GOMERSAL MILLS, GOMERSAL, GOMERSAL, BD19 4LU	Permission reference: AR7017 Local Authority: KIRKLEES METROPOLITAN BOROUGH COUNCIL First received date: 01/01/2015	Last received date: 01/01/2015 Status: RECEIVED

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 1 Dangerous Substances

Records within 500m	1

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

Features are displayed on the Current industrial land use map on **page 37 >**

ID	Location	Name	Status	Receiving Water	Authorised Substances
7	366m S	Spen Valley Scouring Company, Cleckheaton	Active	-	Hexachlorocyclohexane

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution Incidents (EA/NRW)

Records within 500m	5

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 37 >**

ID	Location	Details	
B	330m SW	Incident Date: 03/09/2001 Incident Identification: 28548 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
B	330m SW	Incident Date: 03/09/2001 Incident Identification: 28548 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
C	378m W	Incident Date: 18/04/2022 Incident Identification: 2053897 Pollutant: Inert Materials and Wastes Pollutant Description: Other Inert Material or Waste	Water Impact: Category 3 (Minor) Land Impact: Category 2 (Significant) Air Impact: Category 3 (Minor)

ID	Location	Details	
C	378m W	Incident Date: 18/04/2022 Incident Identification: 2053897 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Other General Biodegradable Material or Waste	Water Impact: Category 3 (Minor) Land Impact: Category 2 (Significant) Air Impact: Category 3 (Minor)
8	500m S	Incident Date: 01/11/2002 Incident Identification: 118184 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.20 Pollution inventory substances

Records within 500m	0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.21 Pollution inventory waste transfers

Records within 500m	0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.22 Pollution inventory radioactive waste

Records within 500m	0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Hydrogeology - Superficial aquifer

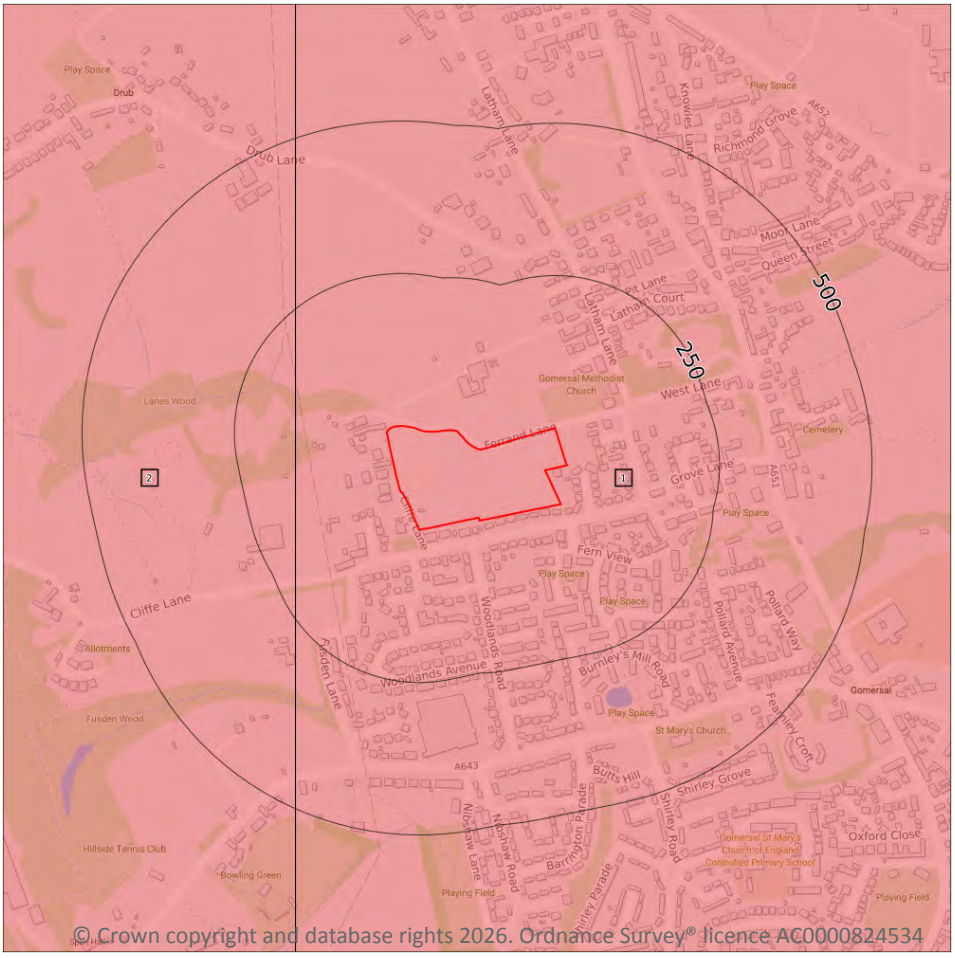
5.1 Superficial aquifer

Records within 500m	0

Aquifer status of groundwater held within superficial geology.

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



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5.2 Bedrock aquifer

Records within 500m	2

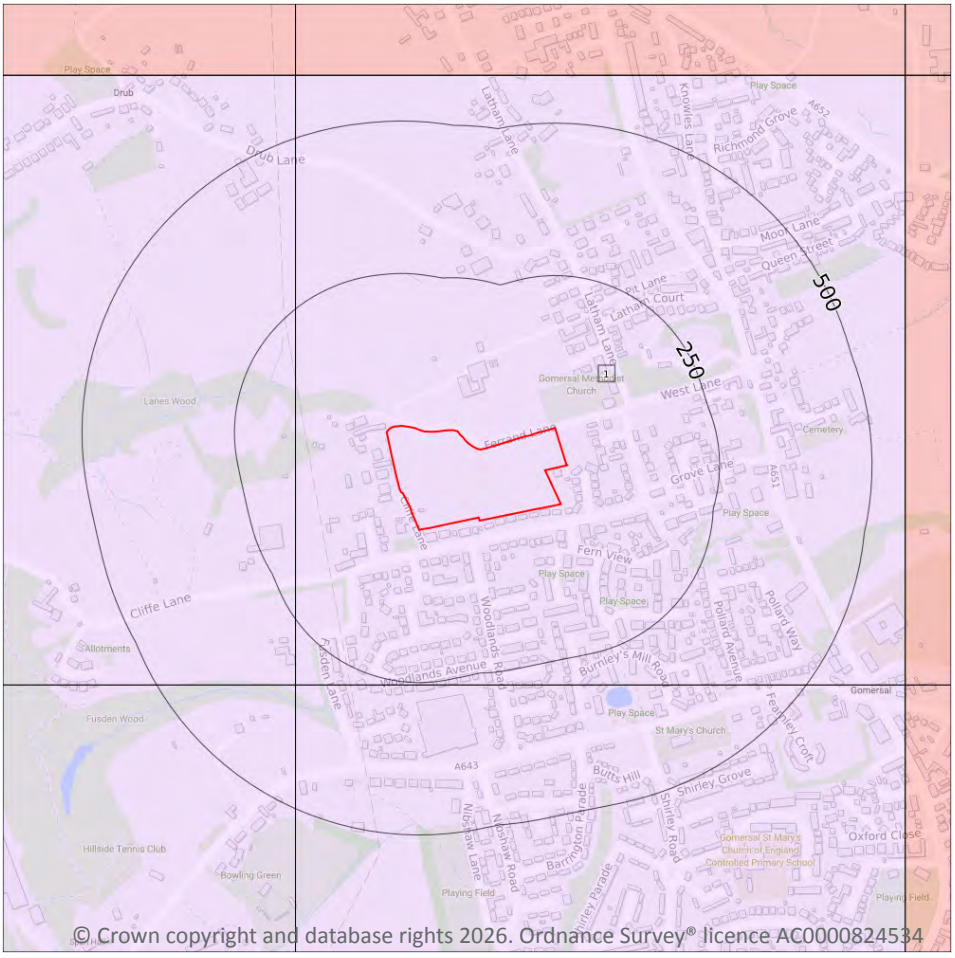
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 45 >**

ID	Location	Designation	Description
1	**On site**	**Secondary A**	**Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers**
2	150m W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



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5.3 Groundwater vulnerability

Records within 50m	1

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 47 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	**Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year**	**Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data**	**Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures**

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	0

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

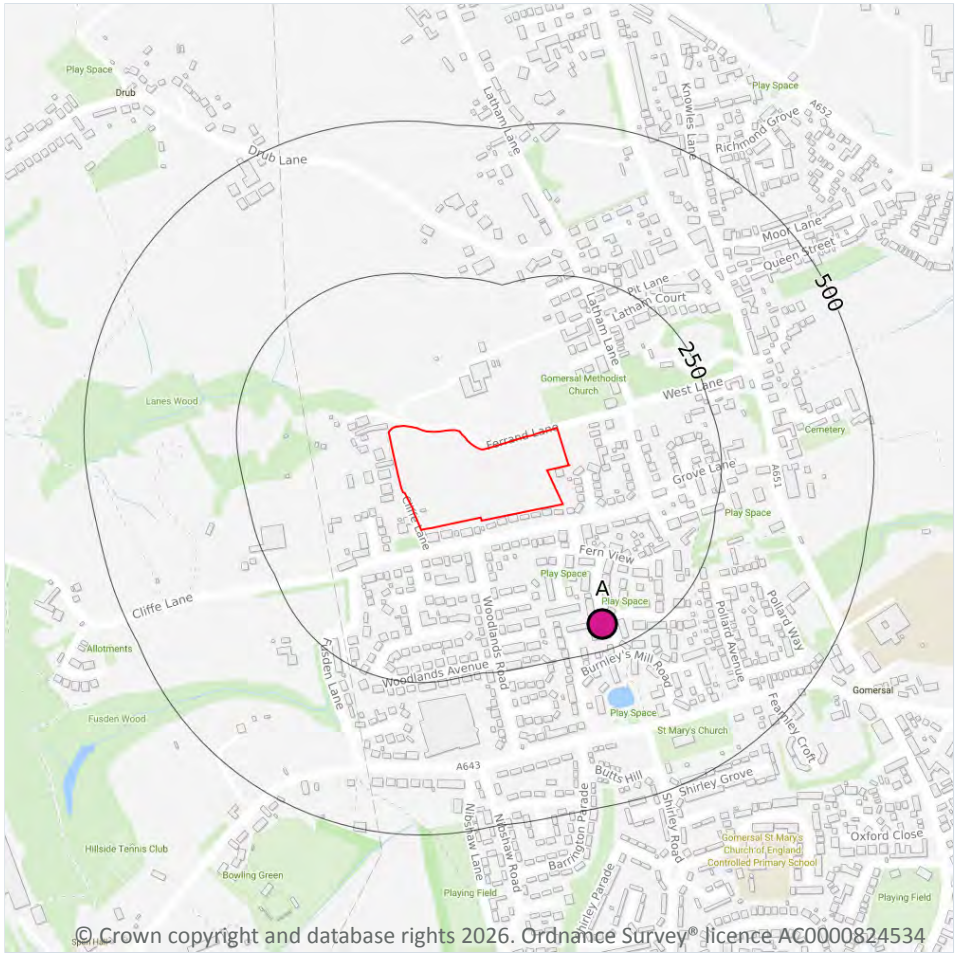
5.5 Groundwater vulnerability- local information

Records on site	0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk ↗.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



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- Site Outline

Search buffers in metres (m)

- Source Protection Zone 1 — Inner catchment
- Source Protection Zone 2 — Outer catchment
- Source Protection Zone 3 — Total catchment
- Source Protection Zone 4 — Zone of Special Interest
- Source Protection Zone 1c — Inner catchment - confined aquifer
- Source Protection Zone 2c — Outer catchment - confined aquifer
- Source Protection Zone 3c — Total catchment - confined aquifer
- Drinking water abstraction licences
- Drinking water abstraction licences — Polygon features
- Drinking water abstraction licences — Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

5.6 Groundwater abstractions

Records within 2000m	8

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 49 >**

ID	Location	Details	
A	207m S	Status: Historical Licence No: 2/27/13/001 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUNDWATERS Point: BOREHOLES X 2 Data Type: Point Name: GOMERSAL MILLS LTD Easting: 420500 Northing: 426100	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 01/12/1965 Expiry Date: - Issue No: 100 Version Start Date: 28/02/1997 Version End Date: -
A	207m S	Status: Historical Licence No: 2/27/13/001 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUNDWATERS Point: BOREHOLES X 2 - COAL MEASURES Data Type: Point Name: GOMERSAL MILLS LTD Easting: 420500 Northing: 426100	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 01/12/1965 Expiry Date: - Issue No: 101 Version Start Date: 01/04/2002 Version End Date: -
-	1862m W	Status: Historical Licence No: 2/27/13/022 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUNDWATERS Point: BOREHOLE Data Type: Point Name: METROTECT LIMITED Easting: 418300 Northing: 426200	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 14/12/1965 Expiry Date: - Issue No: 100 Version Start Date: 21/10/1996 Version End Date: -
-	1862m W	Status: Historical Licence No: 2/27/13/022 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUNDWATERS Point: BOREHOLE - COAL MEASURES - CLECKHEATON Data Type: Point Name: METROTECT LTD Easting: 418300 Northing: 426200	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 14/12/1965 Expiry Date: - Issue No: 100 Version Start Date: 21/10/1996 Version End Date: -

ID	Location	Details	
-	1891m E	Status: Historical Licence No: 2/27/13/190 Details: General use relating to Secondary Category (High Loss) Direct Source: GROUNDWATERS Point: BOREHOLE Data Type: Point Name: KALON GROUP LIMITED Easting: 422230 Northing: 425700	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 30/04/1997 Expiry Date: 31/12/2006 Issue No: 100 Version Start Date: 30/04/1997 Version End Date: -
-	1891m E	Status: Historical Licence No: 2/27/13/190 Details: General use relating to Secondary Category (High Loss) Direct Source: GROUNDWATERS Point: BOREHOLE - COAL MEASURES - BATLEY Data Type: Point Name: SIGMAKALON UK LTD Easting: 422230 Northing: 425700	Annual Volume (m^3): 50000 Max Daily Volume (m^3): 240 Original Application No: - Original Start Date: 30/04/1997 Expiry Date: 31/12/2006 Issue No: 103 Version Start Date: 13/03/2006 Version End Date: -
-	1891m E	Status: Historical Licence No: 2/27/13/220 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: GROUNDWATERS Point: BOREHOLE - COAL MEASURES - BATLEY Data Type: Point Name: SIGMAKALON UK LTD Easting: 422230 Northing: 425700	Annual Volume (m^3): 50000 Max Daily Volume (m^3): 240 Original Application No: - Original Start Date: 01/01/2007 Expiry Date: 31/03/2015 Issue No: 1 Version Start Date: 01/01/2007 Version End Date: -
-	1925m E	Status: Active Licence No: NE/027/0013/033 Details: Process Water Direct Source: GROUNDWATERS Point: UNDERGROUND STRATA COMPRISING OF THE COAL MEASURES, BIRSTALL Data Type: Point Name: PPG Architectural Coatings UK Ltd Easting: 422259 Northing: 425682	Annual Volume (m^3): 109500 Max Daily Volume (m^3): 300 Original Application No: NPS/WR/040133 Original Start Date: 22/07/2024 Expiry Date: 31/03/2039 Issue No: 1 Version Start Date: 22/07/2024 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	3

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 49 >**

ID	Location	Details	
-	1747m NE	Status: Historical Licence No: 2/27/13/153 Details: General use relating to Secondary Category (Low Loss) Direct Source: SURFACE WATER Point: NOVA BECK Data Type: Point Name: KIRKLEES METROPOLITAN COUNCIL Easting: 421980 Northing: 427220	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 26/04/1982 Expiry Date: - Issue No: 100 Version Start Date: 26/04/1982 Version End Date: -
-	1747m NE	Status: Historical Licence No: 2/27/13/153 Details: Make-Up or Top Up Water Direct Source: SURFACE WATER Point: NOVA BECK Data Type: Point Name: KIRKLEES METROPOLITAN COUNCIL Easting: 421980 Northing: 427220	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 26/04/1982 Expiry Date: - Issue No: 100 Version Start Date: 26/04/1982 Version End Date: -
-	1747m NE	Status: Historical Licence No: 2/27/13/153 Details: Make-Up Or Top Up Water Direct Source: SURFACE WATER Point: NOVA BECK Data Type: Point Name: KIRKLEES METROPOLITAN COUNCIL Easting: 421980 Northing: 427220	Annual Volume (m^3): 9500 Max Daily Volume (m^3): 36 Original Application No: - Original Start Date: 26/04/1982 Expiry Date: - Issue No: 100 Version Start Date: 26/04/1982 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m	0

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m	0

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

Records within 500m	0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

6 Hydrology



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Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m	8

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 54 >**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	175m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
A	209m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	209m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
A	210m NW	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
A	210m NW	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
A	211m NW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	214m W	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	236m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey®.

6.2 Surface water features

Records within 250m	5

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 54 >**

This data is sourced from the Ordnance Survey®.

6.3 WFD Surface water body catchments

Records on site	1

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 54 >**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	**On site**	**River**	**Spen Beck from Source to River Calder**	**GB104027062710**	**Calder Lower**	**Aire and Calder**

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	**1**

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

Features are displayed on the Hydrology map on **page 54 >**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
-	1064m SW	River	Spen Beck from Source to River Calder	GB104027062710 ↗	Moderate	Fail	Moderate	2019

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	**1**

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

Features are displayed on the Hydrology map on **page 54 >**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
2	**On site**	**Aire & Calder Carb Limestone / Millstone Grit / Coal Measures.**	**GB40402G700400 ↗**	**Poor**	**Poor**	**Good**	**2019**

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding

7.1 Risk of flooding from rivers and the sea

Records within 50m	0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m	0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m	0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m	0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 Flood Storage Areas

Records within 250m	0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



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Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**Negligible**
Highest risk within 50m	**1 in 100 year, 0.1m - 0.3m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 61 >**

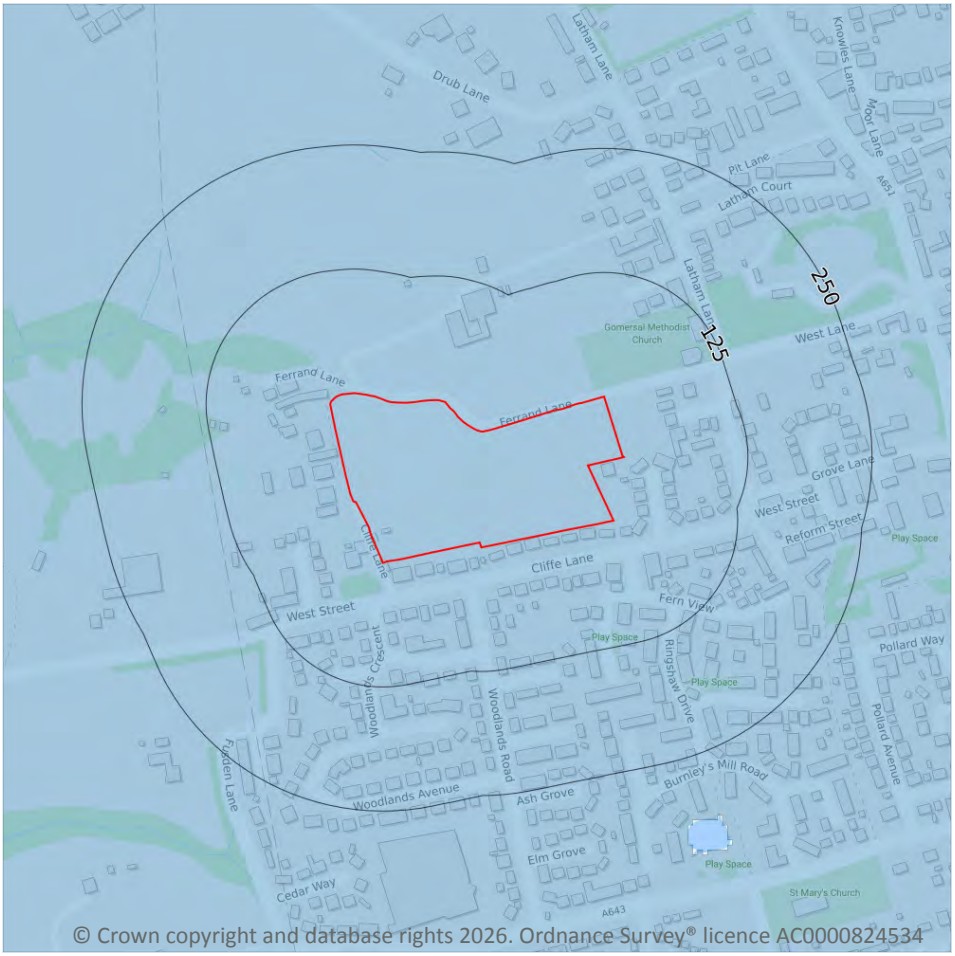
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Negligible
1 in 250 year	Negligible
1 in 100 year	Negligible
1 in 30 year	Negligible

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



Site Outline

Search buffers in metres (m)

- High
- Moderate - High
- Moderate
- Low
- Negligible

9.1 Groundwater flooding

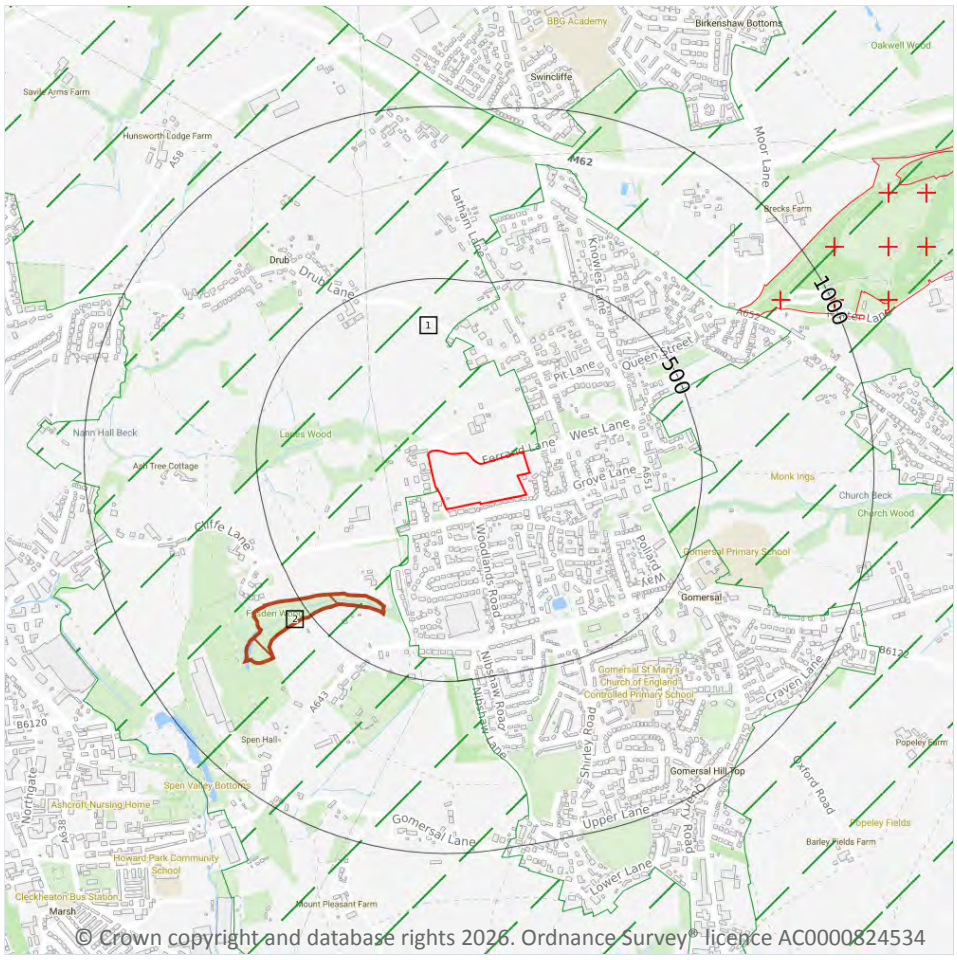
Highest risk on site	**Negligible**
Highest risk within 50m	**Negligible**

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 63 >**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



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Site Outline

Search buffers in metres (m)

Local Nature Reserves (LNR)

Designated Ancient Woodland

Green Belt

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	0

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m	0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m	0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m	1

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

Features are displayed on the Environmental designations map on **page 64 >**

ID	Location	Name	Data source
3	753m NE	Oakwell Park	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m	3

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 64 >**

ID	Location	Name	Woodland Type
2	333m SW	Fusden Wood	Ancient Replanted Woodland
-	1627m NW	Great And Little Hunsworth Woods	Ancient & Semi-Natural Woodland
-	1937m W	Unknown	Ancient & Semi-Natural Woodland

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.8 Biosphere Reserves

Records within 2000m	0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m	0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.11 Green Belt

Records within 2000m	1

Areas designated to prevent urban sprawl by keeping land permanently open.

Features are displayed on the Environmental designations map on **page 64 >**

ID	Location	Name	Local Authority name
1	**On site**	**South and West Yorkshire Green Belt**	**Kirklees**

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m	2

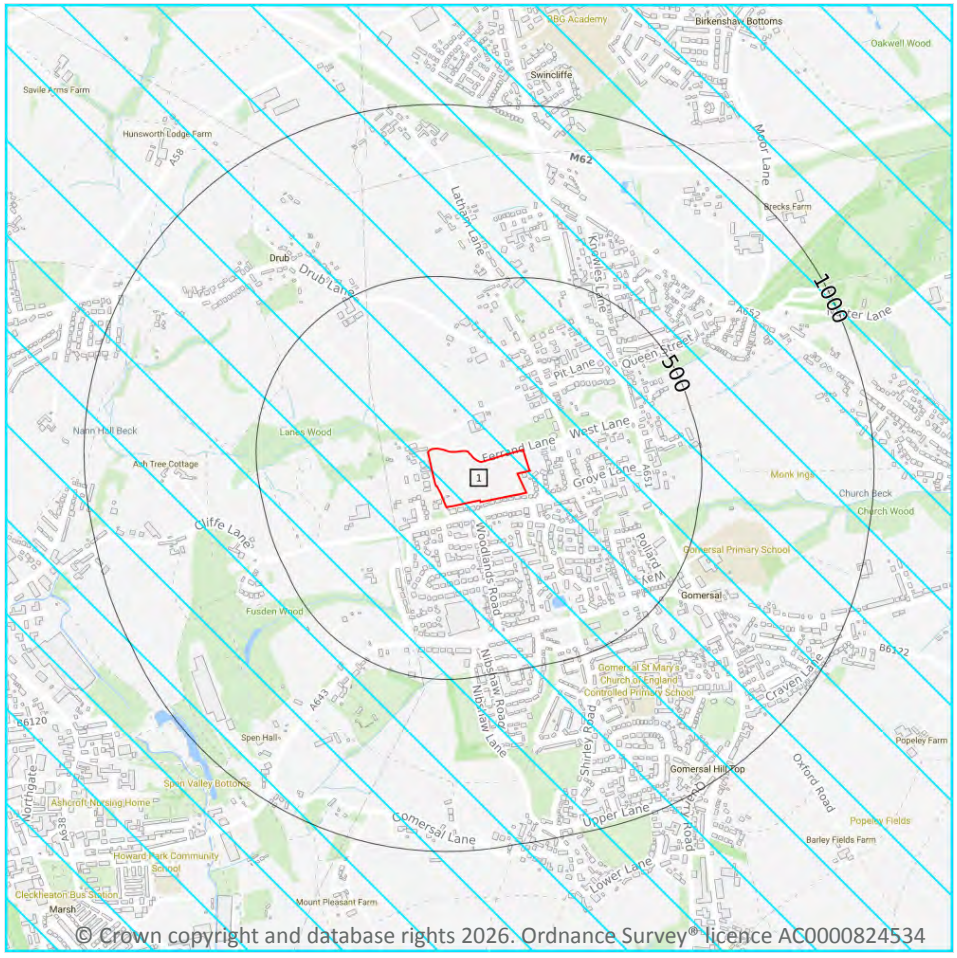
Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

Location	Name	Type	NVZ ID	Status
On site	**Spen Beck from Source to River Calder NVZ**	**Surface Water**	**271**	**Existing**

Location	Name	Type	NVZ ID	Status
272m S	Spen Beck from Source to River Calder NVZ	Surface Water	271	Existing

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units



Site Outline

Search buffers in metres (m)

SSSI Impact Risk Zones

SSSI Units

- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

10.17 SSSI Impact Risk Zones

Records on site	1

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 70 >**

ID	Location	Type of developments requiring consultation
1	**On site**	**https://irz.geodata.org.uk/IRZ/step2.html?irzcode=0000000000000&notes=&location=417554,424273%20(IRZ%20polygon%20centre)**

This data is sourced from Natural England.

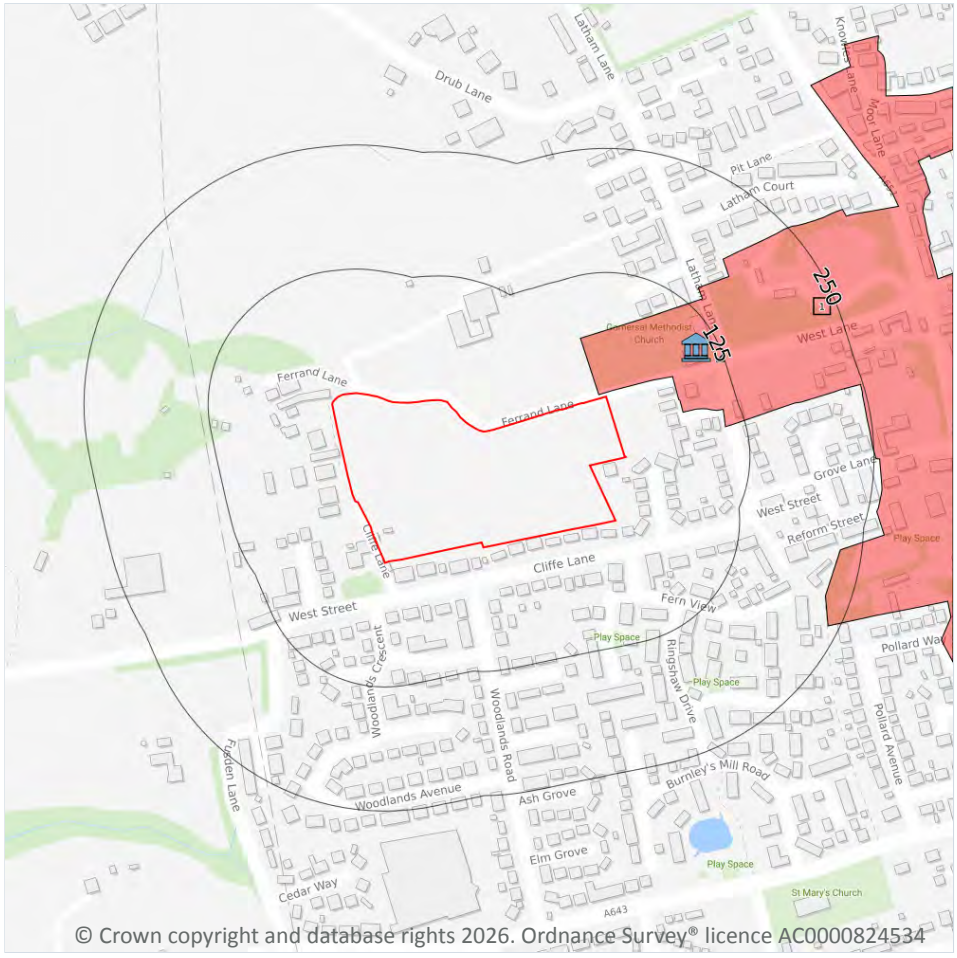
10.18 SSSI Units

Records within 2000m	0

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations



- Site Outline

Search buffers in metres (m)

- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

11.1 World Heritage Sites

Records within 250m	0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m	0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m	1

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

Features are displayed on the Visual and cultural designations map on **page 72 >**

ID	Location	Name	Grade	Reference Number	Listed date
2	103m NE	Gomersal Methodist Church	II	1313715	30/04/1982

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m	1

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

Features are displayed on the Visual and cultural designations map on **page 72 >**

ID	Location	Name	District	Date of designation
1	4m N	Gomersal	Kirklees	31/07/1978

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m	0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

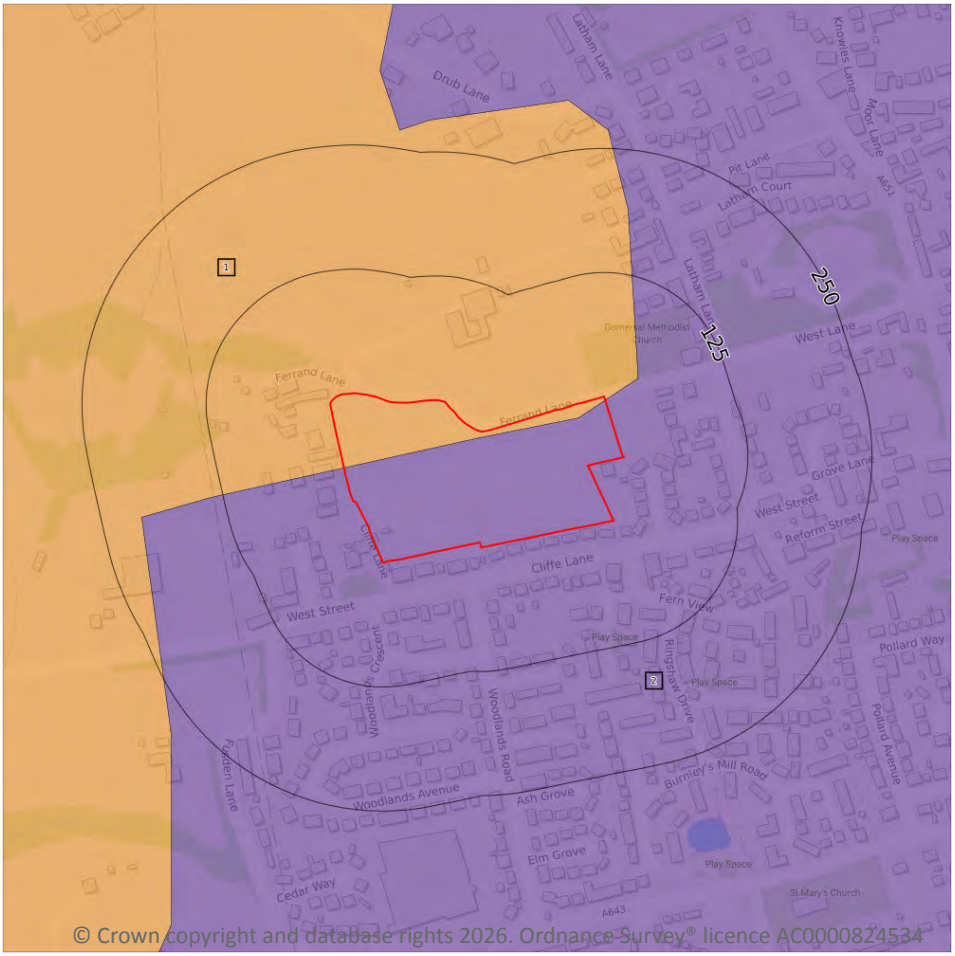
11.7 Registered Parks and Gardens

Records within 250m	0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	2

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 75 >**

ID	Location	Classification	Description
1	On site	Grade 3	Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.
2	On site	Urban	Non-agricultural/no quality assigned

This data is sourced from Natural England.

12.2 Open Access Land

Records within 250m	0

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	0

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

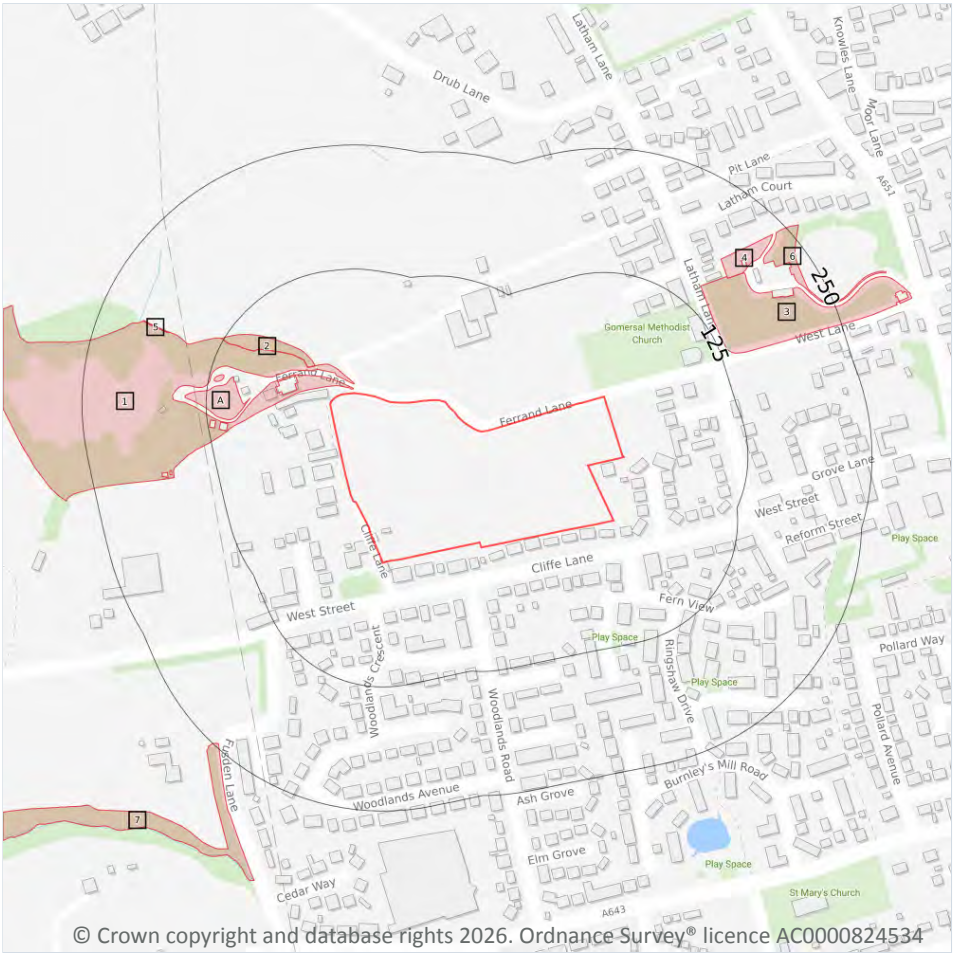
12.5 Countryside Stewardship Schemes

Records within 250m	0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations



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Site Outline

Search buffers in metres (m)

- Priority Habitat Inventory
- Open Mosaic Habitat
- Limestone Pavement Orders

Habitat Networks

- Primary Habitat
- Restorable Habitat
- Associated Habitats
- Habitat Restoration-Creation
- Network Enhancement Zone 1
- Network Enhancement Zone 2

13.1 Priority Habitat Inventory

Records within 250m	9

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

Features are displayed on the Habitat designations map on **page 77 >**

ID	Location	Main Habitat	Other habitats
1	4m N	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
2	38m NW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
A	82m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
A	111m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

ID	Location	Main Habitat	Other habitats
3	132m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
4	172m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
5	177m NW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
6	210m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
7	247m SW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

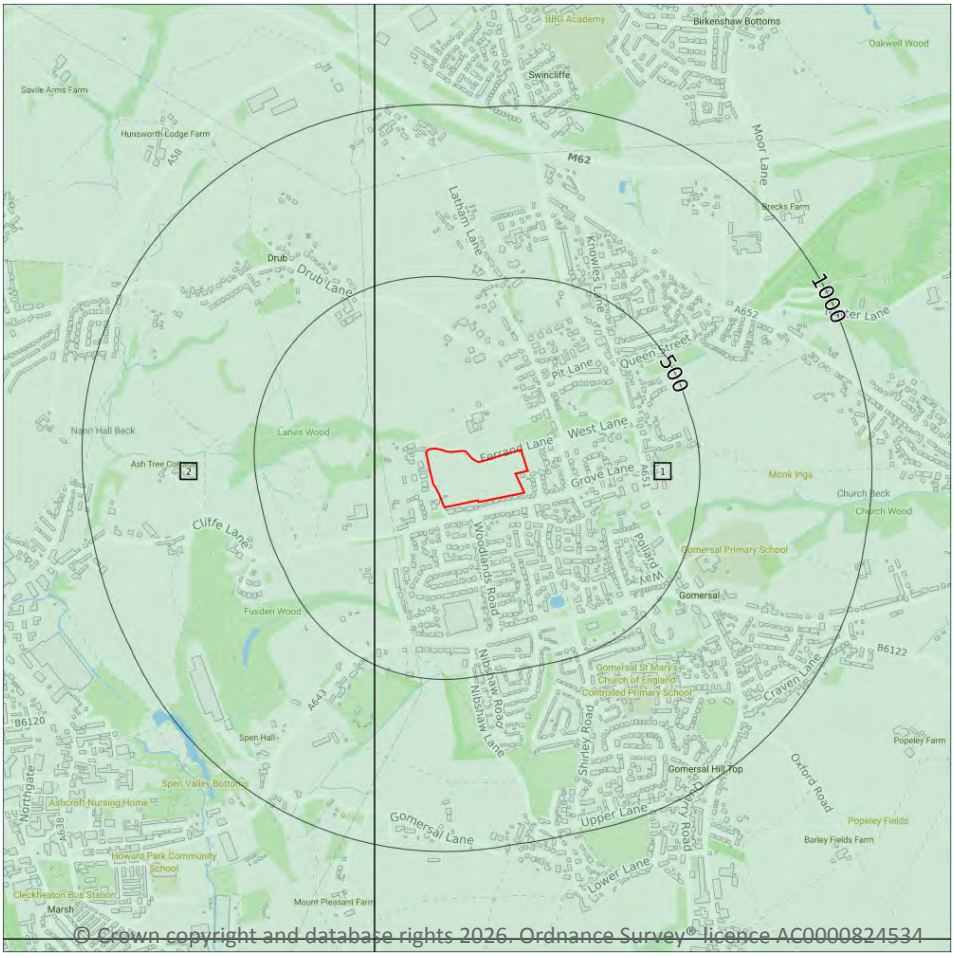
13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



14.1 10k Availability

Records within 500m	2

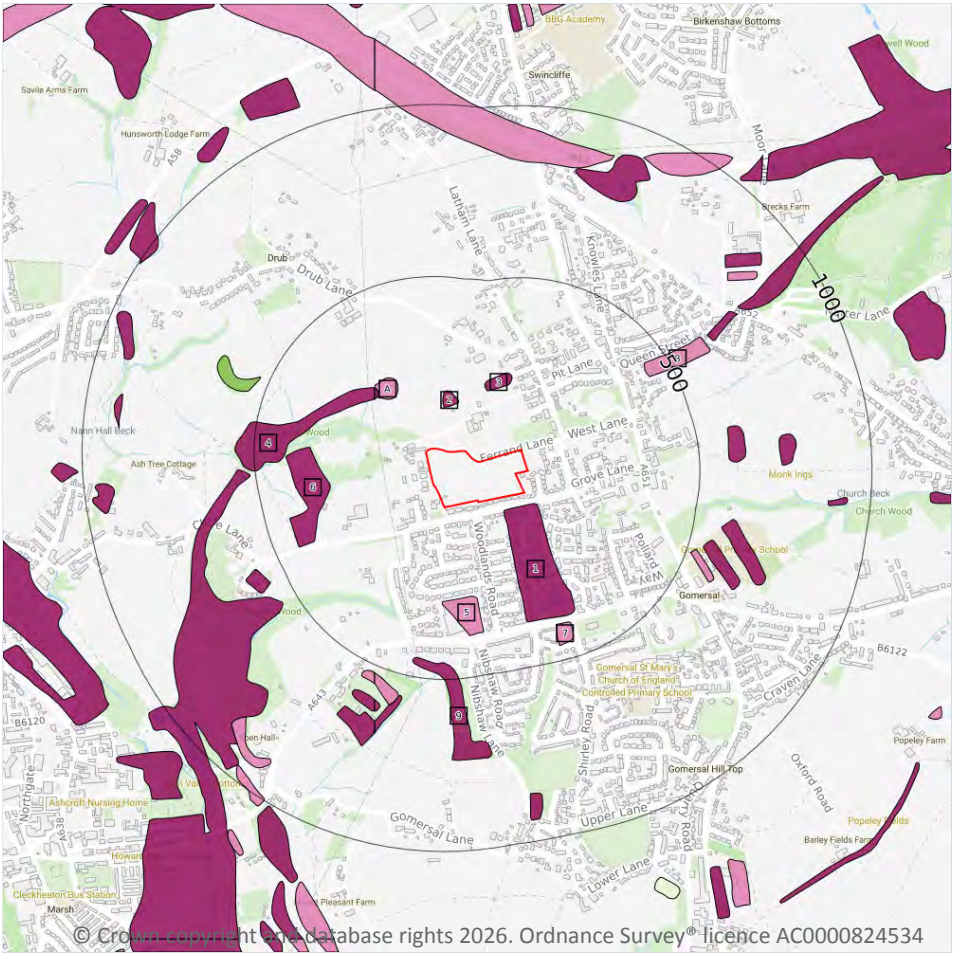
An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 79 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**No coverage**	**SE22NW**
2	150m W	Full	Full	Full	Full	SE12NE

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground



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14.2 Artificial and made ground (10k)

Records within 500m	11

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 80 >**

ID	Location	LEX Code	Description	Rock description
1	36m S	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit
2	123m N	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit
A	181m NW	WGR-VOID	Worked Ground (Undivided)	Void
3	188m N	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit

ID	Location	LEX Code	Description	Rock description
A	213m NW	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit
4	214m NW	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit
5	268m S	WGR-VOID	Worked Ground (Undivided)	Void
6	292m W	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit
7	394m S	WGR-VOID	Worked Ground (Undivided)	Void
8	427m NE	WGR-VOID	Worked Ground (Undivided)	Void
9	443m S	MGR-ARTDP	Made Ground (Undivided)	Artificial deposit

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial

14.3 Superficial geology (10k)

Records within 500m	0

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

This data is sourced from the British Geological Survey.

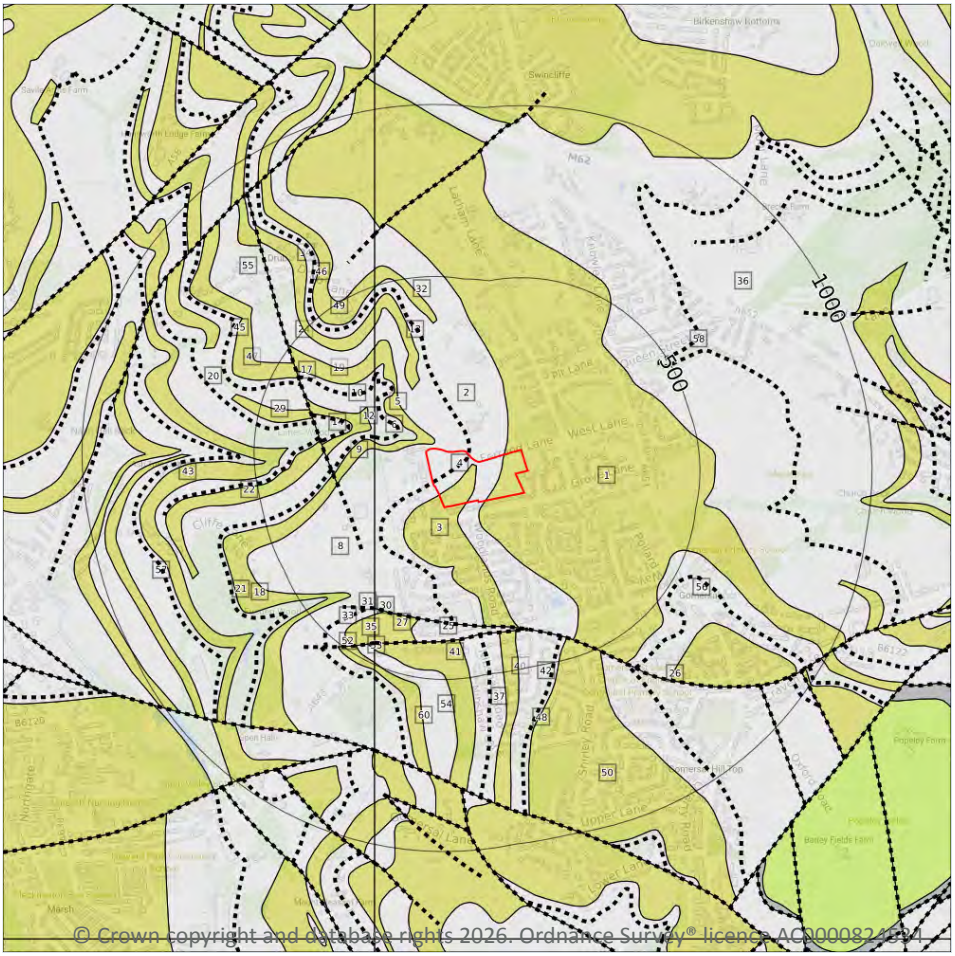
14.4 Landslip (10k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock



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Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (10k)

Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m	41

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 83 >**

ID	Location	LEX Code	Description	Rock age
1	On site	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
2	On site	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
3	On site	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian

ID	Location	LEX Code	Description	Rock age
5	14m N	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
6	47m NW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
8	150m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
9	150m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
10	153m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
12	174m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
13	180m N	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
14	227m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
18	271m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
19	277m NW	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
20	277m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
22	296m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
24	320m NW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
25	331m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
27	331m S	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
29	345m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
30	348m SW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
32	365m N	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
34	366m NW	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
35	372m SW	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
36	381m NE	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
37	382m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
40	384m S	BRSR-SDST	Birstall Rock-Sandstone	Westphalian

ID	Location	LEX Code	Description	Rock age
41	387m S	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
42	387m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
43	402m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
44	403m NW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
47	428m NW	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
49	437m NW	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
50	439m S	ER-SDST	Emley Rock-Sandstone	Westphalian
51	443m SW	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
53	455m SW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
54	460m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
55	464m NW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
56	465m SE	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
57	468m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, Siltstone And Sandstone	Westphalian
59	476m SW	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
60	495m SW	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m	**19**

Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

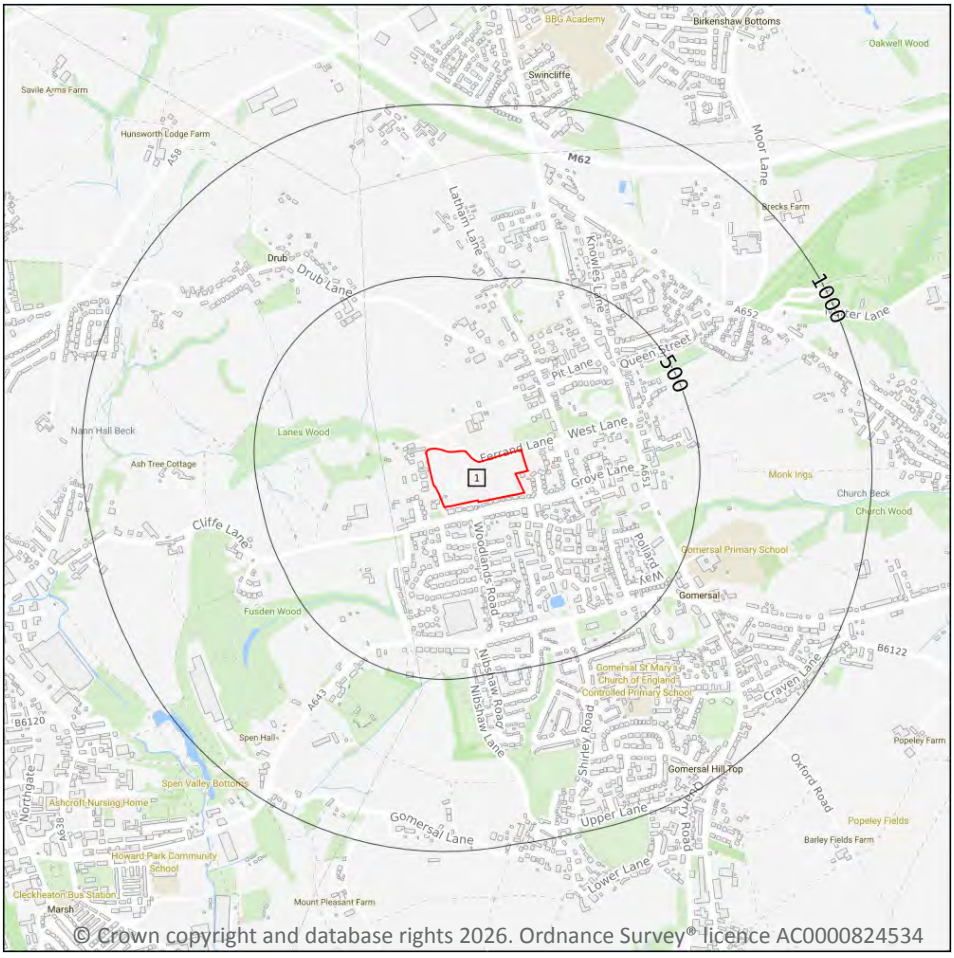
Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 83 >**

ID	Location	Category	Description
4	**On site**	**ROCK**	**Coal seam, inferred**

ID	Location	Category	Description
7	99m NW	ROCK	Coal seam, inferred
11	156m W	ROCK	Coal seam, inferred
15	237m W	ROCK	Coal seam, inferred
16	243m NW	ROCK	Coal seam, inferred
17	258m W	FAULT	Fault, inferred, displacement unknown
21	280m W	ROCK	Coal seam, inferred
23	313m W	ROCK	Coal seam, inferred
26	331m S	FAULT	Fault, inferred, displacement unknown
28	337m W	ROCK	Coal seam, inferred
31	357m SW	FAULT	Fault, inferred, displacement unknown
33	365m SW	ROCK	Coal seam, inferred
38	382m S	FAULT	Fault, inferred, displacement unknown
39	382m S	ROCK	Coal seam, inferred
45	414m NW	ROCK	Coal seam, inferred
46	427m NW	ROCK	Coal seam, inferred
48	429m S	ROCK	Coal seam, inferred
52	443m SW	FAULT	Fault, inferred, displacement unknown
58	472m NE	ROCK	Coal seam, inferred

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

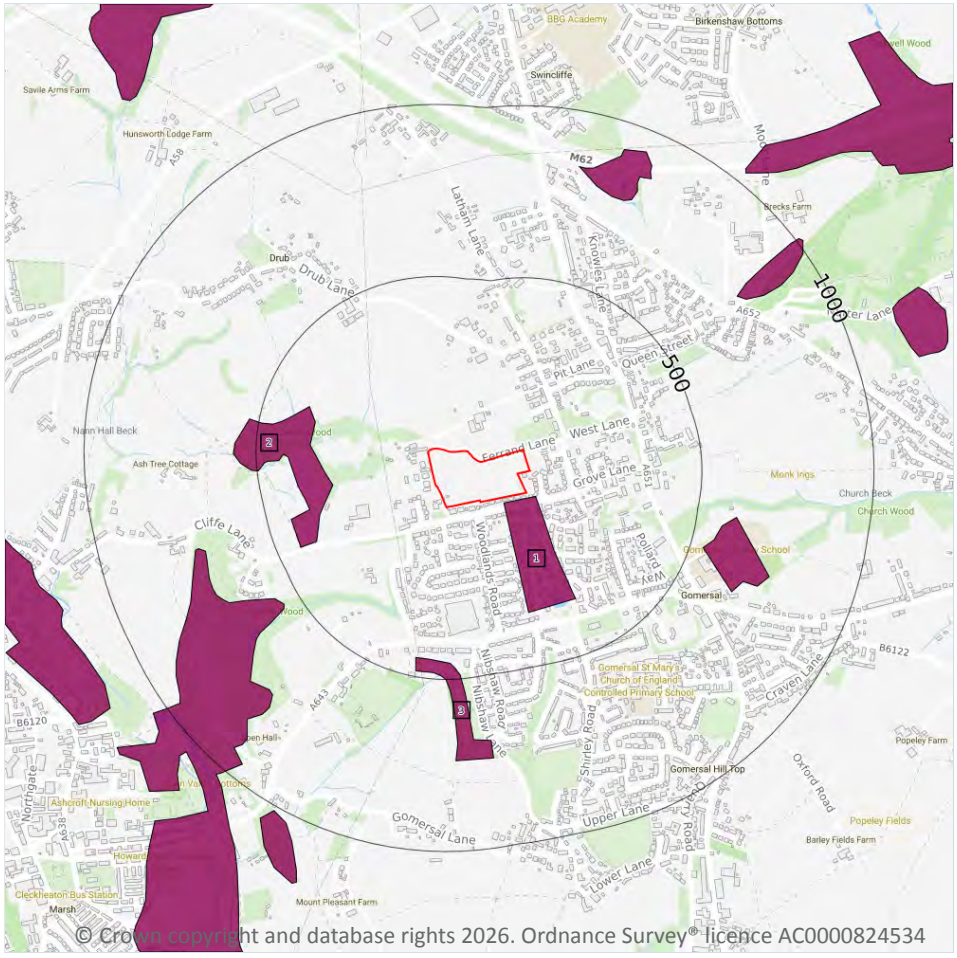
An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 87 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**Full**	**EW077_huddersfield_v4**

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground



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Site Outline

Search buffers in metres (m)

- Made ground
- Worked ground
- Infilled ground
- Disturbed ground
- Landscaped ground

15.2 Artificial and made ground (50k)

Records within 500m	3

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on **page 88 >**

ID	Location	LEX Code	Description	Rock description
1	16m S	MGR-ARTDP	Made Ground	Artificial deposit
2	290m W	MGR-ARTDP	Made Ground	Artificial deposit
3	444m S	MGR-ARTDP	Made Ground	Artificial deposit

This data is sourced from the British Geological Survey.

15.3 Artificial ground permeability (50k)

Records within 50m	**1**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
16m S	Mixed	Very High	Low

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial

15.4 Superficial geology (50k)

Records within 500m	0

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

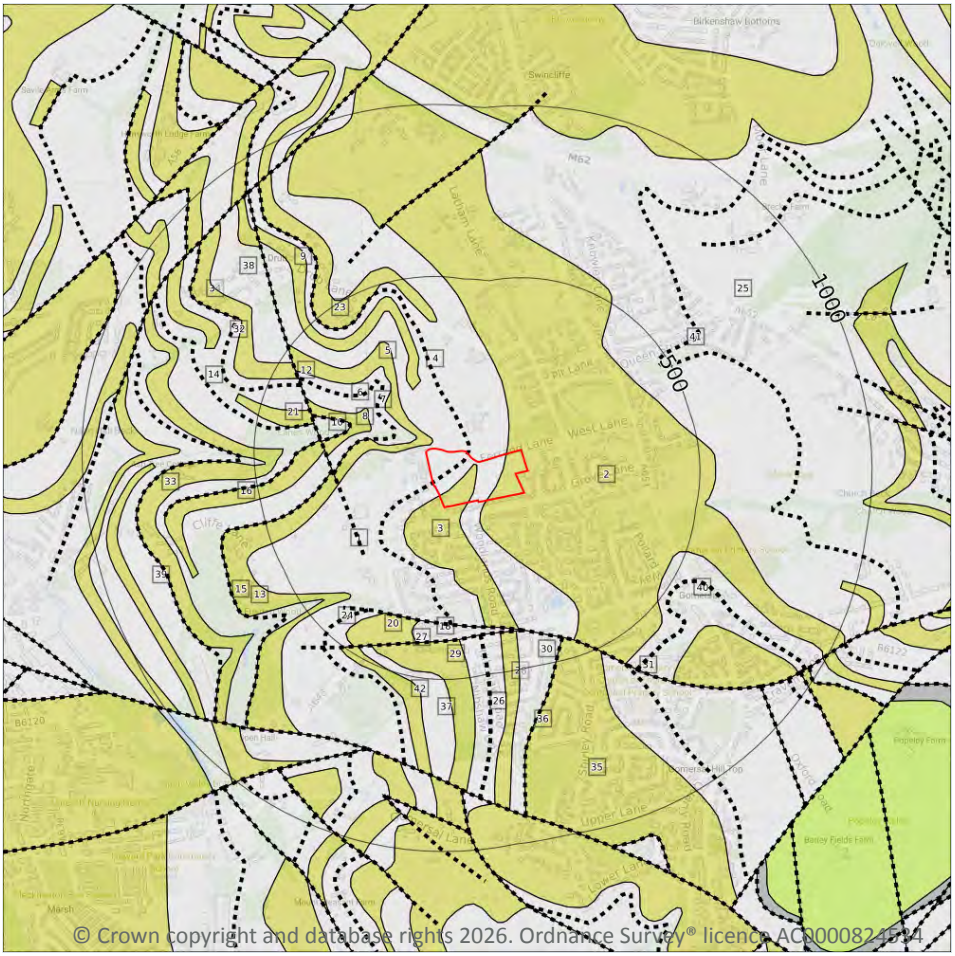
15.7 Landslip permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m **28**

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 91 >**

ID	Location	LEX Code	Description	Rock age
1	On site	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
2	On site	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
3	On site	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian

ID	Location	LEX Code	Description	Rock age
5	12m N	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
6	47m NW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
8	173m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
9	180m N	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
10	234m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
13	270m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
14	278m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
16	295m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
18	335m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
20	336m S	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
21	337m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
23	368m N	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
25	376m NE	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
26	384m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
28	384m S	BRSR-SDST	Birstall Rock-Sandstone	Westphalian
29	386m S	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian
30	389m S	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
33	416m W	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
34	427m NW	PLCM-SDST	Pennine Lower Coal Measures Formation-Sandstone	Westphalian
35	434m S	ER-SDST	Emley Rock-Sandstone	Westphalian
37	454m SW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
38	467m NW	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
39	469m W	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian

ID	Location	LEX Code	Description	Rock age
40	470m SE	PLCM-MDSS	Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone	Westphalian
42	476m SW	LPE-SDST	Lepton Edge Rock-Sandstone	Westphalian

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	**5**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**Moderate**	**Low**
On site	**Fracture**	**High**	**Moderate**
On site	**Fracture**	**High**	**Moderate**
12m N	Fracture	High	Moderate
47m NW	Fracture	Moderate	Low

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	**16**

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 91 >**

ID	Location	Category	Description
4	**On site**	**ROCK**	**Coal seam, inferred**
7	104m NW	ROCK	Coal seam, inferred
11	234m W	ROCK	Coal seam, inferred
12	259m W	FAULT	Fault, inferred, crossmark on downthrow side, throw in metres
15	278m W	ROCK	Coal seam, inferred

ID	Location	Category	Description
17	309m W	ROCK	Coal seam, inferred
19	335m S	FAULT	Fault, inferred, crossmark on downthrow side, throw in metres
22	337m W	ROCK	Coal seam, inferred
24	372m SW	ROCK	Coal seam, inferred
27	384m S	FAULT	Fault, inferred, displacement unknown
A	384m S	ROCK	Coal seam, inferred
A	384m S	ROCK	Coal seam, inferred
31	391m S	FAULT	Fault, inferred, crossmark on downthrow side, throw in metres
32	412m NW	ROCK	Coal seam, inferred
36	434m S	ROCK	Coal seam, inferred
41	474m NE	ROCK	Coal seam, inferred

This data is sourced from the British Geological Survey.

16 Boreholes



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Site Outline

Search buffers in metres (m)

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+
- Unknown

16.1 BGS Boreholes

Records within 250m	61

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on **page 95 >**

ID	Location	Grid reference	Name	Length	Confidential	Web link
A	47m S	420436 426249	GOMERSALL MILLS GOMERSAL TP7	1.3	N	20574704 ↗
A	48m S	420445 426250	GOMERSALL MILLS GOMERSAL TP8	0.6	N	20574705 ↗

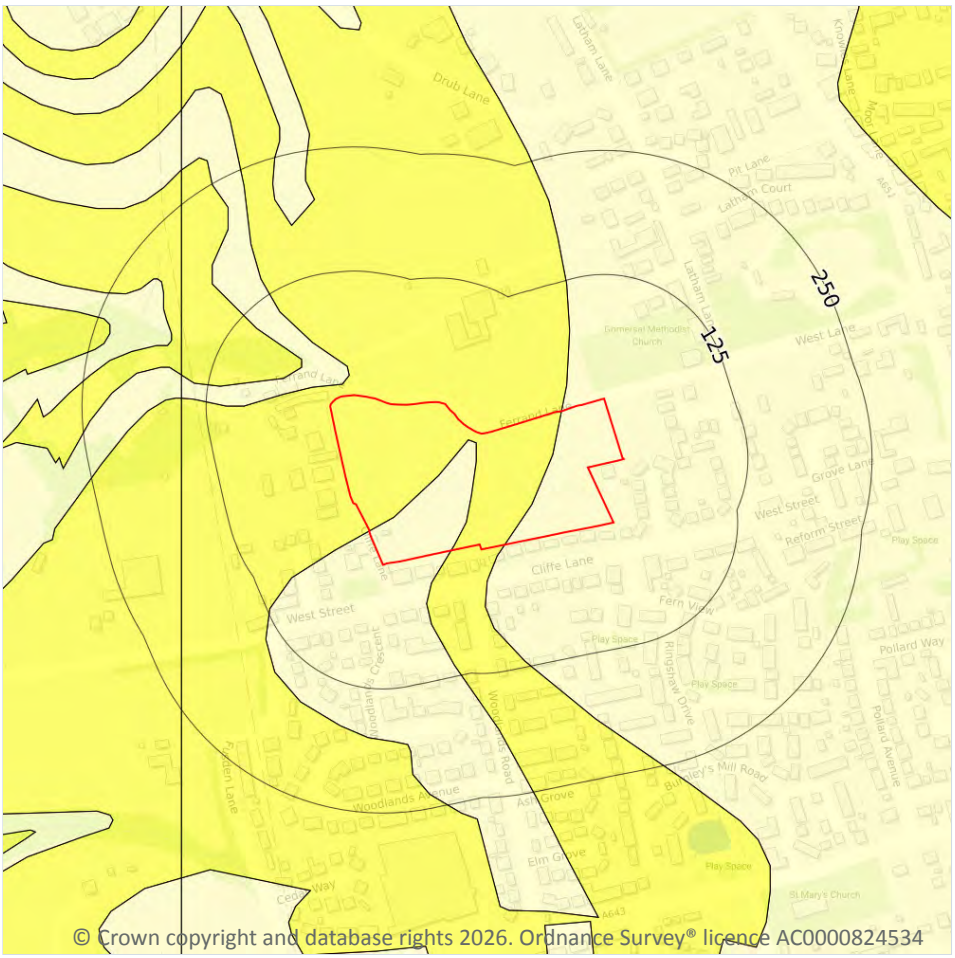
ID	Location	Grid reference	Name	Length	Confidential	Web link
1	54m S	420380 426230	GOMERSAL MILLS GOMERSAL TP 003	-	Y	N/A
A	54m S	420430 426240	GOMERSAL MILLS GOMERSAL WS 020	-	Y	N/A
A	55m S	420436 426241	GOMERSALL MILLS GOMERSAL TP3	2.0	N	20574696 ↗
2	61m E	420490 426420	BURNLEY & SONS, GOMERSAL MILLS	176.48	N	58850 ↗
B	75m SE	420504 426266	GOMERSALL MILLS GOMERSAL TP5	2.8	N	20574702 ↗
B	78m SE	420507 426266	GOMERSALL MILLS GOMERSAL TP4	2.0	N	20574701 ↗
3	80m S	420450 426218	MESSRS BURNLEY & SONS GOMERSAL YORKS	176.17	N	58224 ↗
4	100m SE	420500 426220	GOMERSAL MILLS GOMERSAL WS 001	-	Y	N/A
C	107m S	420400 426180	GOMERSAL MILLS GOMERSAL TP 002	-	Y	N/A
C	110m S	420404 426178	GOMERSALL MILLS GOMERSAL TP2	-	Y	N/A
5	115m SE	420482 426192	GOMERSALL MILLS GOMERSAL TP6	1.8	N	20574703 ↗
D	116m SE	420530 426230	GOMERSAL MILLS GOMERSAL TP 004	-	Y	N/A
C	117m S	420400 426170	GOMERSAL MILLS GOMERSAL A	-	Y	N/A
D	130m SE	420540 426220	GOMERSALL MILLS GOMERSAL WS14	-	Y	N/A
D	130m SE	420540 426220	GOMERSAL MILLS GOMERSAL C	-	Y	N/A
D	133m SE	420550 426230	GOMERSALL MILLS GOMERSAL WS13A	-	Y	N/A
D	136m SE	420540 426210	GOMERSAL MILLS GOMERSAL TP 006	-	Y	N/A
C	137m S	420400 426150	GOMERSAL MILLS GOMERSAL TP 001	-	Y	N/A
D	155m SE	420570 426220	GOMERSALL MILLS GOMERSAL WS16	-	Y	N/A
D	155m SE	420540 426182	WELL AT GOMERSAL MILLS	182.88	N	58225 ↗
D	160m SE	420570 426210	CLIFFE LN GOMERSAL YKS BH1	3.0	N	58577 ↗
E	161m S	420470 426140	GOMERSALL MILLS GOMERSAL WS19	-	Y	N/A
E	163m S	420480 426140	BURNLEY & SONS, GOMERSAL MILLS	182.88	N	58851 ↗
D	164m SE	420550 426180	CLIFFE LN GOMERSAL YKS BH2	2.0	N	58578 ↗
6	164m S	420440 426130	GOMERSAL MILLS GOMERSAL TP 010	-	Y	N/A
D	164m SE	420560 426190	GOMERSALL MILLS GOMERSAL WS25	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
E	170m S	420470 426130	GOMERSAL MILLS GOMERSAL TP 009	-	Y	N/A
E	173m S	420480 426130	GOMERSALL MILLS GOMERSAL WS20	-	Y	N/A
D	177m SE	420590 426210	GOMERSALL MILLS GOMERSAL WS26	-	Y	N/A
D	186m SE	420600 426210	CLIFFE LN GOMERSAL YKS BH3	3.0	N	58579 ↗
F	186m SE	420550 426150	GOMERSAL MILLS GOMERSAL WS 002	-	Y	N/A
G	187m E	420630 426330	GROVE LANE GOMERSAL TP4	-	Y	N/A
D	191m SE	420610 426220	GOMERSAL MILLS GOMERSAL B	-	Y	N/A
F	193m SE	420560 426150	GOMERSALL MILLS GOMERSAL WS24	-	Y	N/A
D	196m SE	420600 426190	GOMERSALL MILLS GOMERSAL WS27	-	Y	N/A
G	197m E	420640 426330	GROVE LANE GOMERSAL TRENCH 2	-	Y	N/A
H	197m S	420460 426100	GOMERSAL MILLS GOMERSAL TP 013	-	Y	N/A
H	200m S	420470 426100	GOMERSAL MILLS GOMERSAL WS 004	-	Y	N/A
D	200m SE	420590 426170	GOMERSALL MILLS GOMERSAL WS22	-	Y	N/A
G	206m E	420650 426340	GROVE LANE GOMERSAL TP5	-	Y	N/A
D	207m SE	420590 426160	GOMERSALL MILLS GOMERSAL WS23	-	Y	N/A
G	208m E	420650 426320	GROVE LANE GOMERSAL TP9	-	Y	N/A
G	211m E	420650 426310	GROVE LANE GOMERSAL TP11	-	Y	N/A
G	211m E	420650 426310	GROVE LANE GOMERSAL TP13	-	Y	N/A
G	211m E	420650 426310	GROVE LANE GOMERSAL TP15	-	Y	N/A
7	214m SE	420540 426110	GOMERSAL MILLS GOMERSAL WS 003	-	Y	N/A
G	215m E	420660 426340	GROVE LANE GOMERSAL TP6	-	Y	N/A
G	217m E	420660 426330	GROVE LANE GOMERSAL TP7	-	Y	N/A
G	217m E	420660 426330	GROVE LANE GOMERSAL TP8	-	Y	N/A
8	217m SE	420630 426200	GOMERSAL MILLS GOMERSAL TP 008	-	Y	N/A
G	218m E	420660 426320	GROVE LANE GOMERSAL TP10	-	Y	N/A
D	220m SE	420590 426140	GOMERSAL MILLS GOMERSAL WS 019	-	Y	N/A
G	220m E	420660 426310	GROVE LANE GOMERSAL TP12	-	Y	N/A
G	220m E	420660 426310	GROVE LANE GOMERSAL TP14	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
I	224m S	420490 426080	GOMERSALL MILLS GOMERSAL WS17	-	Y	N/A
I	226m S	420500 426080	GOMERSAL MILLS GOMERSAL WS 005	-	Y	N/A
9	231m S	420430 426060	GOMERSAL MILLS GOMERSAL TP 012	-	Y	N/A
I	233m S	420490 426070	GOMERSAL MILLS GOMERSAL D	-	Y	N/A
10	247m SE	420570 426090	GOMERSAL MILLS GOMERSAL WS 021	-	Y	N/A

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.1 Shrink swell clays

Records within 50m	4

The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

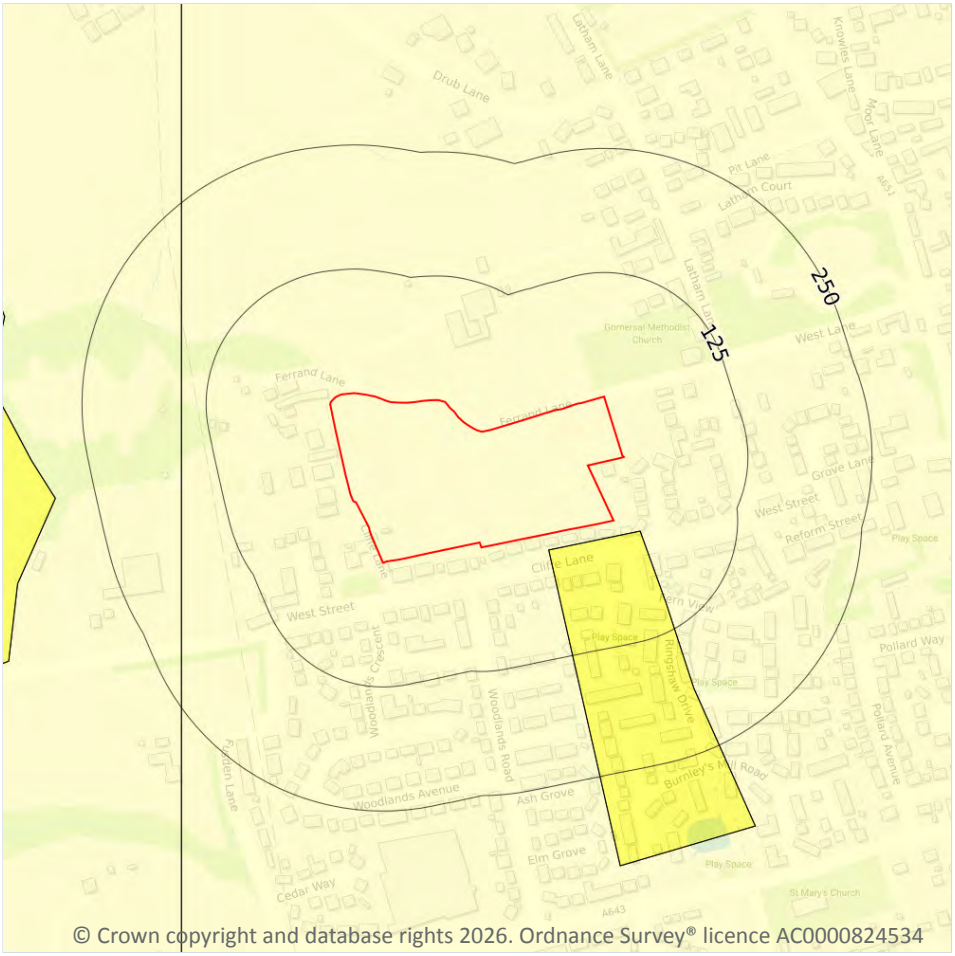
Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 99 >**

Location	Hazard rating	Details
On site	**Negligible**	**Ground conditions predominantly non-plastic.**
On site	**Very low**	**Ground conditions predominantly low plasticity.**
12m N	Negligible	Ground conditions predominantly non-plastic.

Location	Hazard rating	Details
47m NW	Very low	Ground conditions predominantly low plasticity.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.2 Running sands

Records within 50m	2

The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

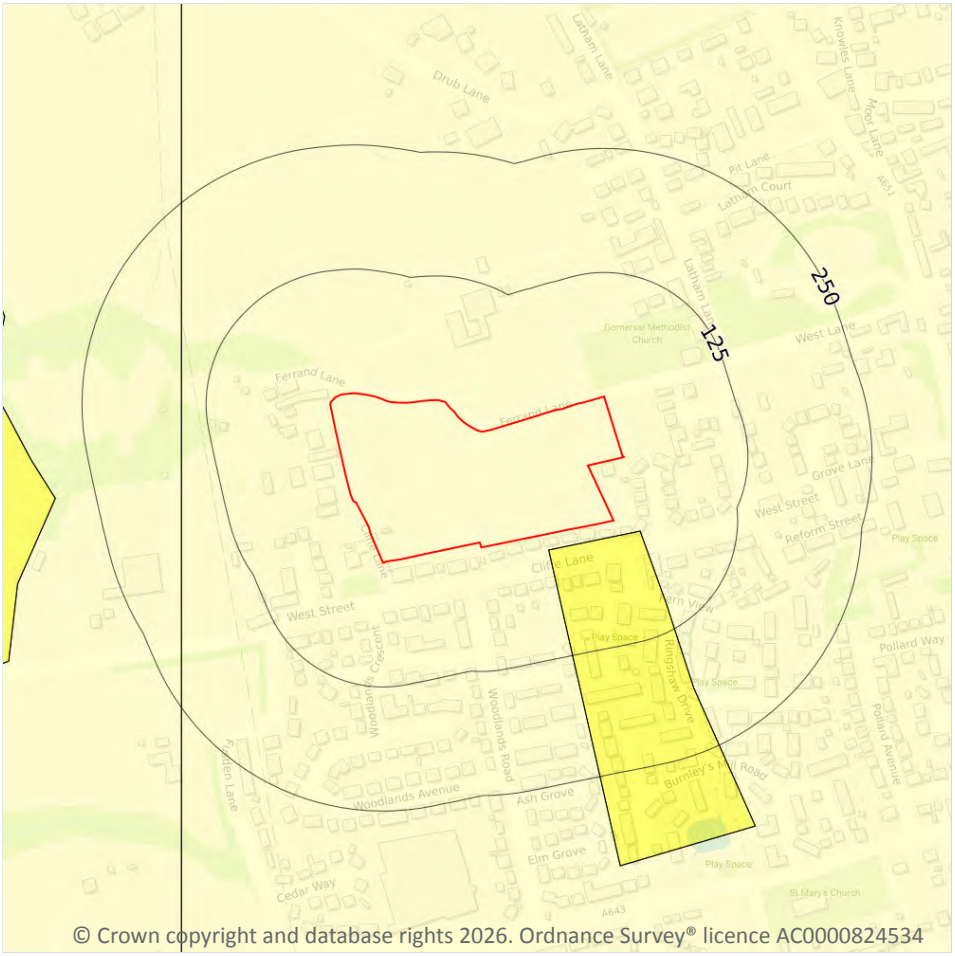
Features are displayed on the Natural ground subsidence - Running sands map on **page 101 >**

Location	Hazard rating	Details
On site	**Negligible**	**Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.**

Location	Hazard rating	Details
16m S	Very low	Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.3 Compressible deposits

Records within 50m	2

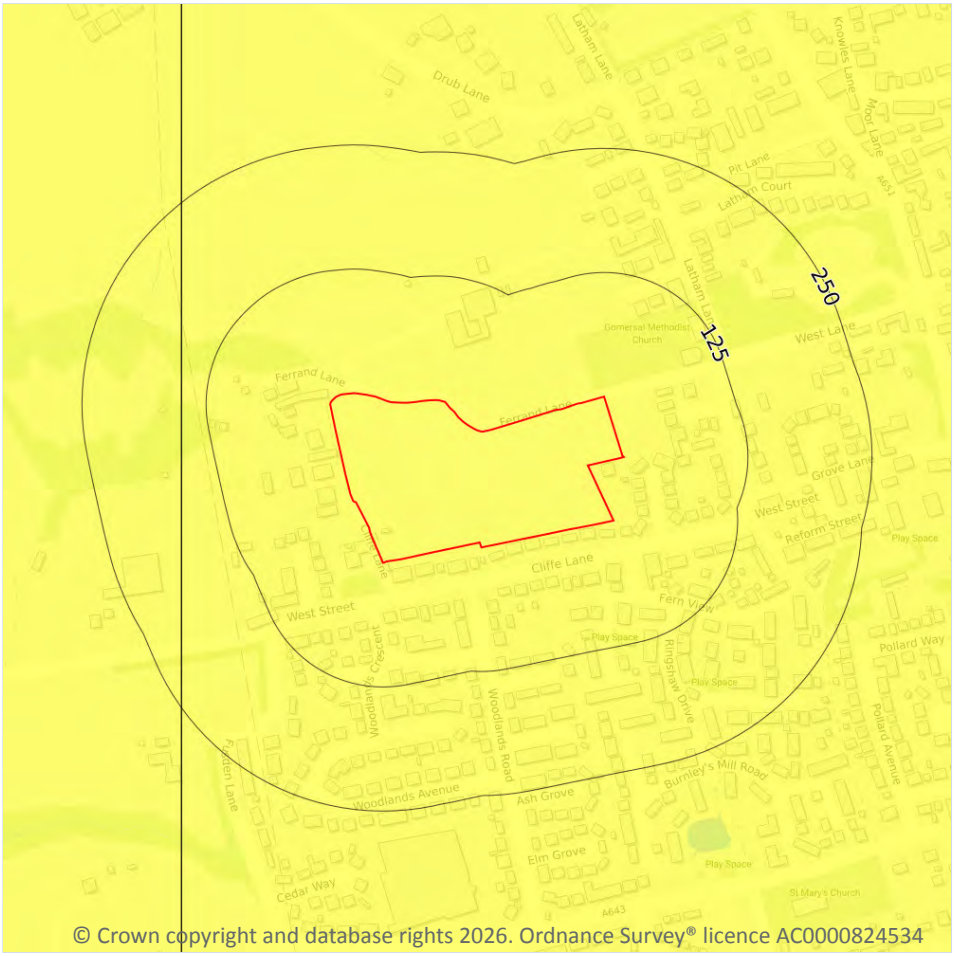
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 103 >**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**
16m S	Very low	Compressibility and uneven settlement problems are not likely to be significant on the site for most land uses.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.4 Collapsible deposits

Records within 50m	1

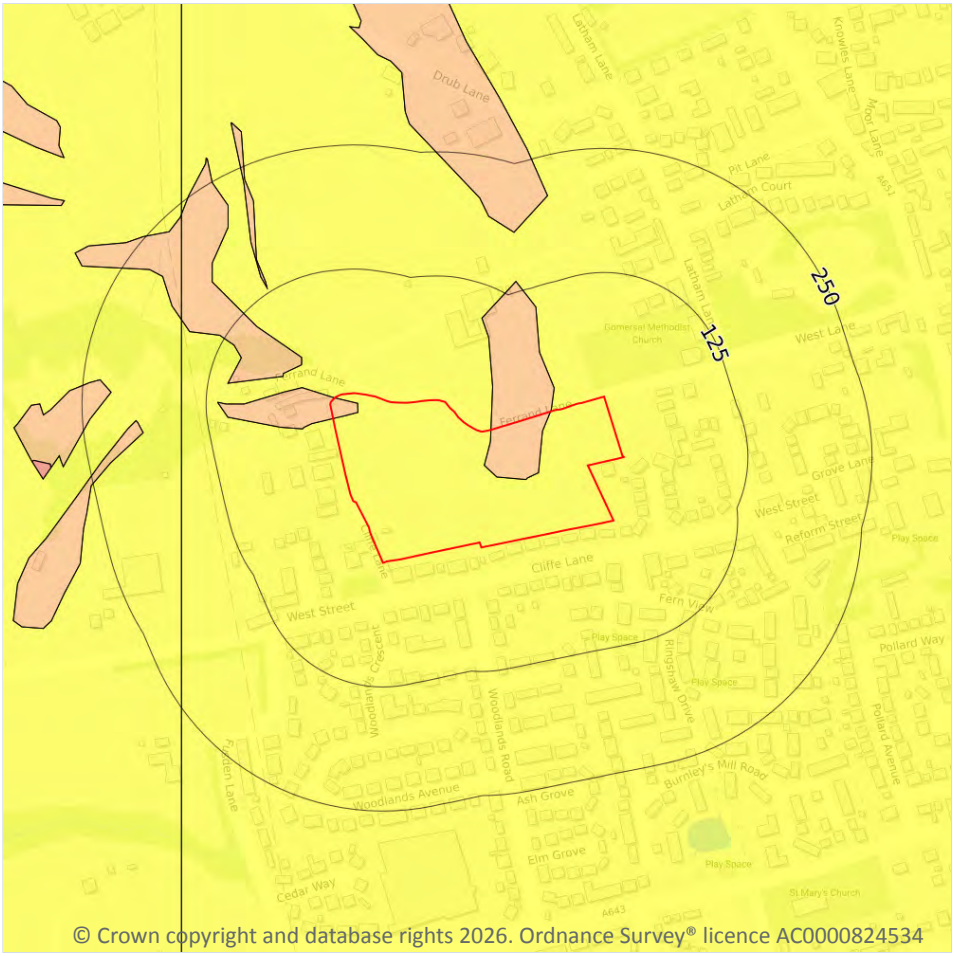
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 105 >**

Location	Hazard rating	Details
On site	**Very low**	**Deposits with potential to collapse when loaded and saturated are unlikely to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.5 Landslides

Records within 50m	3

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

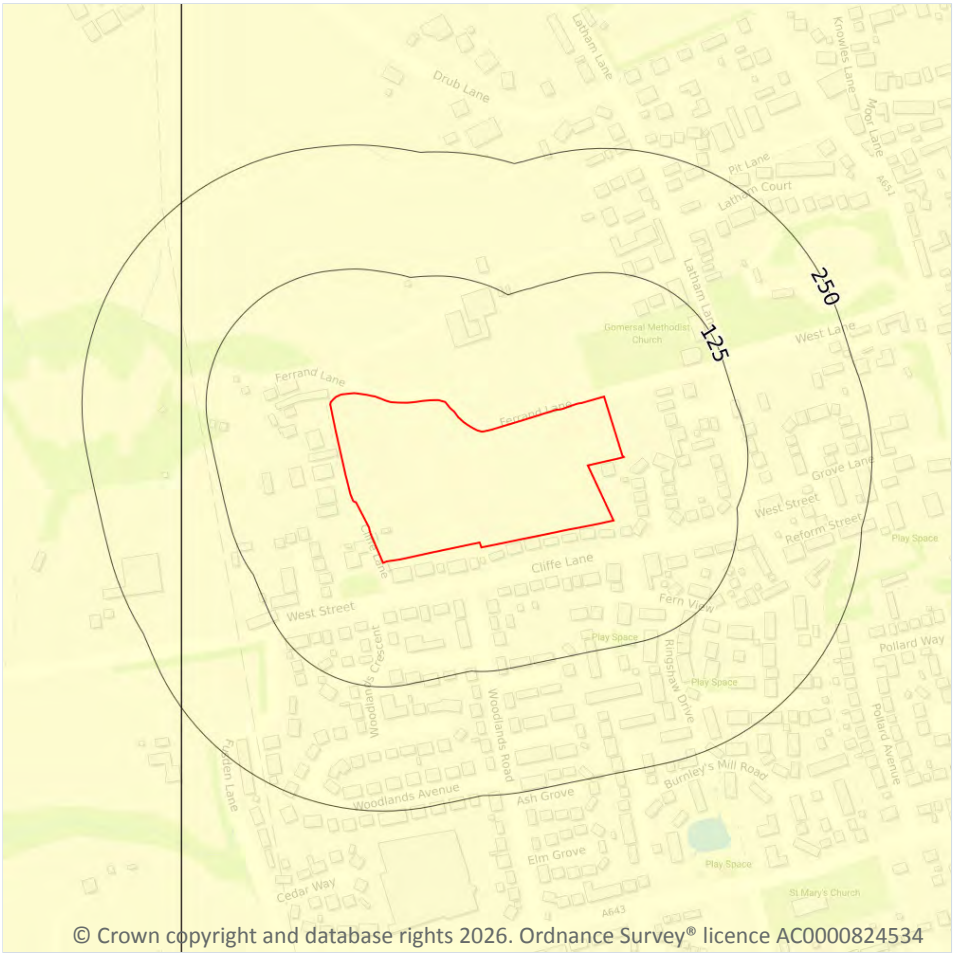
Features are displayed on the Natural ground subsidence - Landslides map on **page 106 >**

Location	Hazard rating	Details
On site	**Very low**	**Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.**

Location	Hazard rating	Details
On site	**Low**	**Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.**
47m NW	Low	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.6 Ground dissolution of soluble rocks

Records within 50m	1

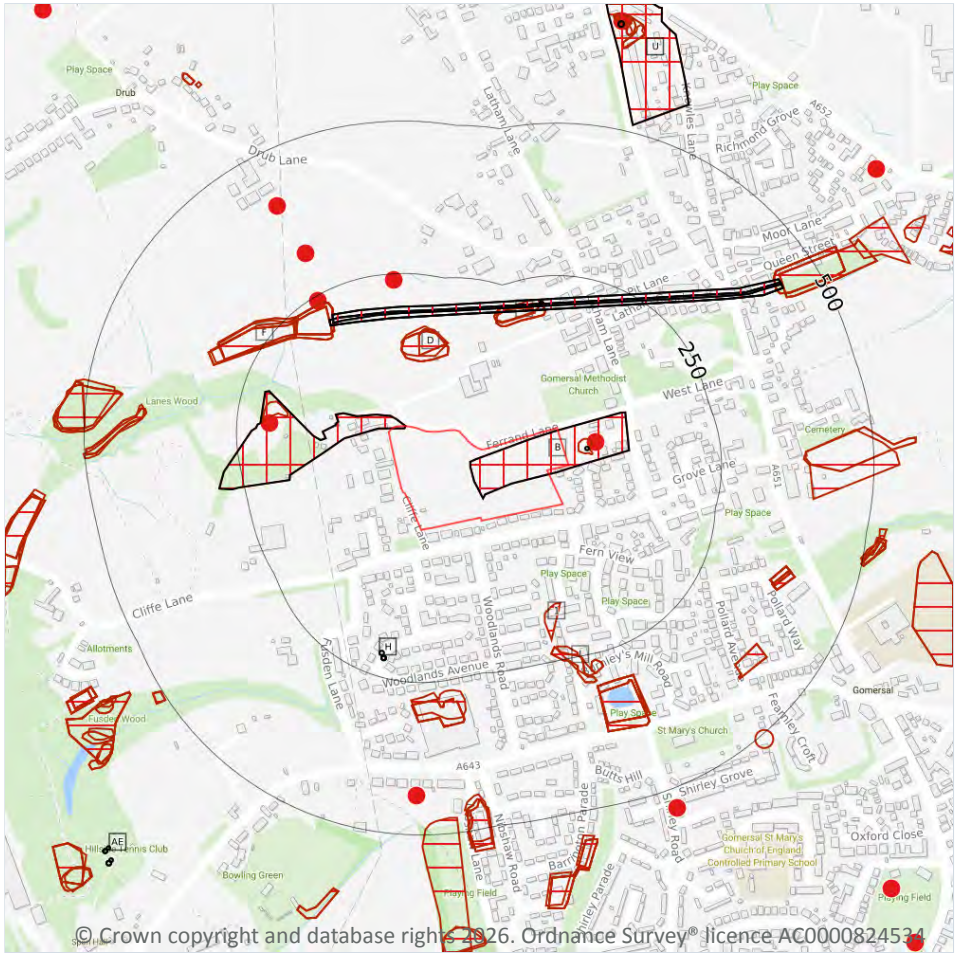
The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 108 >**

Location	Hazard rating	Details
On site	**Negligible**	**Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.**

This data is sourced from the British Geological Survey.

18 Mining and ground workings



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18.1 BritPits

Records within 500m	7

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

Features are displayed on the Mining and ground workings map on **page 110 >**

ID	Location	Details	Description
C	54m E	Name: West Lane Address: Gomersal, CLECKHEATON, West Yorkshire Commodity: Coal, Deep Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.
A	196m W	Name: Lanes Wood Address: Gomersal, CLECKHEATON, West Yorkshire Commodity: Coal, Deep Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.
2	240m N	Name: Latham Hill Address: Gomersal, CLECKHEATON, West Yorkshire Commodity: Coal, Deep Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.
G	243m NW	Name: Owlet Hall Address: Drub, CLECKHEATON, West Yorkshire Commodity: Coal, Deep Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.

ID	Location	Details	Description
3	321m NW	Name: Primrose Hill Address: Drub, CLECKHEATON, West Yorkshire Commodity: Coal, Deep Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.
4	411m NW	Name: Drub Address: Drub, CLECKHEATON, West Yorkshire Commodity: Coal, Deep Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.
5	435m S	Name: Upper Spen Quarry Address: Gomersal, CLECKHEATON, West Yorkshire Commodity: Sandstone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Delf, Delph, Gravel Pit, Sand Pit, Sand and Gravel Pit, Clay Pit, Pit, Opencast Coal Site or Surface Mine. It may be mapped as Worked Ground or Worked and Made Ground on BGS mapping. Status description: Site which has ceased to extract minerals. May be considered as 'Closed' by operator. May be considered to have 'Active', 'Dormant' or 'Expired' planning permissions by the Mineral Planning Authority.

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m **33**

Historical land uses identified from Ordnance Survey® mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on **page 110 >**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Colliery**	**1892**	**1:10560**
B	**On site**	**Colliery**	**1892**	**1:10560**

ID	Location	Land Use	Year of mapping	Mapping scale
C	23m E	Unspecified Heap	1892	1:10560
D	108m N	Unspecified Heaps	1948	1:10560
D	108m N	Unspecified Heaps	1938	1:10560
D	108m N	Unspecified Heaps	1905	1:10560
D	117m N	Unspecified Heap	1955	1:10560
D	118m N	Unspecified Heap	1974	1:10000
D	118m N	Unspecified Heap	1985	1:10000
1	157m S	Unspecified Heap	1955	1:10560
A	168m W	Refuse Heap	1892	1:10560
F	178m NW	Cuttings	1948	1:10560
F	178m NW	Cuttings	1938	1:10560
F	178m NW	Cuttings	1905	1:10560
E	183m N	Unspecified Heap	1948	1:10560
E	183m N	Unspecified Heap	1938	1:10560
E	183m N	Unspecified Heap	1905	1:10560
G	185m NW	Cuttings	1994	1:10000
G	185m NW	Cuttings	1974	1:10000
G	185m NW	Cuttings	1985	1:10000
G	185m NW	Cuttings	1966	1:10560
G	185m NW	Cuttings	1955	1:10560
E	190m N	Unspecified Heap	1974	1:10000
E	190m N	Unspecified Heap	1985	1:10000
E	191m N	Unspecified Heap	1966	1:10560
E	191m N	Unspecified Heap	1955	1:10560
F	219m NW	Cuttings	1955	1:10560
F	219m NW	Cuttings	1967	1:10560
F	220m NW	Cuttings	1983	1:10000
F	220m NW	Cuttings	1974	1:10000

ID	Location	Land Use	Year of mapping	Mapping scale
I	227m S	Refuse Heap	1955	1:10560
I	227m S	Unspecified Ground Workings	1948	1:10560
I	227m S	Unspecified Ground Workings	1938	1:10560

This is data is sourced from Ordnance Survey®/Groundsure.

18.3 Underground workings

Records within 1000m	**36**

Historical land uses identified from Ordnance Survey® mapping that indicate the presence of underground workings e.g. mine shafts.

Features are displayed on the Mining and ground workings map on **page 110 >**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Colliery**	**1892**	**1:10560**
B	**On site**	**Colliery**	**1892**	**1:10560**
C	34m E	Unspecified Old Shaft	1905	1:10560
E	178m N	Tunnel	1948	1:10560
E	178m N	Tunnel	1938	1:10560
E	178m N	Tunnel	1905	1:10560
E	185m N	Tunnel	1966	1:10560
E	185m N	Tunnel	1955	1:10560
E	203m N	Air Shaft	1966	1:10560
E	203m N	Air Shaft	1955	1:10560
H	208m S	Unspecified Old Shaft	1955	1:10560
H	215m S	Unspecified Old Shaft	1948	1:10560
H	215m S	Unspecified Old Shaft	1938	1:10560
H	215m S	Unspecified Old Shaft	1905	1:10560
U	512m N	Colliery	1892	1:10560
U	666m N	Unspecified Old Shaft	1948	1:10560
U	666m N	Unspecified Old Shaft	1938	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
AE	729m SW	Unspecified Old Shafts	1955	1:10560
-	735m N	Colliery	1966	1:10560
-	735m N	Colliery	1955	1:10560
AE	735m SW	Unspecified Old Shafts	1948	1:10560
AE	735m SW	Unspecified Old Shafts	1938	1:10560
-	739m S	Colliery	1892	1:10560
AE	740m SW	Unspecified Old Shafts	1955	1:10560
AE	745m SW	Unspecified Old Shafts	1948	1:10560
AE	745m SW	Unspecified Old Shafts	1938	1:10560
-	772m N	Colliery	1948	1:10560
-	772m N	Colliery	1938	1:10560
-	796m NE	Colliery	1948	1:10560
-	796m NE	Colliery	1938	1:10560
-	798m NE	Colliery	1955	1:10560
-	805m NE	Colliery	1966	1:10560
-	938m N	Disused Colliery	1938	1:10560
-	938m N	Disused Colliery	1905	1:10560
-	971m NE	Unspecified Shafts	1948	1:10560
-	971m NE	Unspecified Shafts	1938	1:10560

This is data is sourced from Ordnance Survey®/Groundsure.

18.4 Underground mining extents

Records within 500m	0

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

This data is sourced from Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	9

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

Features are displayed on the Mining and ground workings map on **page 110 >**

ID	Location	Name	Commodity	Class	Likelihood
-	715m W	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	738m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	740m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	778m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	788m W	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.

ID	Location	Name	Commodity	Class	Likelihood
-	864m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	873m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	875m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
-	887m S	Leeds/Bradford area	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.

This data is sourced from the British Geological Survey.

18.7 JPB mining areas

Records on site	0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.8 The Coal Authority non-coal mining

Records within 500m	0

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure prior to any re-use.

This data is sourced from The Coal Authority.

18.9 Researched mining

Records within 500m	0

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas of risk have been captured.

This data is sourced from Groundsure.

18.10 Mining record office plans

Records within 500m	0

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.11 BGS mine plans

Records within 500m	0

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.12 Coal mining

Records on site	1

Areas which could be affected by past, current or future coal mining.

Location	Details
On site	**The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.**

This data is sourced from the Coal Authority.

18.13 Brine areas

Records on site	0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.14 Gypsum areas

Records on site	0

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.15 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

18.16 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m	0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m	0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m	0

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

This data is sourced from Groundsure.

19.4 Historical incidents

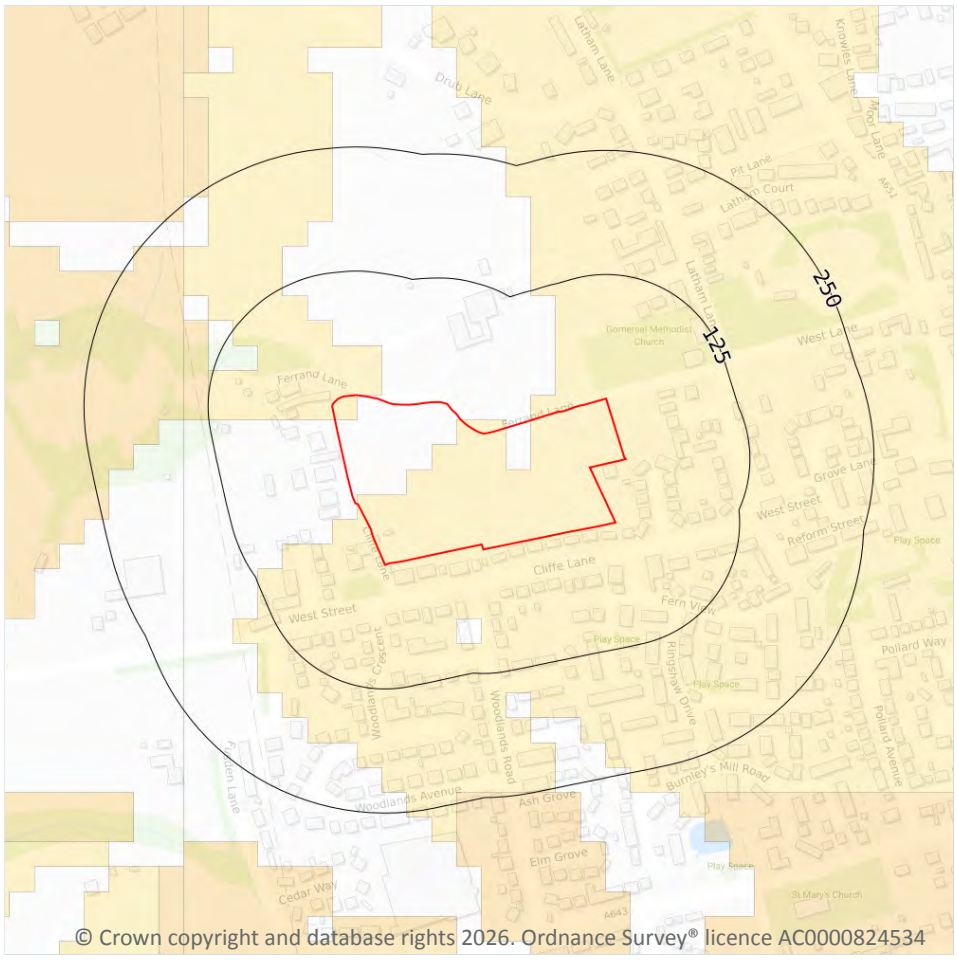
Records within 500m	0

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey® maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey® mapping will necessarily be present within this dataset.

This data is sourced from Groundsure.

20 Radon



Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

20.1 Radon

Records on site	2

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on **page 122 >**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 1% and 3%**	**None**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Less than 1%**	**None**

This data is sourced from the British Geological Survey and UK Health Security Agency.

21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m	5

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km^2. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km^2; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**35 - 45 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**90 - 120 mg/kg**	**15 - 30 mg/kg**
On site	**35 - 45 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**35 - 45 mg/kg**	**No data**	**100 - 200 mg/kg**	**60 - 120 mg/kg**	**1.8 mg/kg**	**90 - 120 mg/kg**	**15 - 30 mg/kg**
12m N	35 - 45 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg
47m NW	35 - 45 mg/kg	No data	100 - 200 mg/kg	60 - 120 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m	0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km^2).

This data is sourced from the British Geological Survey.

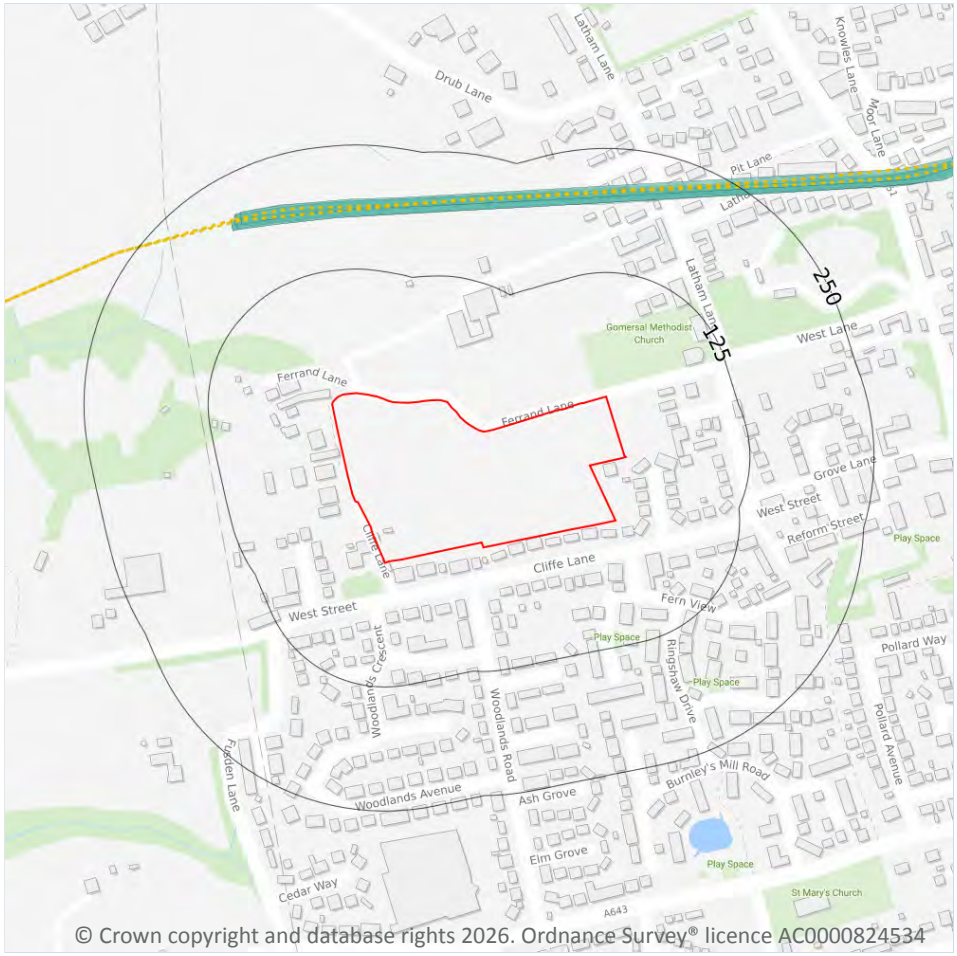
21.3 BGS Measured Urban Soil Chemistry

Records within 50m	0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km^2.

This data is sourced from the British Geological Survey.

22 Railway infrastructure and projects



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Site Outline

Search buffers in metres (m)

- Crossrail 2 Stations
- Crossrail 2 Route
- Crossrail 2 Worksites
- Crossrail 2 Safeguarding
- Crossrail 2 Headhouses
- Railway stations
- Active railways
- Active tunnels
- Abandoned railways
- Historic railways
- Historic tunnels
- Underground stations
- Underground Lines
- Royal Mail tunnels
- HS2 optimised route
- HS2 Stations
- HS2 Depots
- HS2 Surface Safeguarding
- HS2 Subsurface Safeguarding

22.1 Underground railways (London)

Records within 250m	0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

22.2 Underground railways (Non-London)

Records within 250m	0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

22.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey® mapping.

This data is sourced from the Ordnance Survey®.

22.4 Historical railway and tunnel features

Records within 250m	19

Railways and tunnels digitised from historical Ordnance Survey® mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

Features are displayed on the Railway infrastructure and projects map on **page 126 >**

Location	Land Use	Year of mapping	Mapping scale
178m N	Tunnel	1905	10560
178m N	Tunnel	1938	10560
178m N	Tunnel	1948	10560
178m N	Tunnel	1938	2500
179m N	Tunnel	1908	2500
179m N	Tunnel	1922	2500
180m N	Tunnel	1907	2500
180m N	Tunnel	1922	2500
180m N	Tunnel	1933	2500
180m N	Tunnel	1938	2500
181m N	Tunnel	1948	10560
184m N	Disused Tunnel	1990	1250
185m N	Tunnel	1955	10560
185m N	Tunnel	1966	10560
186m N	Tunnel	1956	1250
186m N	Tunnel	1957	2500
216m N	Tunnel	1956	1250

Location	Land Use	Year of mapping	Mapping scale
217m N	Disused Tunnel	1996	1250
217m N	Disused Tunnel	1997	1250

This data is sourced from Ordnance Survey®/Groundsure.

22.5 Royal Mail tunnels

Records within 250m	0

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

This data is sourced from Groundsure/the Postal Museum.

22.6 Historical railways

Records within 250m	4

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

Features are displayed on the Railway infrastructure and projects map on **page 126 >**

Location	Description
184m N	Historical OSM
188m N	Abandoned
203m NW	Historical OSM
206m NW	Abandoned

This data is sourced from OpenStreetMap.

22.7 Railways

Records within 250m	0

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

This data is sourced from Ordnance Survey® and OpenStreetMap.

22.8 Crossrail 2

Records within 500m	0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

22.9 HS2

Records within 500m	0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 ltd.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference ↗.

Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: www.groundsure.com/terms-and-conditions-april-2023/ ↗.

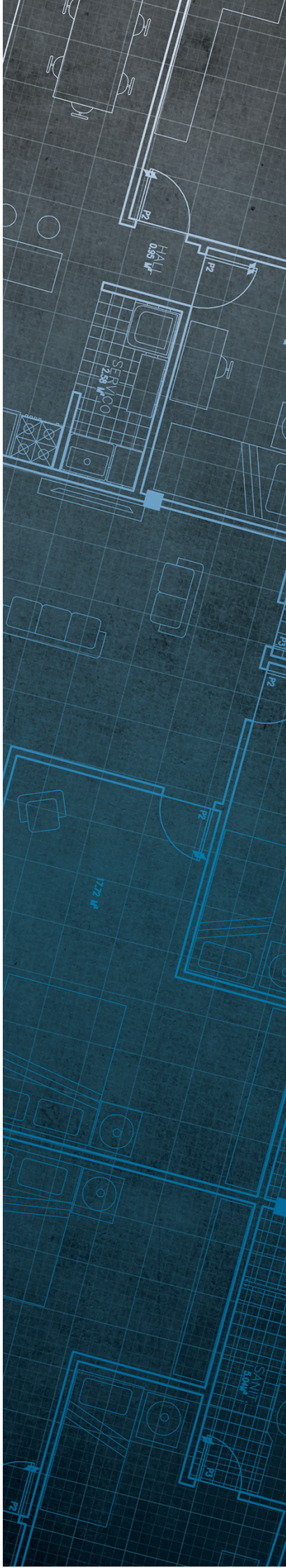
The Coal Authority

Consultants

Coal Mining Report

225 Cliffe Lane
Gomersal
Cleckheaton
Kirklees
BD19 4SB

Date of enquiry:	**29 January 2026**
Date enquiry received:	**29 January 2026**
Issue date:	**29 January 2026**
Our reference:	**51003550070001**
Your reference:	**PO25887 / 5685 / EW**



Consultants
Coal Mining Report

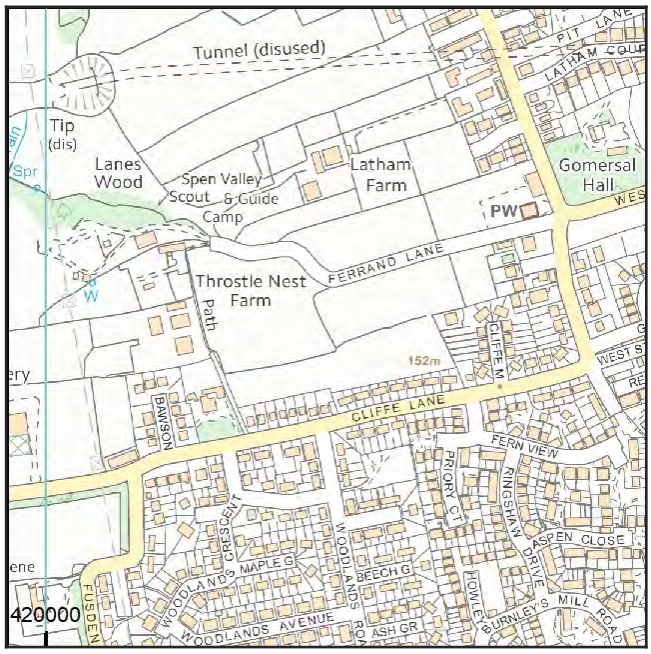
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

LITHOS CONSULTING

Enquiry address

225 Cliffe Lane
Gomersal
Cleckheaton
Kirklees
BD19 4SB



Approximate position of property

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Mansfield
Nottinghamshire
NG18 4RG

reports@miningremediation.gov.uk

Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	SILKSTONE	Coal	6Z1Q	73	Beneath Property	0.7	South-East	86	1899
unnamed	WHINMOOR	Coal	6Z1S	121	Beneath Property	0.8	South-East	71	1957

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	420426-003	420476 426391	was searched for by drilling in 1983 but was not found. We have no record of what steps if any have been taken to treat this shaft.	Coal	
Shaft	420426-004	420505 426398	Treatment details unknown.*	Coal	
Shaft	420426-005	420280 426311	This shaft was located during ground investigation works in October 2019.	Coal	
Shaft	420426-006	420270 426322	This shaft was located during ground investigation works in October 2019.	Coal	

*For your information, before the coal industry was nationalised in 1947, there was no requirement for a mine operator to record mine entry treatment details when a mine was abandoned. Therefore, it is not unusual for us to have no treatment details for many of the 176,000 recorded mine entries on our database. Despite this lack of information, please be assured that the fact we have no treatment recorded does not necessarily mean that the mine entry was left untreated when abandoned.

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Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

3921	M49	PO0
4115	NE794	M31

For assistance in identifying the specific abandoned mine plans relevant to your requirements, **please contact us at InformationManagers@MiningRemediation.gov.uk**.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
MIDDLETON LITTLE	Coal	Yes	Within	N/A	20

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

Distance to site investigation (m)	Direction
Within	N/A

See Section 4 for further information.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

There are 2 claims within 50 metres of the property boundary that do not match the property address. These are shown on the enquiry boundary plot.

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

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

If further subsidence damage claims information is required, please visit www.miningremediation.co.uk.

See Section 4 for further information.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

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Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is in an area where notices to withdraw support were given in 1951 and 1954.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

Site investigations

The site is within an area of previous interest. It is close to where the Coal Authority has received information relating to past site investigations.

The site requires further investigation and may influence how you approach your risk assessment.

Coal mining subsidence

The site is within an area of previous interest. It is close to where the Coal Authority or licensed mine operator has investigated and where necessary remediated issues relating to coal mining subsidence.

The site requires further investigation and may influence your risk assessment. We recommend that you order the appropriate **Coal Authority Subsidence Claims Report**, which will include more information about the hazard.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please email us at reports@miningremediation.gov.uk.

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Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **email us at reports@miningremediation.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

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Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

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Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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The Coal Authority

Summary of findings

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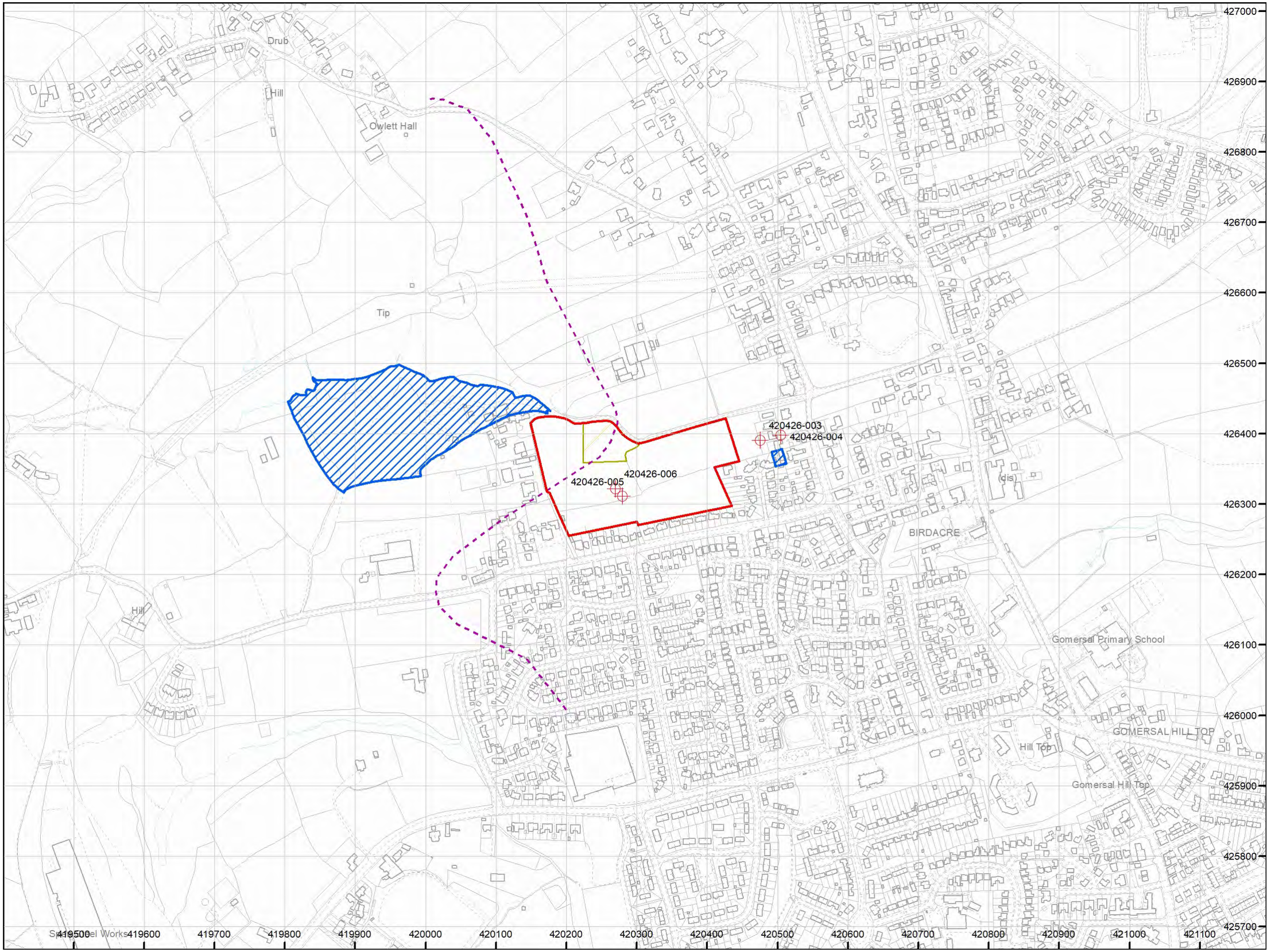
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown
- Disused mine shaft
- Outcrop (Conjectured)
- Site investigations
- Coal claim



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
reports@miningremediation.gov.uk

Appendix F

Trial Pit Logs

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP101
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420256.94 - 426308.72 Level: 139.60	Date 23/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.10 × 0.60, Depth 2.90	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T		0.30	139.30		MADE GROUND: Dark brown gravelly slightly sandy CLAY with occasional rootlets. Gravel is angular to subrounded fine to coarse of mixed lithologies including mudstone, coal and clinker. (MADE GROUND TOPSOIL)
	0.40	J&T		0.60	139.00		MADE GROUND: Dark grey clayey slightly sandy angular to subangular fine to coarse GRAVEL of coal, mudstone, sandstone and clinker. (GRANULAR MADE GROUND)
	0.70	HSV	HSV=60kPa	1.20	138.40		Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.80	HSV	HSV=68kPa	2.40	137.20		Light orangish brown clayey angular to subangular fine to coarse GRAVEL of sandstone and mudstone lithorelics. (GRANULAR RESIDUAL SOIL)
				2.90	136.70		Light greyish brown sandy slightly clayey angular to subangular fine to coarse GRAVEL of sandstone lithorelics. (GRANULAR RESIDUAL SOIL) *At 2.9m, unable to excavate further due to bedrock.* End of Pit at 2.90m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered at 2.5m during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP102
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420210.00 - 426309.79 Level: 136.40	Date 23/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.90 × 0.60 Depth 2.80	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	J&T		0.40	136.00		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal. (TOPSOIL)
	0.60	HSV	HSV=65kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular rounded fine to coarse of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.80	D		1.10	135.30		Light brown very clayey sandy angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.90	134.50		Light greyish brown slightly sandy angular to subangular fine to coarse GRAVEL of sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.80	133.60		*At 2.8m, refusal on bedrock.* End of Pit at 2.80m

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Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP103
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420194.71 - 426339.36 Level: 133.60	Date 23/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.00 x 0.60 Depth 2.30	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	B					Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal. Rare pottery. (TOPSOIL)
				0.50	133.10		Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of sandstone. (COHESIVE RESIDUAL SOIL)
	0.80	D					*Between 0.7m and 0.9m, land drain running east to west. Comprised of angular cobbles of sandstone with some ash and clinker.*
	0.90	HSV	HSV=68kPa				
				1.50	132.10		Greyish brown sandy slightly clayey angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.30	131.30		*At 2.3m, scraping on bedrock.* End of Pit at 2.30m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP104
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420194.65 - 426377.90 Level: 130.70	Date 23/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.80 × 0.60 Depth 3.00	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T					Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subrounded fine to medium of sandstone, coal and mudstone. Rare pottery fragments. (TOPSOIL)
				0.40	130.30		
	0.60	HSV	HSV=64kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
				1.40	129.30		Stiff brown mottled grey gravelly slightly sandy CLAY. Gravel is angular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL) *From 1.4m, unable to obtain hand vane as clay recovered as gravel sized pieces.*
				2.30	128.40		Greyish brown slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				3.00	127.70		*At 3.0m, refusal on bedrock.* End of Pit at 3.00m

1 2 3 4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP105
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420176.69 - 426412.22 Level: 128.45	Date 23/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.10 × 0.60, Depth 2.90	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.50	127.95		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse of sandstone, mudstone coal and rare pottery. (TOPSOIL)
	0.60	HSV	HSV=54kPa				Firm light orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.80	D					
				1.60	126.85		Light greyish brown clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.00	126.45		Greyish brown slightly sandy angular to subangular tabular fine GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.90	125.55		*At 2.9m, unable to excavate further due to bedrock.* End of Pit at 2.90m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP106
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420215.65 - 426399.86 Level: 130.85	Date 23/02/2026
Equipment & Method:	Tracked 360o excavator with 0.6m wide toothed bucket.	Dimensions (m): 3.00 × 0.60, Depth 3.40		Scale 1:20
Client:	Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T		0.30	130.55		Dark brown sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subrounded fine to medium of sandstone and mudstone. Rare pottery. (TOPSOIL)
	0.60	HSV	HSV=52kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.90 0.90	D HSV	HSV=70kPa	1.30	129.55		Light greyish brown clayey slightly sandy angular to subangular fine to medium GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.90	128.95		Greyish brown slightly sandy slightly clayey angular to subangular tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				3.40	127.45		*At 3.4m, full reach of excavator.* End of Pit at 3.40m

1 2 3 4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP107
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420230.34 - 426371.54 Level: 133.40	Date 23/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.90 × 0.60 Depth 2.40	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.50	132.90		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal. Rare fragments of pottery. (TOPSOIL)
	0.60	HSV	HSV=55kPa				Firm light orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.80	D					
				1.70	131.70		Greyish brown slightly sandy slightly clayey angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.40	131.00		End of Pit at 2.40m

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Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP108
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420237.61 - 426339.90 Level: 135.95	Date 24/02/2026
Equipment & Method:	Tracked 360o excavator with 0.6m wide toothed bucket.	Dimensions (m): 3.10 × 0.60, Depth 2.80		Scale 1:20
Client:	Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	J&T		0.50	135.45		Dark brown sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to coarse of mixed lithologies including sandstone, mudstone, coal and rare pottery. (TOPSOIL)
	0.60	HSV	HSV=60kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.90	D					
	1.00	HSV	HSV=58kPa				
				1.50	134.45		Light greyish brown clayey angular to subrounded fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.90	134.05		Greyish brown slightly sandy slightly clayey angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.80	133.15		*At 2.8m, refusal on bedrock.* End of Pit at 2.80m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP109
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420263.51 - 426385.88 Level: 134.05	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.90 × 0.60, Depth 1.90	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	B					Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
				0.50	133.55		
	0.70	HSV	HSV=56kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone and mudstone. (COHESIVE RESIDUAL SOIL)
	0.90	HSV	HSV=60kPa				
				1.10	132.95		Light greyish brown clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.60	132.45		Greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.90	132.15		*At 1.9m, refusal on bedrock.* End of Pit at 1.90m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP110
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420278.82 - 426351.79 Level: 137.00	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.00 × 0.60, Depth 2.10	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T					Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
				0.40	136.60		
	0.60	HSV	HSV=55kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	0.80	HSV	HSV=57kPa				
				1.10	135.90		Light greyish brown clayey angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.50	135.50		Greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.10	134.90		*At 2.1m, refusal on bedrock.* End of Pit at 2.10m

1 2 3 4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP111
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420322.45 - 426351.78 Level: 140.00	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.10 × 0.60, Depth 2.50	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T		0.30	139.70		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.60	HSV	HSV=55kPa	1.10	138.90		Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular a fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	1.40	D		2.50	137.50		Greyish brown sandy slightly clayey angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL) *At 2.5m, refusal on bedrock.* End of Pit at 2.50m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP112
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420345.81 - 426388.19 Level: 139.90	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.80 × 0.60, Depth 2.60	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	B		0.50	139.40		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.60	HSV	HSV=67kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	0.80 0.80	D HSV	HSV=72kPa				*From 1.0m, clay becomes stiff. Recovered as gravel sized pieces. No hand vane reading possible.*
▼				1.70	138.20		Greyish brown slightly sandy angular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
							At 1.9m, water seepage.
				2.60	137.30		*At 2.6m, refusal on bedrock.*
							End of Pit at 2.60m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered at 1.9m during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP113
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420378.74 - 426365.65 Level: 144.75	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.10 x 0.60 Depth 3.00	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T		0.40	144.35		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.50	HSV	HSV=85kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	0.60	HSV	HSV=64kPa				
	0.70	D					
	0.70	HSV	HSV=72kPa				
				1.30	143.45		Light greyish brown clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.10	142.65		Greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				3.00	141.75		*At 3.0m, refusal on bedrock.* End of Pit at 3.00m

1 2 3 4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP114
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420394.08 - 426397.85 Level: 146.65	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.00 × 0.60, Depth 2.60	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	J&T		0.30	146.35		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.60	HSV	HSV=58kPa	1.00	145.65		Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	1.20	D		1.60	145.05		Stiff light grey mottled orange gravelly slightly sandy CLAY. Gravel is angular to subangular fine to coarse of sandstone and sandstone lithorelicts. (COHESIVE RESIDUAL SOIL)
				2.60	144.05		Greyish brown slightly sandy slightly clayey angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL) *At 2.6m, refusal on bedrock.* End of Pit at 2.60m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP115
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420429.85 - 426371.21 Level: 150.10	Date 24/02/2026
Equipment & Method:	Tracked 360o excavator with 0.6m wide toothed bucket.	Dimensions (m): 3.10 × 0.60		Scale 1:20
Client:	Keepmoat Homes	Depth 3.50		Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	B		0.40	149.70		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.70	HSV	HSV=64kPa				Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	1.20	D		1.10	149.00		Stiff light grey mottled brown slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone lithorelicts. (COHESIVE RESIDUAL SOIL) *Between 1.1m and 2.1m, clay recovered as gravel sized pieces. No hand vane readings possible.*
				2.10	148.00		Greyish brown slightly clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				3.50	146.60		End of Pit at 3.50m

1 2 3 4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP116
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420407.26 - 426337.53 Level: 148.40	Date 24/02/2026
Equipment & Method:	Tracked 360o excavator with 0.6m wide toothed bucket.	Dimensions (m): 2.90 × 0.60 Depth 3.00		Scale 1:20
Client:	Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	J&T		0.30	148.10		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone and mudstone. (TOPSOIL)
	0.80 0.80	D HSV	HSV=56kPa	1.70	146.70		Firm light orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
				2.20	146.20		Stiff light grey gravelly slightly sandy CLAY. Gravel is angular to subangular fine to medium of sandstone lithorelicts. (COHESIVE RESIDUAL SOIL) *Between 1.7m and 2.2m, clay recovered as gravel sized pieces. Unable to obtain hand vane reading.*
				3.00	145.40		Light greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL) End of Pit at 3.00m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP117
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420403.51 - 426301.01 Level: 149.75	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.00 × 0.60, Depth 2.90	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	J&T		0.30	149.45		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	1.00	D		0.90	148.85		Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
				1.30	148.45		Stiff light grey mottled brown gravelly slightly sandy CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
				1.80	147.95		Light grey clayey angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
							Between 1.7m and 1.8m, inconsistent layer of dark grey very weak carbonaceous mudstone. Recovered as a slightly clayey angular fine to coarse GRAVEL.
							Light orangish brown SANDSTONE. Recovered as sandy angular fine to coarse Gravel. (COAL MEASURES)
				2.90	146.85		End of Pit at 2.90m

1
2
3
4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No
TP118
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420357.11 - 426285.50 Level: 147.05	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.80 × 0.60 Depth 3.00	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	J&T		0.30	146.75		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.60	HSV	HSV=68kPa				Firm light orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	0.70	D		1.40	145.65		Light orangish brown clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.30	144.75		Greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				3.00	144.05		*At 3.0m, refusal on bedrock.* End of Pit at 3.00m

1
2
3
4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP119
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420364.46 - 426327.52 Level: 145.15	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.70 × 0.60 Depth 1.80	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	B		0.30	144.85		Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.50	D					Light orangish brown clayey angular to subrounded fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.80	143.35		*At 1.8m, refusal on bedrock.* End of Pit at 1.80m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

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Trial Pit Log

TrialPit No: TP120
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420319.55 - 426306.51 Level: 143.40	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 3.00 × 0.60, Depth 2.50	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. Rare pottery. (TOPSOIL)
				0.30	143.10		Firm light orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	0.50	HSV	HSV=61kPa				
	0.60	HSV	HSV=56kPa				
				0.70	142.70		Light greyish brown clayey slightly sandy angular to subangular fine to medium GRAVEL of sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				1.70	141.70		Greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
				2.50	140.90		*At 2.5m, refusal on bedrock.* End of Pit at 2.50m

1
2
3
4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

LITHOS CONSULTING

Trial Pit Log

TrialPit No: TP121
Sheet 1 of 1

Project Name: Cliffe Lane	Project No. 5685	Co-ords: 420259.59 - 426271.31 Level: 141.45	Date 24/02/2026
Equipment & Method: Tracked 360o excavator with 0.6m wide toothed bucket.		Dimensions (m): 2.80 × 0.60, Depth 2.50	Scale 1:20
Client: Keepmoat Homes			Logged CC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	J&T		0.30	141.15		Dark brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (TOPSOIL)
	0.60	HSV	HSV=68kPa	1.00	140.45		Firm light orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of sandstone, mudstone and coal. (COHESIVE RESIDUAL SOIL)
	1.30	D		1.90	139.55		Light greyish brown clayey slightly sandy angular to subangular fine to medium GRAVEL of sandstone lithorelicts. (GRANULAR RESIDUAL SOIL)
▼				2.50	138.95		Greyish brown slightly sandy angular to subangular, tabular fine to coarse GRAVEL of sandstone and sandstone lithorelicts. (GRANULAR RESIDUAL SOIL) *At 2.5m, slight water seepage at base of pit.* *At 2.5m, refusal on bedrock.* End of Pit at 2.50m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered at 2.5m during excavation. 3. Backfilled with materials arising upon completion. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

Appendix G

Probehole Logs

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Borehole Log

Borehole No.
PH101
Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420392E - 426386N	Hole Type RO
Equipment & Method:	Beretta tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level: 146.40 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates: 24/02/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						146.40		Light brown CLAY. (OVERBURDEN)
					3.00	143.40		Brown MUDSTONE. (WEATHERED COAL MEASURES)
					6.00	140.40		Dark grey MUDSTONE. (COAL MEASURES)
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

Borehole Log

Borehole No. **PH101**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420392E - 426386N	Hole Type RO
Equipment & Method:	Beretta tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	146.40 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	24/02/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Dark grey MUDSTONE. (COAL MEASURES)
					30.00			End of Borehole at 30.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No.
PH101A
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420392E - 426386N	Hole Type RO
Equipment & Method:	Beretta tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	146.40 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	24/02/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						146.40		Light brown CLAY. (OVERBURDEN)
					3.00	143.40		Brown MUDSTONE. (WEATHERED COAL MEASURES)
					4.50			End of Borehole at 4.50m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH102
Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420207E - 426322N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	135.50 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	30/03/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						135.50		Light brown CLAY. (OVERBURDEN)
					4.00	131.50		Brown SILSTONE. (WEATHERED COAL MEASURES)
					9.00	126.50		Grey MUDSTONE. (COAL MEASURES)
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 20.0m to 24.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

Borehole Log

Borehole No. **PH102**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420207E - 426322N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level: 135.50 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates: 30/03/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Grey MUDSTONE. (COAL MEASURES)
								At 20.0m, partial loss of flush.
					22.20	113.30		*At 22.0m, complete loss of flush, springs open.*
								Black COAL. (MIDDLETON MAIN COAL)
								At 23.0m, 0% flush returns.
					23.80	111.70		*Very weak, weathered coal.*
								Grey MUDSTONE. (COAL MEASURES)
								At 24.0m, 100% flush returns.
					27.00			End of Borehole at 27.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 20.0m to 24.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Borehole Log

Borehole No. **PH102A**

Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420207E - 426322N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	135.50 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						135.50		Orangish-brown CLAY. (OVERBURDEN)
					1.50	134.00		Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					4.50			End of Borehole at 4.50m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No. **PH103**

Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420264E - 426386N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	134.05 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	31/03/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
						134.05		Brown CLAY. (OVERBURDEN)
					0.50	133.55		Black and grey CLAY. (OVERBURDEN)
					1.00	133.05		*From 0.5m to 1.0m, weathered Middleton Little Coal seam in overburden.*
					2.00	132.05		Greyish brown CLAY. (OVERBURDEN)
								From 0.0 to 24.0m, drilling with air flush.
								Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					5.00	129.05		Light grey MUDSTONE. (COAL MEASURES)
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 26.5m to 27.5m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No. **PH103**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420264E - 426386N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level: 134.05 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates: 31/03/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Light grey MUDSTONE. (COAL MEASURES)
								At 23.0m, hard drilling.
								From 24.0m, switched to water flush.
					26.50	107.55		Soft ground. (COAL MEASURES)
					27.50	106.55		*From 26.5m to 27.5m, loss of flush within soft ground.*
								Light grey MUDSTONE. (COAL MEASURES)
					30.00			End of Borehole at 30.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 26.5m to 27.5m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

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Borehole Log

Borehole No.
PH103A
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420264E - 426386N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	134.05 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	30/03/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						134.05		Brown CLAY. (OVERBURDEN)
					0.50	133.55		Black and grey CLAY. (OVERBURDEN)
					1.00	133.05		*At 0.5m, weathered Middleton Little Coal seam in overburden.*
					2.00	132.05		Greyish brown CLAY. (OVERBURDEN)
								Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					4.50			End of Borehole at 4.50m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH104
Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420184E - 426389N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	129.85 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	31/03/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						129.85		Light brown CLAY. (OVERBURDEN)
					4.00	125.85		Grey MUDSTONE. (COAL MEASURES)
								At 17.0m, partial loss of flush.
					17.60	112.25		*At 17.5m, 0% flush returns.* Black COAL. (MIDDLETON MAIN COAL)
					19.00	110.85		Grey MUDSTONE. (COAL MEASURES) *From 19.0m, 100% flush returns.*

Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 17.0m to 19.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

Borehole Log

Borehole No. **PH104**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420184E - 426389N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	129.85 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	31/03/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grey MUDSTONE. (COAL MEASURES)
					21.00			End of Borehole at 21.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 17.0m to 19.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

Borehole Log

Borehole No. **PH104A**

Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420184E - 426389N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	129.85 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	02/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						129.85		Light brown CLAY. (OVERBURDEN)
					4.00	125.85		Grey MUDSTONE. (WEATHERED COAL MEASURES)
					4.50			End of Borehole at 4.50m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

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Borehole Log

Borehole No. **PH105**

Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420200E - 426352N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	132.90 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	31/03/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
						132.90		Light brown CLAY. (OVERBURDEN)
					1.80	131.10		Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					4.50	128.40		Grey MUDSTONE. (COAL MEASURES)
					14.00	118.90		Grey SILTSTONE. (COAL MEASURES) *At 14.0m, harder drilling.*
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 20.0m to 22.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH105
Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420200E - 426352N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level: 132.90 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates: 31/03/2026	Logged By EW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					20.40	112.50		Grey SILTSTONE. (COAL MEASURES)
								At 20.0m, loss of flush.
								Black COAL. (MIDDLETON MAIN COAL)
					21.80	111.10		*From 20.4 to 21.8m, 0% flush returns.*
								Grey MUDSTONE. (COAL MEASURES)
								From 22.0m, 100% flush returns.
					24.00			End of Borehole at 24.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 20.0m to 22.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH106
Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420173E - 426365N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	Scale 1:100
Client:	Keepmoat Homes		Dates: 01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Orangish-brown CLAY. (OVERBURDEN)
					1.00			Brown MUDSTONE. (WEATHERED COAL MEASURES) *From 0.0 to 15.0m, drilling with air flush.*
					4.30			Grey MUDSTONE. (COAL MEASURES)
								From 15.0m, switched to water flush.
								From 18.0m to 19.2m, loss of flush with hard drilling.
								From 19.2m, flush returns.
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 18.0m to 19.2m. 4. Co-ordinates from hand held GPS, hole not surveyed in.

AGS

Borehole Log

Borehole No. **PH106**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420173E - 426365N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	Scale 1:100
Client:	Keepmoat Homes		Dates: 01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Grey MUDSTONE. (COAL MEASURES)
					21.00			End of Borehole at 21.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 18.0m to 19.2m. 4. Co-ordinates from hand held GPS, hole not surveyed in.

LITHOS CONSULTING

Borehole Log

Borehole No. **PH107**

Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420210E - 426310N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	136.40 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
						136.40		Orangish-brown CLAY. (OVERBURDEN)
								From 0.0 to 15.0m, drilling with air flush.
					1.50	134.90		Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					4.50	131.90		Light grey MUDSTONE. (COAL MEASURES)
								From 15.0m, switched to water flush.
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 21.5m to 23.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

Borehole Log

Borehole No. **PH107**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420210E - 426310N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level: 136.40 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates: 01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Light grey MUDSTONE. (COAL MEASURES)
								From 21.5m to 23.0m, loss of flush but still hard drilling.
								From 23.0m, flush returns.
					24.00			End of Borehole at 24.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 21.5m to 23.0m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

LITHOS CONSULTING

Borehole Log

Borehole No.
PH107A
Sheet 1 of 1

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420210E - 426310N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	136.40 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						129.85		Light brown CLAY. (OVERBURDEN)
					4.00	125.85		Grey MUDSTONE. (WEATHERED COAL MEASURES)
					4.50			End of Borehole at 4.50m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No. **PH108**

Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420279E - 426352N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level: 137.00 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates: 01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
						137.00		Orangish-brown CLAY. (OVERBURDEN)
								From 0.0 to 21.0m, drilling with air flush.
					1.50	135.50		Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					5.00	132.00		Light grey MUDSTONE. (COAL MEASURES)
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 23.5m to 24.5m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

Borehole Log

Borehole No. **PH108**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420279E - 426352N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	137.00 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Light grey MUDSTONE. (COAL MEASURES)
								From 21.0m, switched to water flush.
								From 23.5m to 24.5m, loss of flush with hard drilling.
								From 24.5m, flush returns.
					27.00			End of Borehole at 27.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 23.5m to 24.5m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

LITHOS CONSULTING

Borehole Log

Borehole No. **PH109** Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420282E - 426299N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	Scale 1:100
Client:	Keepmoat Homes		Dates: 01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Orangish-brown CLAY. (OVERBURDEN)
								From 0.0 to 21.0m, drilling with air flush.
					2.20			Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					4.00			Light grey MUDSTONE. (COAL MEASURES)
								Groundwater strike at 12.0m.
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 24.1m to 25.2m. 4. Co-ordinates from hand held GPS, hole not surveyed in.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No. **PH109** Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420282E - 426299N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	Scale 1:100
Client:	Keepmoat Homes		Dates: 01/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Light grey MUDSTONE. (COAL MEASURES)
								From 21.0m, switched to water flush.
					24.10			*From 24.1m to 25.2m, loss of flush within soft ground.* Soft ground. (COAL MEASURES)
					25.20			Light grey MUDSTONE. (COAL MEASURES) *From 25.2m, flush returns.*
					27.00			End of Borehole at 27.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were lost from 24.1m to 25.2m. 4. Co-ordinates from hand held GPS, hole not surveyed in.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No. **PH110**

Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420326E - 426291N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	145.60 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	02/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
						145.60		Orangish-brown CLAY. (OVERBURDEN)
								From 0.0 to 24.0m, drilling with air flush.
					1.70	143.90		Light brown MUDSTONE. (WEATHERED COAL MEASURES)
	▼				2.80	142.80		Light grey MUDSTONE. (COAL MEASURES)
								Groundwater strike at 3.0m.
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered at 3.0m depth. 3. Flush returns were lost from 28.3m to 29.5m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

LITHOS CONSULTING

Borehole Log

Borehole No.
PH110
Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords:	420326E - 426291N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	145.60 m AOD	Scale 1:100
Client:	Keepmoat Homes		Dates:	02/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Light grey MUDSTONE. (COAL MEASURES)
								From 24.0m, switched to water flush.
					28.30	117.30		Soft ground. (COAL MEASURES)
								From 28.3m to 29.5m, partial loss of flush within soft ground.
					29.50	116.10		Light grey MUDSTONE. (COAL MEASURES)
					30.00			*From 29.5m, flush returns.*
								End of Borehole at 30.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater encountered at 3.0m depth. 3. Flush returns were lost from 28.3m to 29.5m. 4. Exploratory hole surveyed in (level and co-ordinates) on completion.

AGS

Borehole Log

Borehole No. **PH111**

Sheet 1 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420246E - 426305N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	Scale 1:100
Client:	Keepmoat Homes		Dates: 02/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Orangish-brown CLAY. (OVERBURDEN)
								From 0.0 to 24.0m, drilling with air flush.
					2.30			Light brown MUDSTONE. (WEATHERED COAL MEASURES)
					5.50			Light grey MUDSTONE. (COAL MEASURES)
								Continued on Next Sheet

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Co-ordinates from hand held GPS, hole not surveyed in.

Borehole Log

Borehole No. **PH111**

Sheet 2 of 2

Project Name:	Cliffe Lane	Project No. 5685	Co-ords: 420246E - 426305N	Hole Type RO
Equipment & Method:	Mustang tracked drilling rig equipped with 100mm tri-cone bit and water flush.		Level:	Scale 1:100
Client:	Keepmoat Homes		Dates: 02/04/2026	Logged By DW

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Light grey MUDSTONE. (COAL MEASURES)
								From 24.0m, switched to water flush.
					25.80			Black COAL. (MIDDLETON MAIN COAL)
					27.20			Light grey MUDSTONE. (COAL MEASURES)
					30.00			End of Borehole at 30.00m

Remarks

1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out. 2. Groundwater was not apparent during drilling. 3. Flush returns were not lost during drilling. 4. Co-ordinates from hand held GPS, hole not surveyed in.

Appendix H

Chemical Test Results

Certificate of Analysis

Certificate Number 26-05040 *Issued:* 13-Mar-26

Client Lithos Consulting Ltd
Parkhill
Walton Rd
Wetherby
LS22 5DZ

Our Reference 26-05040

Client Reference ~ 5685

Order No ~ PO26093/5685/CC

Contract Title ~ Cliffe Lane, Gomersal

Description 19 Soil samples.

Date Received 03-Mar-26

Date Started 03-Mar-26

Date Completed 13-Mar-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Reyhan Irfan
Operations Manager

2139

Sample Deviations present. See Deviation Table Section for details.

Normec DETS Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info-dets@normecgroup.com • normecdets.com

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

				Lab No	2650118	2650119	2650120	2650121	2650122	2650123
				Sample ID ~	TP101	TP101	TP104	TP106	TP108	TP110
				Depth ~	0.20	0.40	0.20	0.20	0.30	0.20
				Other ID ~						
				Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026
				Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Preparation										
Stones >10mm	DETSC 1003*	1	% m/m	< 1.0	12	< 1.0	< 1.0	< 1.0	< 1.0
Moisture Content	DETSC 1004	0.1	%	18	13	20	20	18	22
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	42	140	44	60	61	64
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.3	0.3	0.6	0.7	0.8	0.9
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.2	0.3	0.4	0.4	0.4
Chromium	DETSC 2301#	0.15	mg/kg	17	7.0	20	30	28	31
Chromium III	DETSC 2301*	0.15	mg/kg	17	7.0	20	30	28	31
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	64	28	78	100	120	130
Lead	DETSC 2301#	0.3	mg/kg	120	33	160	200	190	290
Mercury	DETSC 2325#	0.05	mg/kg	0.23	0.22	0.53	0.65	0.59	0.53
Nickel	DETSC 2301#	1	mg/kg	19	10	20	29	30	31
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	35	16	38	54	56	60
Zinc	DETSC 2301#	1	mg/kg	84	26	80	120	130	130
Inorganics										
pH	DETSC 2008#		pH	7.7	7.5	7.3	7.0	6.9	6.9
Total Organic Carbon	DETSC 2084#	0.5	%	15	36	14	11	14	12
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l						
Petroleum Hydrocarbons										
VPH (C6-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1				
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10				
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10				
EPH (C16-C21)	DETSC 3311	10	mg/kg	31	< 10				
EPH (C21-C35)	DETSC 3311	10	mg/kg	16	< 10				
EPH (C35-C40)	DETSC 3311	10	mg/kg	< 10	< 10				
EPH (C10-C40)	DETSC 3311#	10	mg/kg	56	< 10				
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	< 0.03	< 0.03	0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.09	0.07	0.06	0.16	0.16	0.10
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.11	< 0.03	0.09	0.15	0.16	0.13
Pyrene	DETSC 3303#	0.03	mg/kg	0.09	< 0.03	0.07	0.13	0.13	0.11
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03	< 0.03	0.04	0.03	0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.04	< 0.03	0.03	0.05	0.05	0.05
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

			Lab No	2650118	2650119	2650120	2650121	2650122	2650123
			Sample ID ~	TP101	TP101	TP104	TP106	TP108	TP110
			Depth ~	0.20	0.40	0.20	0.20	0.30	0.20
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.34	0.12	0.21	0.53	0.50	0.40

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

			Lab No	2650124	2650125	2650126	2650127	2650128	2650129
			Sample ID ~	TP111	TP113	TP114	TP116	TP117	TP118
			Depth ~	0.20	0.20	0.10	0.10	0.20	0.10
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Preparation									
Stones >10mm	DETSC 1003*	1	% m/m	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Moisture Content	DETSC 1004	0.1	%	36	23	24	24	28	26
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	33	44	37	23	29	22
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.1	1.1	0.9	0.9	1.1	1.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.4	0.4	0.3	0.4	0.3
Chromium	DETSC 2301#	0.15	mg/kg	25	25	18	21	29	27
Chromium III	DETSC 2301*	0.15	mg/kg	25	25	18	21	29	27
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	63	68	49	41	47	40
Lead	DETSC 2301#	0.3	mg/kg	110	140	69	77	110	75
Mercury	DETSC 2325#	0.05	mg/kg	0.31	0.34	0.27	0.22	0.31	0.22
Nickel	DETSC 2301#	1	mg/kg	26	28	22	21	19	19
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	49	54	40	30	40	35
Zinc	DETSC 2301#	1	mg/kg	100	110	92	85	96	88
Inorganics									
pH	DETSC 2008#		pH	6.4	6.5	7.3	7.6	6.8	7.0
Total Organic Carbon	DETSC 2084#	0.5	%	8.6	7.1	6.9	6.5	7.0	5.5
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l						
Petroleum Hydrocarbons									
VPH (C6-C10)	DETSC 3321*	0.1	mg/kg						
EPH (C10-C12)	DETSC 3311	10	mg/kg						
EPH (C12-C16)	DETSC 3311	10	mg/kg						
EPH (C16-C21)	DETSC 3311	10	mg/kg						
EPH (C21-C35)	DETSC 3311	10	mg/kg						
EPH (C35-C40)	DETSC 3311	10	mg/kg						
EPH (C10-C40)	DETSC 3311#	10	mg/kg						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.08	0.06	0.04	0.05	0.03	0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	0.08	0.07	0.05	0.06	0.05
Pyrene	DETSC 3303#	0.03	mg/kg	0.13	0.07	0.06	0.04	0.05	0.04
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.05	< 0.03	< 0.03	0.03	< 0.03	0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

			Lab No	2650124	2650125	2650126	2650127	2650128	2650129
			Sample ID ~	TP111	TP113	TP114	TP116	TP117	TP118
			Depth ~	0.20	0.20	0.10	0.10	0.20	0.10
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.45	0.21	0.17	0.14	0.11	< 0.10

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

	Lab No	2650130	2650131	2650132	2650133	2650134	2650135
	Sample ID ~	TP121	Shaft-005	Shaft-005	Shaft-005	Shaft-006	Shaft-006
	Depth ~	0.10					
	Other ID ~						
	Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026
	Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Preparation									
Stones >10mm	DETSC 1003*	1	% m/m	< 1.0					
Moisture Content	DETSC 1004	0.1	%	34					
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	26					
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.3					
Cadmium	DETSC 2301#	0.1	mg/kg	0.3					
Chromium	DETSC 2301#	0.15	mg/kg	26					
Chromium III	DETSC 2301*	0.15	mg/kg	26					
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0					
Copper	DETSC 2301#	0.2	mg/kg	43					
Lead	DETSC 2301#	0.3	mg/kg	95					
Mercury	DETSC 2325#	0.05	mg/kg	0.27					
Nickel	DETSC 2301#	1	mg/kg	19					
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5					
Vanadium	DETSC 2301#	0.8	mg/kg	37					
Zinc	DETSC 2301#	1	mg/kg	86					
Inorganics									
pH	DETSC 2008#		pH	6.6	7.3	7.0	7.3	5.7	5.6
Total Organic Carbon	DETSC 2084#	0.5	%	7.1					
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l		< 10	18	< 10	31	26
Petroleum Hydrocarbons									
VPH (C6-C10)	DETSC 3321*	0.1	mg/kg						
EPH (C10-C12)	DETSC 3311	10	mg/kg						
EPH (C12-C16)	DETSC 3311	10	mg/kg						
EPH (C16-C21)	DETSC 3311	10	mg/kg						
EPH (C21-C35)	DETSC 3311	10	mg/kg						
EPH (C35-C40)	DETSC 3311	10	mg/kg						
EPH (C10-C40)	DETSC 3311#	10	mg/kg						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03					
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03					
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03					
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03					
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.04					
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03					
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.06					
Pyrene	DETSC 3303#	0.03	mg/kg	0.05					
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03					
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03					
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03					
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03					

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

	Lab No	2650130	2650131	2650132	2650133	2650134	2650135
	Sample ID ~	TP121	Shaft-005	Shaft-005	Shaft-005	Shaft-006	Shaft-006
	Depth ~	0.10					
	Other ID ~						
	Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026	23/02/2026
	Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03					
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03					
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03					
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03					
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.12					

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

Lab No	2650136
Sample ID ~	Shaft-006
Depth ~	
Other ID ~	
Sample Type ~	SOIL
Sampling Date ~	23/02/2026
Sampling Time ~	n/s

Test	Method	LOD	Units	
Preparation				
Stones >10mm	DETSC 1003*	1	% m/m	
Moisture Content	DETSC 1004	0.1	%	
Metals				
Arsenic	DETSC 2301#	0.2	mg/kg	
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	
Cadmium	DETSC 2301#	0.1	mg/kg	
Chromium	DETSC 2301#	0.15	mg/kg	
Chromium III	DETSC 2301*	0.15	mg/kg	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	
Copper	DETSC 2301#	0.2	mg/kg	
Lead	DETSC 2301#	0.3	mg/kg	
Mercury	DETSC 2325#	0.05	mg/kg	
Nickel	DETSC 2301#	1	mg/kg	
Selenium	DETSC 2301#	0.5	mg/kg	
Vanadium	DETSC 2301#	0.8	mg/kg	
Zinc	DETSC 2301#	1	mg/kg	
Inorganics				
pH	DETSC 2008#		pH	5.5
Total Organic Carbon	DETSC 2084#	0.5	%	
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	35
Petroleum Hydrocarbons				
VPH (C6-C10)	DETSC 3321*	0.1	mg/kg	
EPH (C10-C12)	DETSC 3311	10	mg/kg	
EPH (C12-C16)	DETSC 3311	10	mg/kg	
EPH (C16-C21)	DETSC 3311	10	mg/kg	
EPH (C21-C35)	DETSC 3311	10	mg/kg	
EPH (C35-C40)	DETSC 3311	10	mg/kg	
EPH (C10-C40)	DETSC 3311#	10	mg/kg	
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	
Acenaphthene	DETSC 3303#	0.03	mg/kg	
Fluorene	DETSC 3303	0.03	mg/kg	
Phenanthrene	DETSC 3303#	0.03	mg/kg	
Anthracene	DETSC 3303	0.03	mg/kg	
Fluoranthene	DETSC 3303#	0.03	mg/kg	
Pyrene	DETSC 3303#	0.03	mg/kg	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	
Chrysene	DETSC 3303	0.03	mg/kg	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	

Summary of Chemical Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

Lab No	2650136
Sample ID ~	Shaft-006
Depth ~	
Other ID ~	
Sample Type ~	SOIL
Sampling Date ~	23/02/2026
Sampling Time ~	n/s

Test	Method	LOD	Units	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	

Summary of Asbestos Analysis
Soil Samples

Our Ref 26-05040
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2650118	TP101 0.20	SOIL	NAD	none	Lucy Lindsley
2650119	TP101 0.40	SOIL	NAD	none	Lucy Lindsley
2650120	TP104 0.20	SOIL	NAD	none	Lucy Lindsley
2650121	TP106 0.20	SOIL	NAD	none	Lucy Lindsley
2650122	TP108 0.30	SOIL	NAD	none	Lucy Lindsley
2650123	TP110 0.20	SOIL	NAD	none	Lucy Lindsley
2650124	TP111 0.20	SOIL	NAD	none	Lucy Lindsley
2650125	TP113 0.20	SOIL	NAD	none	Lucy Lindsley
2650126	TP114 0.10	SOIL	NAD	none	Lucy Lindsley
2650127	TP116 0.10	SOIL	NAD	none	Lucy Lindsley
2650128	TP117 0.20	SOIL	NAD	none	Lucy Lindsley
2650129	TP118 0.10	SOIL	NAD	none	Lucy Lindsley
2650130	TP121 0.10	SOIL	NAD	none	Lucy Lindsley

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 26-05040
Client Ref ~ 5685
Contract ~ Cliffe Lane, Gomersal

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2650118	TP101 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650119	TP101 0.40 SOIL	23/02/26	GJ 250ml, PT 1L		
2650120	TP104 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650121	TP106 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650122	TP108 0.30 SOIL	23/02/26	GJ 250ml, PT 1L		
2650123	TP110 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650124	TP111 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650125	TP113 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650126	TP114 0.10 SOIL	23/02/26	GJ 250ml, PT 1L		
2650127	TP116 0.10 SOIL	23/02/26	GJ 250ml, PT 1L		
2650128	TP117 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2650129	TP118 0.10 SOIL	23/02/26	GJ 250ml, PT 1L		
2650130	TP121 0.10 SOIL	23/02/26	GJ 250ml, PT 1L		
2650131	Shaft-005 SOIL	23/02/26	PT 1L		
2650132	Shaft-005 SOIL	23/02/26	PT 1L		
2650133	Shaft-005 SOIL	23/02/26	PT 1L		
2650134	Shaft-006 SOIL	23/02/26	PT 1L		
2650135	Shaft-006 SOIL	23/02/26	PT 1L		
2650136	Shaft-006 SOIL	23/02/26	PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:
~ Sample details are provided by the client and can affect the validity of the results

Information in Support of the Analytical Results

Our Ref 26-05040
Client Ref ~ 5685
Contract ~ Cliffe Lane, Gomersal

***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report Ver 25.10.03

Certificate of Analysis

Certificate Number	26-06666	*Issued:*	02-Apr-26

Client Lithos Consulting Ltd
Parkhill
Walton Rd
Wetherby
LS22 5DZ

Our Reference	26-06666
Client Reference ~	5685
Order No ~	PO26232/5685/CC
Contract Title ~	Cliffe Lane, Gomersal
Description	4 Soil samples.
Date Received	03-Mar-26
Date Started	19-Mar-26
Date Completed	02-Apr-26
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Reyhan Irfan
Operations Manager

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Summary of Chemical Analysis
Soil Samples

Our Ref 26-06666
Client Ref ~ 5685
Contract Title ~ Cliffe Lane, Gomersal

			Lab No	2659011	2659012	2659013	2659014
			Sample ID ~	TP106	TP108	TP110	TP113
			Depth ~	0.20	0.30	0.20	0.20
			Other ID ~				
			Sample Type ~	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	23/02/2026	23/02/2026	23/02/2026	23/02/2026
			Sampling Time ~	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic Gastric % Bioaccessible (% of Total As)	DETSC 2400*		%	1.3	1.1	1.0	1.4
Arsenic Gastric mg/kg Bioaccessible	DETSC 2400*	0.5	mg/kg	0.6	0.6	0.5	< 0.5
Arsenic Gastro Intestinal % Bioaccessible (% of Total As)	DETSC 2400*		%	1.7	1.8	1.4	1.1
Arsenic Gastro Intestinal mg/kg Bioaccessible	DETSC 2400*	0.5	mg/kg	0.8	1.0	0.8	< 0.5
Arsenic	DETSC 2301#	0.2	mg/kg	44	51	53	33

Information in Support of the Analytical Results

Our Ref 26-06666
Client Ref ~ 5685
Contract ~ Cliffe Lane, Gomersal

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2659011	TP106 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2659012	TP108 0.30 SOIL	23/02/26	GJ 250ml, PT 1L		
2659013	TP110 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		
2659014	TP113 0.20 SOIL	23/02/26	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub
Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:
~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report Ver 26.03.15

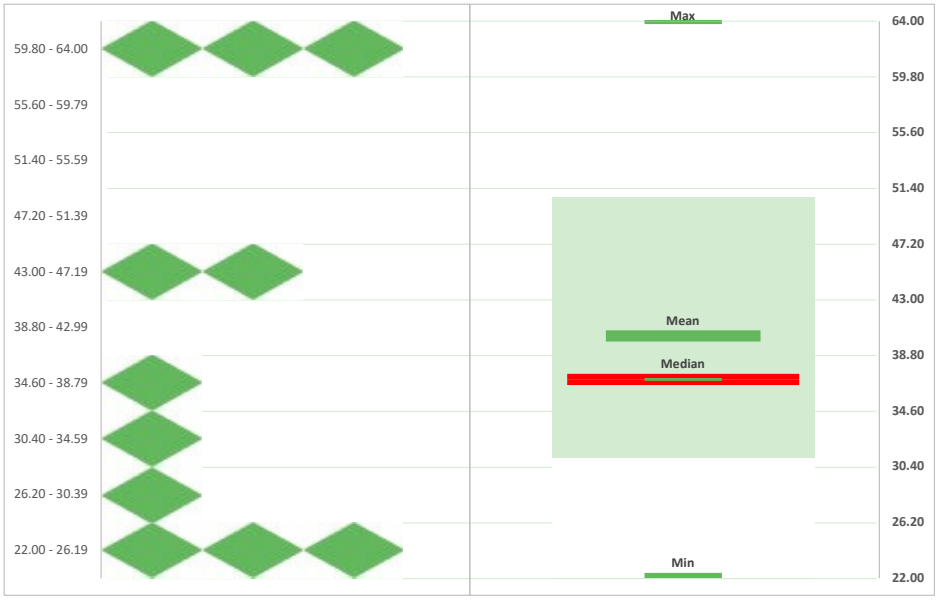
Cliffe Lane, Gomersal

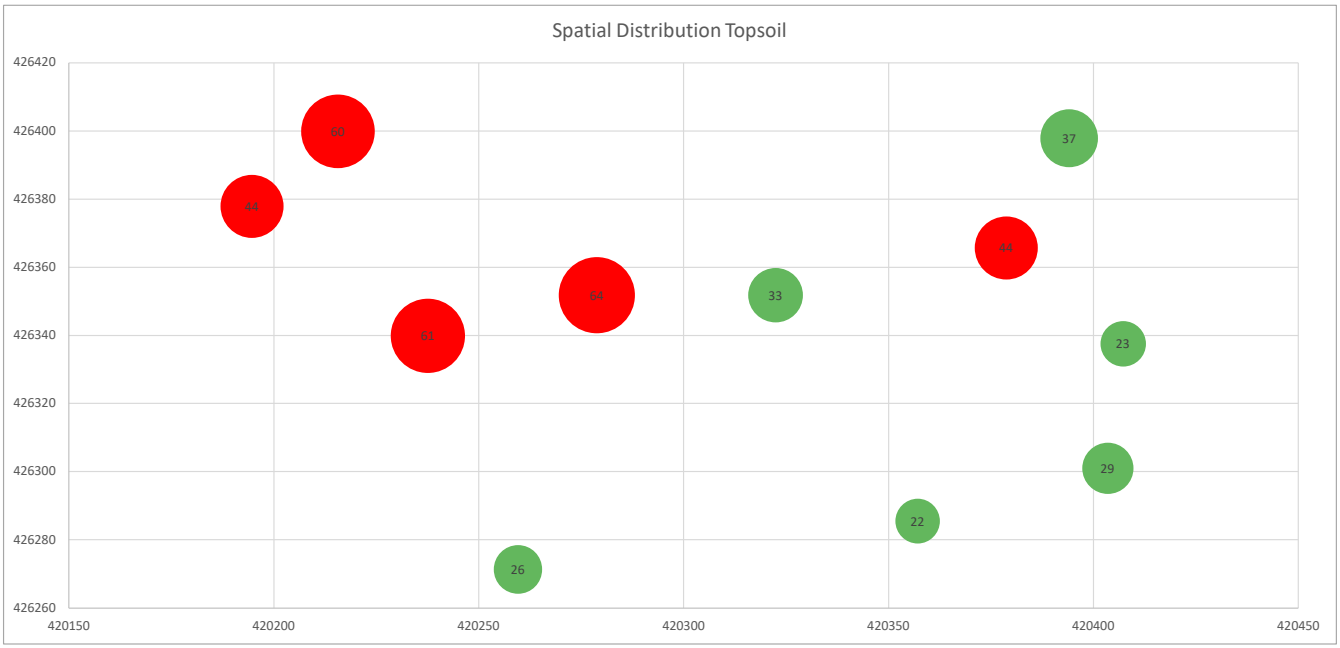
Job No: 5685
Engineer: CC
Date: 13 March 2026

Topsoil: Dataset for As - Dot & Box Plots and Summary Statistics

Determinant	As
Critical concentration	37.00
No. samples	11.00
Max	64.00
Mean	40.27
Min	22.00
Median	37.00
Standard Deviation	15.61
Standard Error	4.71
T value	2.23
Upper Confidence Level (95%)	50.76
Upper Confidence Level (80%)	46.73
Lower Confidence Level (5%)	31.05
Transform data	Normal

Upper Confidence Level for chart	95%





Spatial distribution can show sampling clusters based on ground type it **does not** identify areas of contamintion

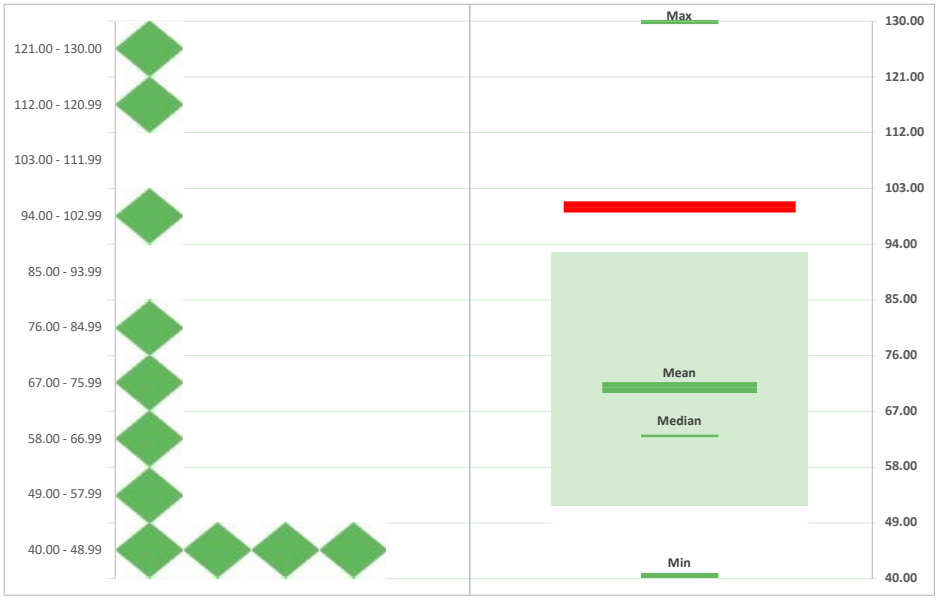
Cliffe Lane, Gomersal

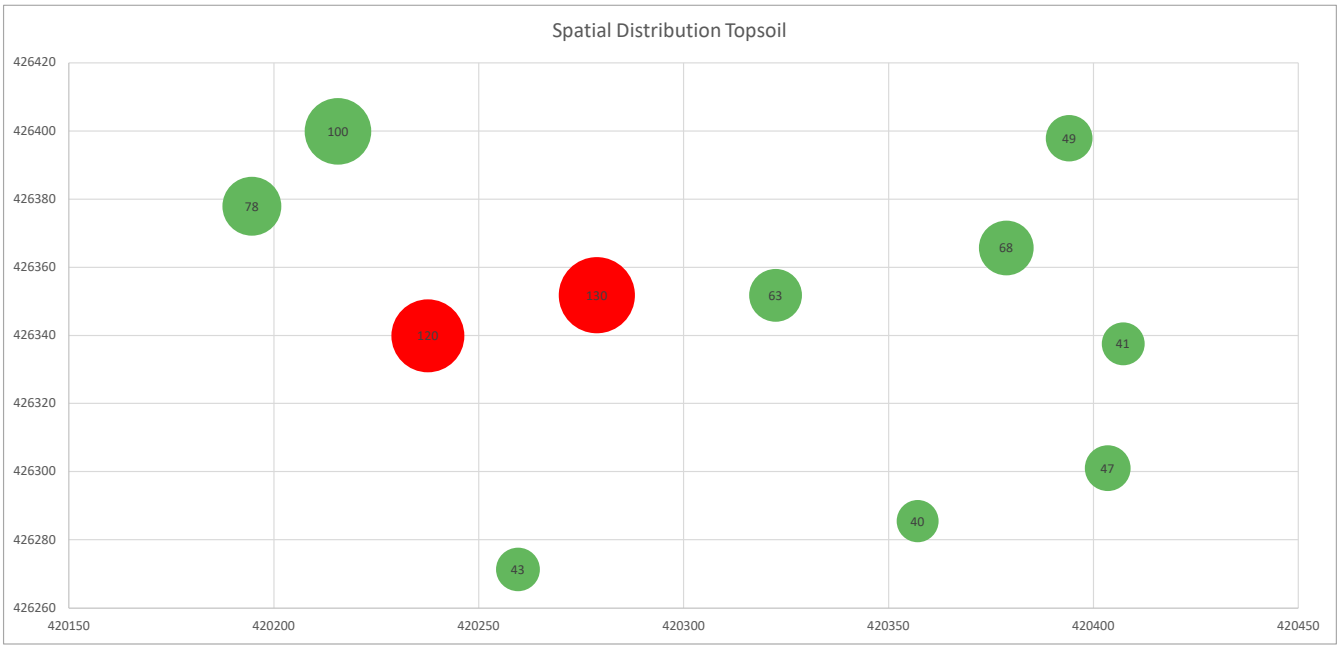
Job No: 5685
Engineer: CC
Date: 13 March 2026

Topsoil: Dataset for Cu - Dot & Box Plots and Summary Statistics

Determinant	Cu
Critical concentration	100.00
No. samples	11.00
Max	130.00
Mean	70.82
Min	40.00
Median	63.00
Standard Deviation	32.48
Standard Error	9.79
T value	2.23
Upper Confidence Level (95%)	92.64
Upper Confidence Level (80%)	84.26
Lower Confidence Level (5%)	51.62
Transform data	Normal

Upper Confidence Level for chart	95%





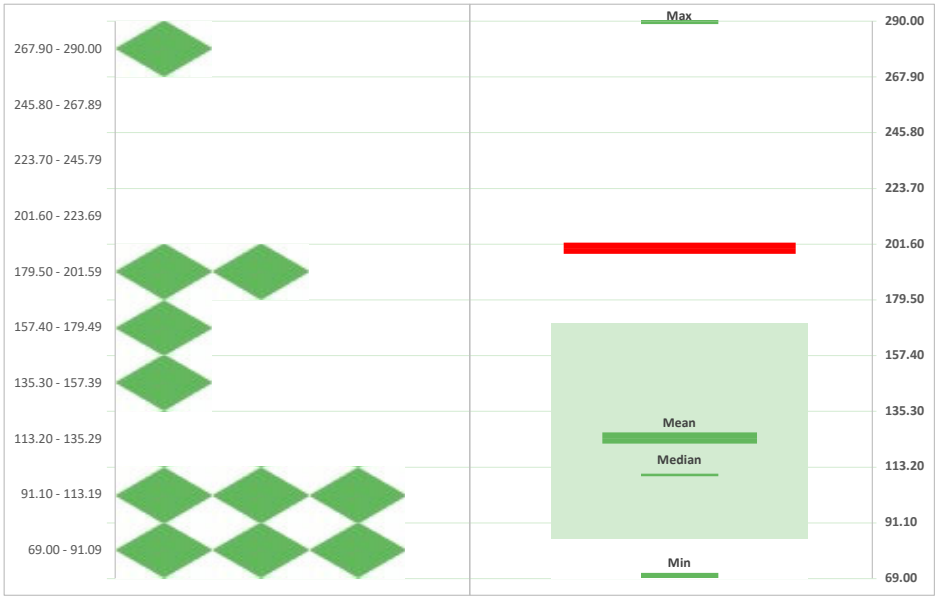
Spatial distribution can show sampling clusters based on ground type it **does not** identify areas of contamintion

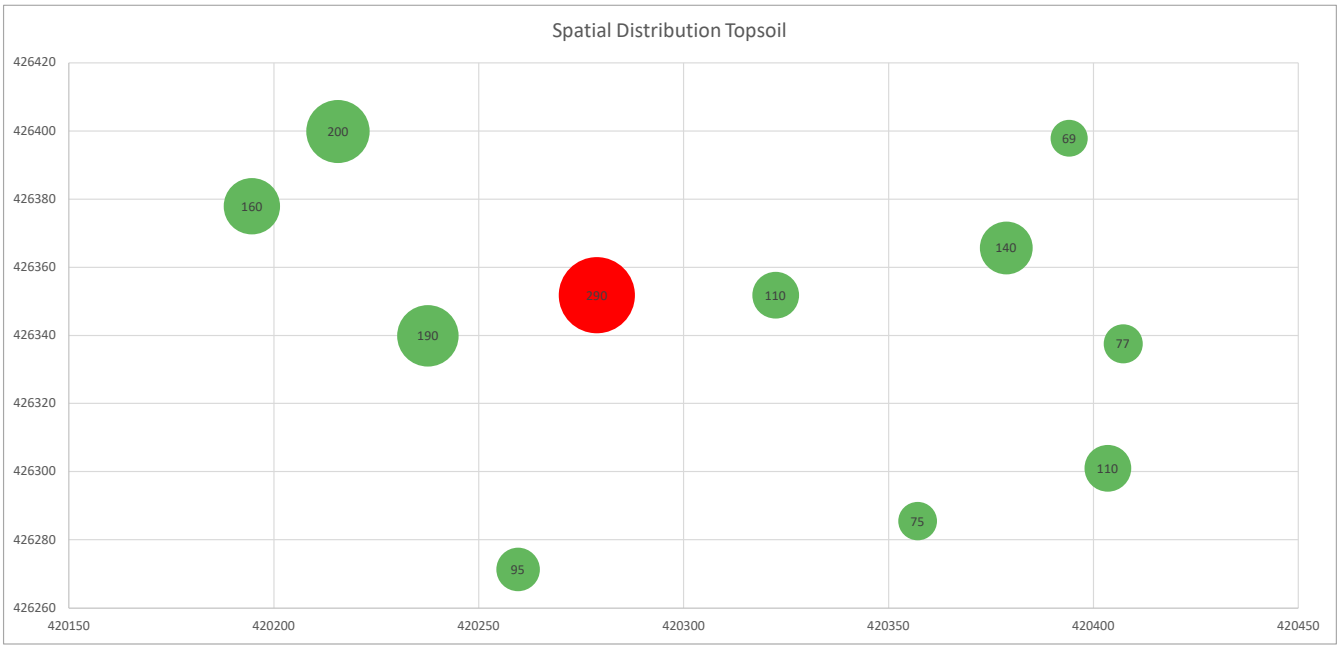
Cliffe Lane, Gomersal

Job No: 5685
Engineer: CC
Date: 13 March 2026

Topsoil: Dataset for Pb - Dot & Box Plots and Summary Statistics

Determinant	Pb
Critical concentration	200.00
No. samples	11.00
Max	290.00
Mean	124.67
Min	69.00
Median	110.00
Standard Deviation	67.83
Standard Error	20.45
T value	2.23
Upper Confidence Level (95%)	170.24
Upper Confidence Level (80%)	152.73
Lower Confidence Level (5%)	84.59
Transform data	Normal
Upper Confidence Level for chart	95%





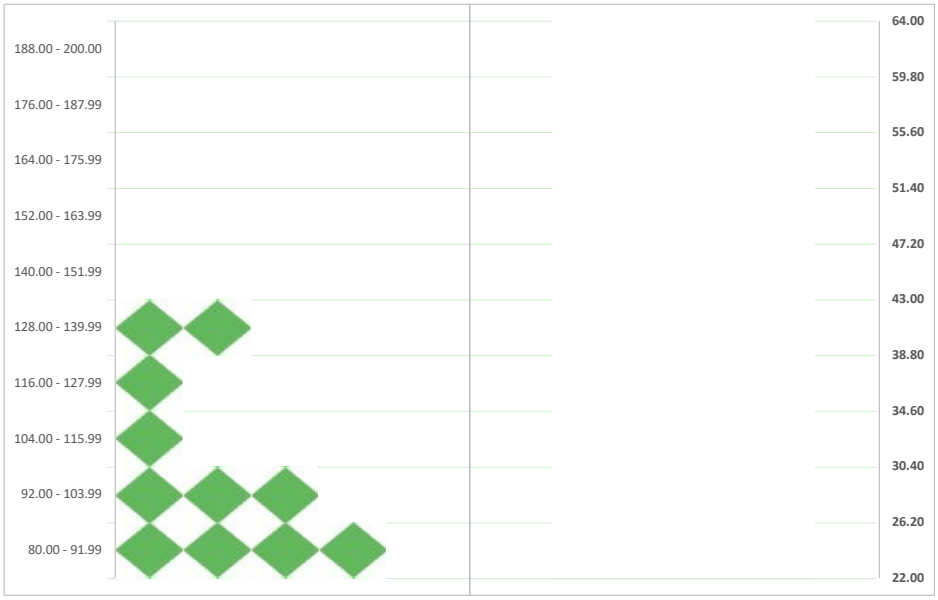
Spatial distribution can show sampling clusters based on ground type it **does not** identify areas of contamintion

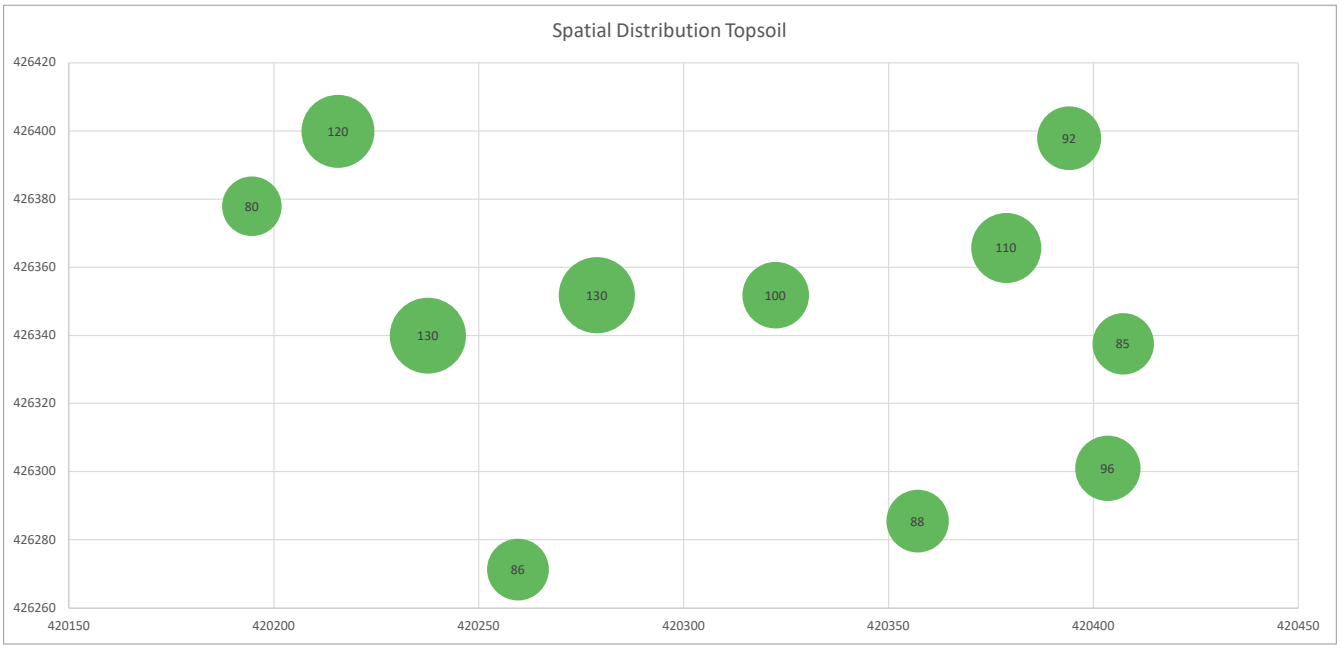
Cliffe Lane, Gomersal

Job No: 5685
Engineer: CC
Date: 13 March 2026

Topsoil: Dataset for Zn - Dot & Box Plots and Summary Statistics

Determinant	Zn
Critical concentration	200.00
No. samples	11.00
Max	130.00
Mean	101.55
Min	80.00
Median	96.00
Standard Deviation	18.22
Standard Error	5.49
T value	2.23
Upper Confidence Level (95%)	113.78
Upper Confidence Level (80%)	109.08
Lower Confidence Level (5%)	90.78
Transform data	Normal
Upper Confidence Level for chart	95%





Spatial distribution can show sampling clusters based on ground type it **does not** identify areas of contamintion

CLEA Software Version 1.071

Report generated	17-Apr-26
Report title	Cliffe Lane, Gomersal
Created by	Julia Reynolds at Lithos Consulting

RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group						
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	Arsenic (C4SL child)	3.95E+02	5.26E+02	NR	1.00	0.75	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
2	Arsenic (C4SL adult)	3.95E+02	2.30E+02	NR	0.58	1.00	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
3	Arsenic	5.23E+02	1.21E+02	NR	0.23	1.00	NR	NR	No	No	Yes	No	No	No	No	No	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group					
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Arsenic (C4SL child)	99.9	0.1	0.0	100.0	3.95E+02	NR	1.97E+02	1.68E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-01	1.58E-01	9.07E-02	1.30E-01	7.89E-02	4.34E-01
2	Arsenic (C4SL adult)	99.9	0.1	0.0	100.0	2.30E+02	NR	1.15E+02	9.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.88E-02	9.19E-02	5.29E-02	7.59E-02	4.60E-02	2.53E-01
3	Arsenic	99.9	0.1	0.0	100.0	1.21E+02	NR	6.05E+01	5.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-02	4.84E-02	2.78E-02	3.99E-02	2.42E-02	1.33E-01
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Environment Agency

	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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Environment Agency

		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Arsenic (C4SL child)	5.85E-05	2.02E-04	3.91E-05	6.52E-06	0.00E+00	0.00E+00	0.00E+00	19.51	67.45	13.05	0.00	0.00	0.00	0.00	0.00
2	Arsenic (C4SL adult)	3.41E-05	1.18E-04	2.28E-05	3.80E-06	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
3	Arsenic	1.79E-05	3.95E-05	1.20E-05	2.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
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Environment Agency

	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency

		Oral Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)		Inhalation Health Criteria Value ($\mu g\ kg^{-1}\ BW\ day^{-1}$)		Oral Mean Daily Intake ($\mu g\ day^{-1}$)	Inhalation Mean Daily Intake ($\mu g\ day^{-1}$)	Air-water partition coefficient ($K_{s,w}$) ($cm^3\ cm^{-3}$)	Coefficient of Diffusion in Air ($m^2\ s^{-1}$)	Coefficient of Diffusion in Water ($m^2\ s^{-1}$)	log K_{oc} ($cm^3\ g^{-1}$)	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor ($g\ g^{-1}$ DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Arsenic (C4SL child)	ID	0.3	ID	0.0087	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.02**	1
2	Arsenic (C4SL adult)	ID	0.3	ID	0.0038	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.02**	1
3	Arsenic	ID	0.3	ID	0.002	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.02**	1
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Environment Agency

	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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		Soil-to-water partition coefficient ($cm^3\ g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg\ L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Arsenic (C4SL child)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
2	Arsenic (C4SL adult)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
3	Arsenic	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
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	Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)
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Report generated	17-Apr-26
Report title	Cliffe Lane, Gomersal
Created by	Julia Reynolds at Lithos Consutling

RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group						
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	Arsenic (C4SL child)	3.05E+02	5.26E+02	NR	1.00	0.58	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
2	Arsenic (C4SL adult)	3.05E+02	2.30E+02	NR	0.75	1.00	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
3	Arsenic	3.76E+02	1.21E+02	NR	0.32	1.00	NR	NR	No	No	Yes	No	No	No	No	No	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group					
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Arsenic (C4SL child)	99.9	0.1	0.0	100.0	3.05E+02	NR	1.52E+02	1.30E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-01	1.22E-01	7.01E-02	1.01E-01	6.09E-02	3.35E-01
2	Arsenic (C4SL adult)	99.9	0.1	0.0	100.0	2.30E+02	NR	1.15E+02	9.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.88E-02	9.19E-02	5.29E-02	7.59E-02	4.60E-02	2.53E-01
3	Arsenic	99.9	0.1	0.0	100.0	1.21E+02	NR	6.05E+01	5.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-02	4.84E-02	2.78E-02	3.99E-02	2.42E-02	1.33E-01
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Environment Agency

	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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Environment Agency

		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Arsenic (C4SL child)	1.13E-04	1.57E-04	3.02E-05	5.04E-06	0.00E+00	0.00E+00	0.00E+00	37.66	52.27	10.07	0.00	0.00	0.00	0.00	0.00
2	Arsenic (C4SL adult)	8.52E-05	1.18E-04	2.28E-05	3.80E-06	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
3	Arsenic	4.49E-05	3.96E-05	1.20E-05	2.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
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Environment Agency

	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency

		Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Arsenic (C4SL child)	ID	0.3	ID	0.0087	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.05**	1
2	Arsenic (C4SL adult)	ID	0.3	ID	0.0038	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.05**	1
3	Arsenic	ID	0.3	ID	0.002	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.05**	1
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Environment Agency

	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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		Soil-to-water partition coefficient ($cm^3\ g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg\ L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Arsenic (C4SL child)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
2	Arsenic (C4SL adult)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
3	Arsenic	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
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	Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit ($mg g^{-1}$ plant DW or FW basis over $mg g^{-1}$ DW soil)	Soil-to-plant concentration factor for tree fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)
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RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group						
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	Arsenic (C4SL child)	2.21E+02	5.26E+02	NR	1.00	0.42	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
2	Arsenic (C4SL adult)	2.21E+02	2.30E+02	NR	1.00	0.96	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
3	Arsenic	2.56E+02	1.21E+02	NR	0.47	1.00	NR	NR	No	No	Yes	No	No	No	No	No	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group					
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Arsenic (C4SL child)	99.9	0.1	0.0	100.0	2.21E+02	NR	1.10E+02	9.40E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-02	8.83E-02	5.08E-02	7.29E-02	4.42E-02	2.43E-01
2	Arsenic (C4SL adult)	99.9	0.1	0.0	100.0	2.21E+02	NR	1.10E+02	9.40E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-02	8.83E-02	5.08E-02	7.29E-02	4.42E-02	2.43E-01
3	Arsenic	99.9	0.1	0.0	100.0	1.21E+02	NR	6.05E+01	5.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-02	4.84E-02	2.78E-02	3.99E-02	2.42E-02	1.33E-01
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	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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Environment Agency

		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Arsenic (C4SL child)	1.64E-04	1.14E-04	2.19E-05	3.65E-06	0.00E+00	0.00E+00	0.00E+00	54.59	38.11	7.30	0.00	0.00	0.00	0.00	0.00
2	Arsenic (C4SL adult)	1.64E-04	1.14E-04	2.19E-05	3.65E-06	0.00E+00	0.00E+00	0.00E+00	54.59	38.11	7.30	0.00	0.00	0.00	0.00	0.00
3	Arsenic	8.97E-05	3.99E-05	1.20E-05	2.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
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Environment Agency

	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency

		Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Arsenic (C4SL child)	ID	0.3	ID	0.0087	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.1**	1
2	Arsenic (C4SL adult)	ID	0.3	ID	0.0038	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.1**	1
3	Arsenic	ID	0.3	ID	0.002	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.1**	1
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Environment Agency

	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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		Soil-to-water partition coefficient ($cm^3\ g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg\ L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Arsenic (C4SL child)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
2	Arsenic (C4SL adult)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
3	Arsenic	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
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	Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)
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CLEA Software Version 1.071

Report generated	17-Apr-26
Report title	Cliffe Lane, Gomersal
Created by	Julia Reynolds at Lithos Consulting

RESULTS

Environment Agency

		Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group						
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
1	Arsenic (C4SL child)	6.90E+01	5.26E+02	NR	1.00	0.13	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
2	Arsenic (C4SL adult)	6.90E+01	2.30E+02	NR	1.00	0.30	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
3	Arsenic	7.22E+01	1.21E+02	NR	1.00	0.60	NR	NR	No	No	Yes	No	No	No	No	No	No
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Environment Agency

	Assessment Criterion (mg kg^{-1})			Ratio of ADE to HCV			Saturation Limit (mg kg^{-1})	50% rule?		Top Two applied?	Apply Top 2 Approach to Produce Group					
	oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal		Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
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Environment Agency

		Soil Distribution				Media Concentrations													
		Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
		%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
1	Arsenic (C4SL child)	99.9	0.1	0.0	100.0	6.90E+01	NR	3.45E+01	2.94E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-02	2.76E-02	1.59E-02	2.28E-02	1.38E-02	7.59E-02
2	Arsenic (C4SL adult)	99.9	0.1	0.0	100.0	6.90E+01	NR	3.45E+01	2.94E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-02	2.76E-02	1.59E-02	2.28E-02	1.38E-02	7.59E-02
3	Arsenic	99.9	0.1	0.0	100.0	7.22E+01	NR	3.61E+01	3.07E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	2.89E-02	1.66E-02	2.38E-02	1.44E-02	7.94E-02
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Environment Agency

	Soil Distribution				Media Concentrations													
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg^{-1}	mg m^{-3}	mg kg^{-1}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg m^{-3}	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW	mg kg^{-1} FW
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Environment Agency

		Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
		Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1	Arsenic (C4SL child)	2.56E-04	3.74E-05	6.84E-06	1.14E-06	0.00E+00	0.00E+00	0.00E+00	85.26	12.46	2.28	0.00	0.00	0.00	0.00	0.00
2	Arsenic (C4SL adult)	2.56E-04	3.74E-05	6.84E-06	1.14E-06	0.00E+00	0.00E+00	0.00E+00	85.26	12.46	2.28	0.00	0.00	0.00	0.00	0.00
3	Arsenic	2.68E-04	2.52E-05	7.16E-06	1.19E-06	0.00E+00	0.00E+00	0.00E+00	89.22	8.39	2.39	0.00	0.00	0.00	0.00	0.00
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Environment Agency

	Average Daily Exposure (mg kg^{-1} bw day^{-1})							Distribution by Pathway (%)							
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency

		Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1	Arsenic (C4SL child)	ID	0.3	ID	0.0087	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.5**	1
2	Arsenic (C4SL adult)	ID	0.3	ID	0.0038	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.5**	1
3	Arsenic	ID	0.3	ID	0.002	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	**0.5**	1
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	Oral Health Criteria Value (µg kg^{-1} BW day^{-1})		Inhalation Health Criteria Value (µg kg^{-1} BW day^{-1})		Oral Mean Daily Intake (µg day^{-1})	Inhalation Mean Daily Intake (µg day^{-1})	Air-water partition coefficient ($K_{s,w}$) (cm^3 cm^{-3})	Coefficient of Diffusion in Air (m^2 s^{-1})	Coefficient of Diffusion in Water (m^2 s^{-1})	log K_{oc} (cm^3 g^{-1})	log K_{ow} (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g^{-1} DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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		Soil-to-water partition coefficient ($cm^3\ g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg\ L^{-1}$)	Soil-to-plant concentration factor for green vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit (mg g^{-1} plant DW or FW basis over mg g^{-1} DW soil)
1	Arsenic (C4SL child)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
2	Arsenic (C4SL adult)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
3	Arsenic	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw
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	Soil-to-water partition coefficient ($cm^3 g^{-1}$)	Vapour pressure (Pa)	Water solubility ($mg L^{-1}$)	Soil-to-plant concentration factor for green vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for root vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tuber vegetables ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for herbaceous fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for shrub fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)	Soil-to-plant concentration factor for tree fruit ($mg g^{-1}$ plant DW or FW basis over mg g^{-1} DW soil)
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Appendix I

Geotechnical Test Results

LABORATORY REPORT

Contract Number: PSL26/1894

Report Date: 21 March 2026

Client's Reference: 5685

Client Name: Lithos Consulting
Parkhill
Walton Road
Wetherby
North Yorkshire
LS22 5DZ

For the attention of: Charlotte Copley

Contract Title: Cliffe Lane, Gomersal

Date Received: 5/3/2026
Date Commenced: 5/3/2026
Date Completed: 21/3/2026

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Managing Director)	R Berriman (Associate Director)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

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Doncaster,
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Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP102	2	D	0.80		Brown mottled grey slightly sandy CLAY.
TP103	2	D	0.80		Brown mottled grey slightly sandy CLAY.
TP105	1	D	0.80		Brown mottled grey slightly sandy CLAY.
TP106	2	D	0.90		Brown mottled grey slightly sandy CLAY.
TP107	1	D	0.80		Brown mottled grey slightly sandy CLAY.
TP108	2	D	0.90		Brown mottled grey slightly sandy CLAY.
TP112	2	D	0.80		Brown mottled grey slightly sandy CLAY.
TP113	2	D	0.70		Brown mottled grey slightly sandy CLAY.
TP114	2	D	1.20		Brown mottled grey slightly sandy CLAY.
TP115	2	D	1.20		Brown mottled grey slightly sandy CLAY.
TP116	2	D	0.80		Brown mottled grey slightly sandy CLAY.
TP117	2	D	1.00		Brown mottled grey slightly sandy CLAY.
TP118	2	D	0.70		Brown mottled grey slightly sandy CLAY.
TP103	1	B	0.20		Brown slightly sandy slightly gravelly CLAY.
TP112	1	B	0.30		Brown slightly sandy slightly gravelly CLAY.
TP115	1	B	0.30		Brown slightly sandy slightly gravelly CLAY.
TP119	1	B	0.20		Brown slightly sandy slightly gravelly CLAY.

SUMMARY OF SOIL CLASSIFICATION TESTS

BS 1377 - Part 2 : 2022 in accordance with BS EN ISO 17892 (as below)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Water Content %	Linear Shrinkage	Particle Density Mg/m^3	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 0.425mm %	Remarks
TP102	2	D	0.80		25.7			50	24	26	100	High Plasticity CIH
TP103	2	D	0.80		32.4			61	27	34	100	High Plasticity CIH
TP105	1	D	0.80		26.3			59	26	33	100	High Plasticity CIH
TP106	2	D	0.90		26.9			57	25	32	100	High Plasticity CIH
TP107	1	D	0.80		34.5			68	28	40	100	High Plasticity CIH
TP108	2	D	0.90		21.9			44	21	23	100	Medium Plasticity CIM
TP112	2	D	0.80		28.5			64	27	37	100	High Plasticity CIH
TP113	2	D	0.70		25.6			56	25	31	100	High Plasticity CIH
TP114	2	D	1.20		22.9			55	25	30	100	High Plasticity CIH
TP115	2	D	1.20		16.2			43	20	23	100	Medium Plasticity CIM
TP116	2	D	0.80		34.6			61	26	35	100	High Plasticity CIH
TP117	2	D	1.00		23.9			65	27	38	100	High Plasticity CIH
TP118	2	D	0.70		25.1			59	26	33	100	High Plasticity CIH

Water Content - BS 1377 - Part 2 : 2022 : Clause 4 in accordance with BS EN ISO 17892 - 1 : 2014 + A1 : 2022
Linear Shrinkage - BS 1377 - Part 2 : 2022 : Clause 7
Particle Density (Gas Jar method) - BS 1377 - Part 2 : 2022 : Clause 9
Liquid, Plastic Limit & Plasticity Index - BS 1377 - Part 2 : 2022 : Clause 5 & 6 in accordance with BS EN ISO 17892 - 12 : 2018 + A2 : 2022

SYMBOLS : NP = Non Plastic

UKAS TESTING 4043

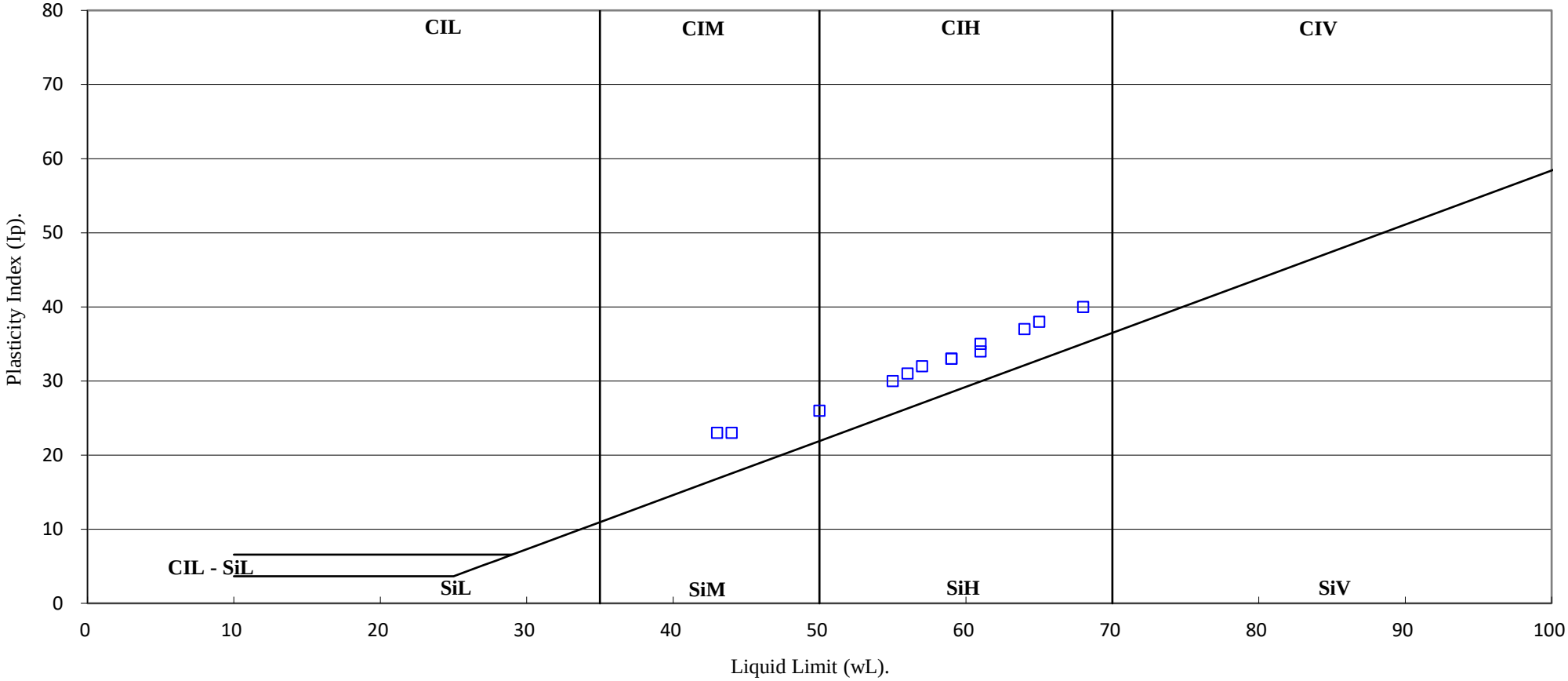
PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Cliffe Lane, Gomersal

Contract No:
PSL26/1894
Client Ref:
5685

PLASTICITY CHART

BS EN ISO 14688-2:2017 Clause 4.4



UKAS TESTING 4043 / PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY	**Cliffe Lane, Gomersal**	**Contract No:**
		PSL26/1894
		Client Ref:
		5685

PARTICLE SIZE DISTRIBUTION TEST

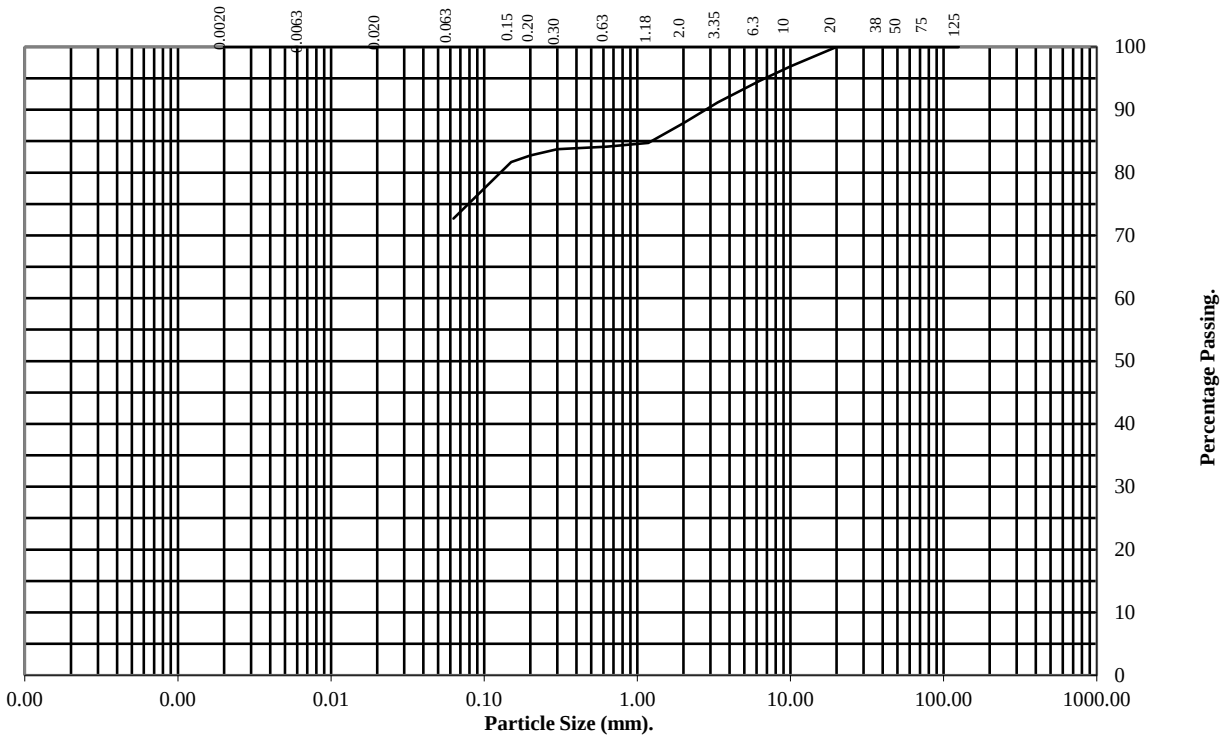
BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2

Hole Number: TP103 **Top Depth (m):** 0.20

Sample Number: 1 **Base Depth (m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
50	100
37.5	100
20	100
10	97
6.3	95
3.35	91
2	88
1.18	85
0.63	84
0.3	84
0.2	83
0.15	82
0.063	73

Soil Fraction	Total Percentage
Cobbles	0
Gravel	12
Sand	15
Silt/Clay	73

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Cliffe Lane, Gomersal

Contract No: PSL26/1894

Client Ref: 5685

PARTICLE SIZE DISTRIBUTION TEST

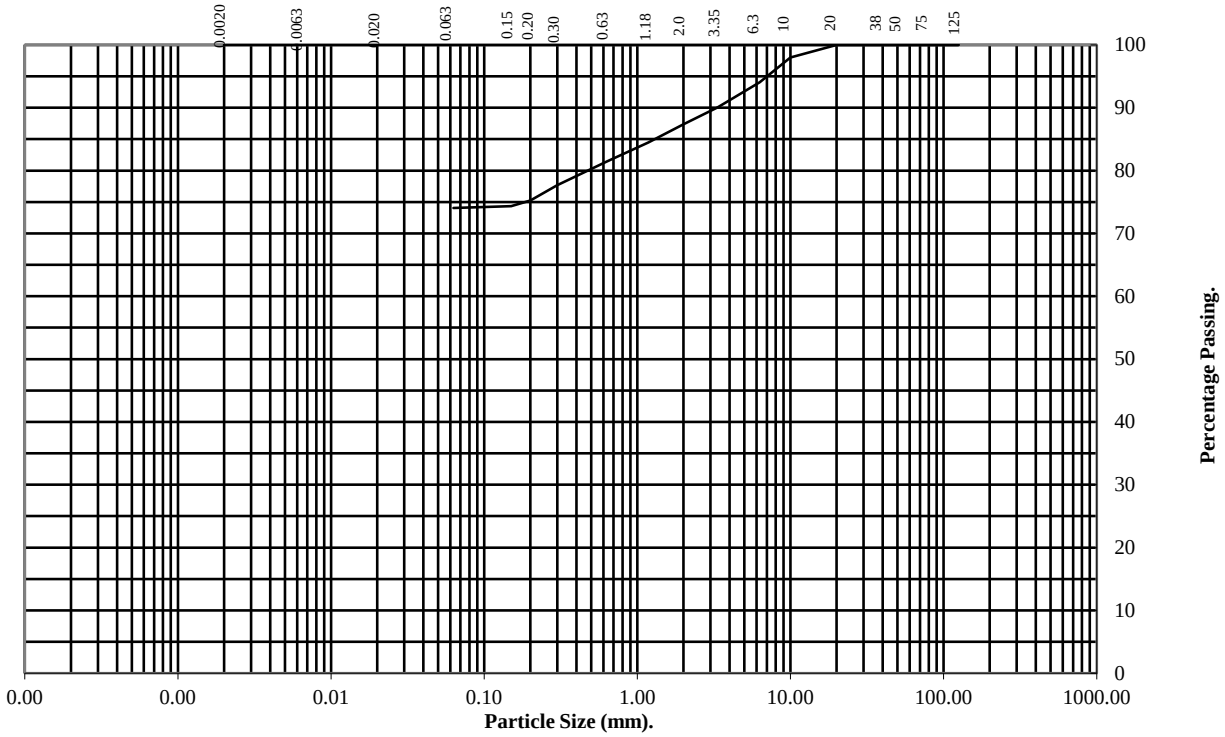
BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2

Hole Number: TP112 **Top Depth (m):** 0.30

Sample Number: 1 **Base Depth (m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
50	100
37.5	100
20	100
10	98
6.3	94
3.35	90
2	87
1.18	84
0.63	81
0.3	78
0.2	75
0.15	74
0.063	74

Soil Fraction	Total Percentage
Cobbles	0
Gravel	13
Sand	13
Silt/Clay	74

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Cliffe Lane, Gomersal

Contract No: PSL26/1894

Client Ref: 5685

PARTICLE SIZE DISTRIBUTION TEST

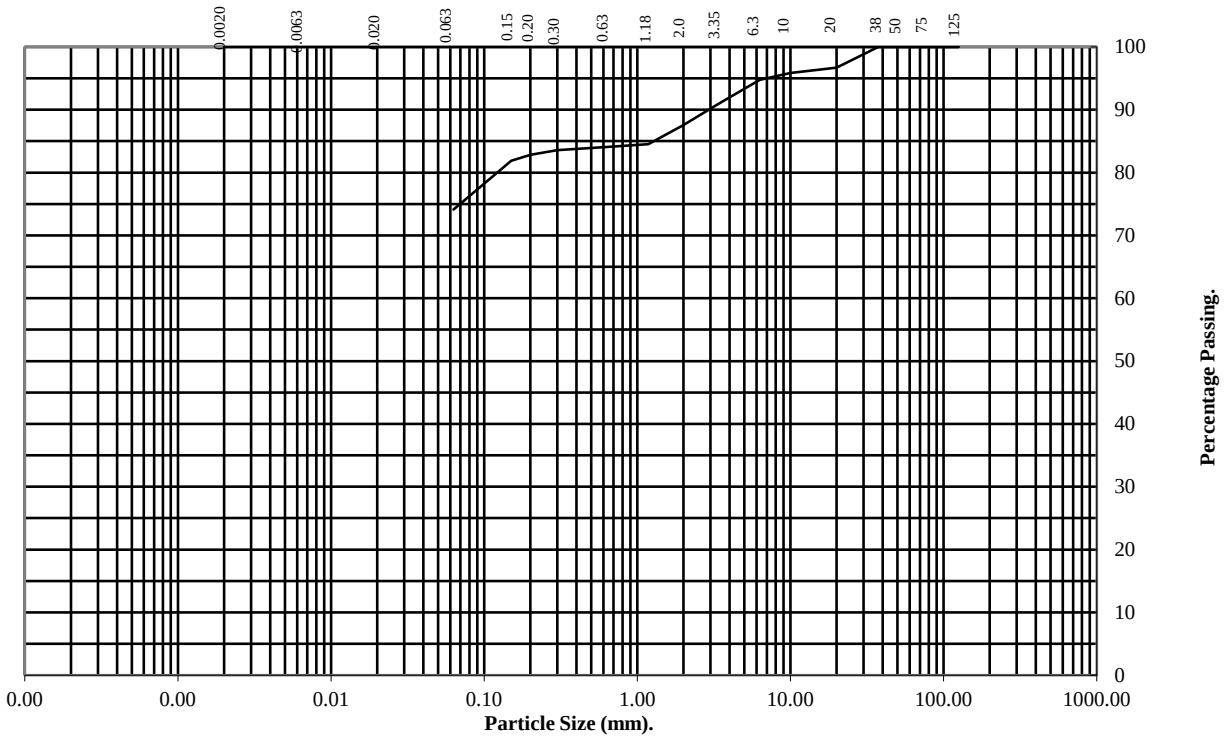
BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2

Hole Number: TP115 **Top Depth (m):** 0.30

Sample Number: 1 **Base Depth (m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
50	100
37.5	100
20	97
10	96
6.3	95
3.35	91
2	88
1.18	85
0.63	84
0.3	84
0.2	83
0.15	82
0.063	74

Soil Fraction	Total Percentage
Cobbles	0
Gravel	12
Sand	14
Silt/Clay	74

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Cliffe Lane, Gomersal

Contract No: PSL26/1894

Client Ref: 5685

PARTICLE SIZE DISTRIBUTION TEST

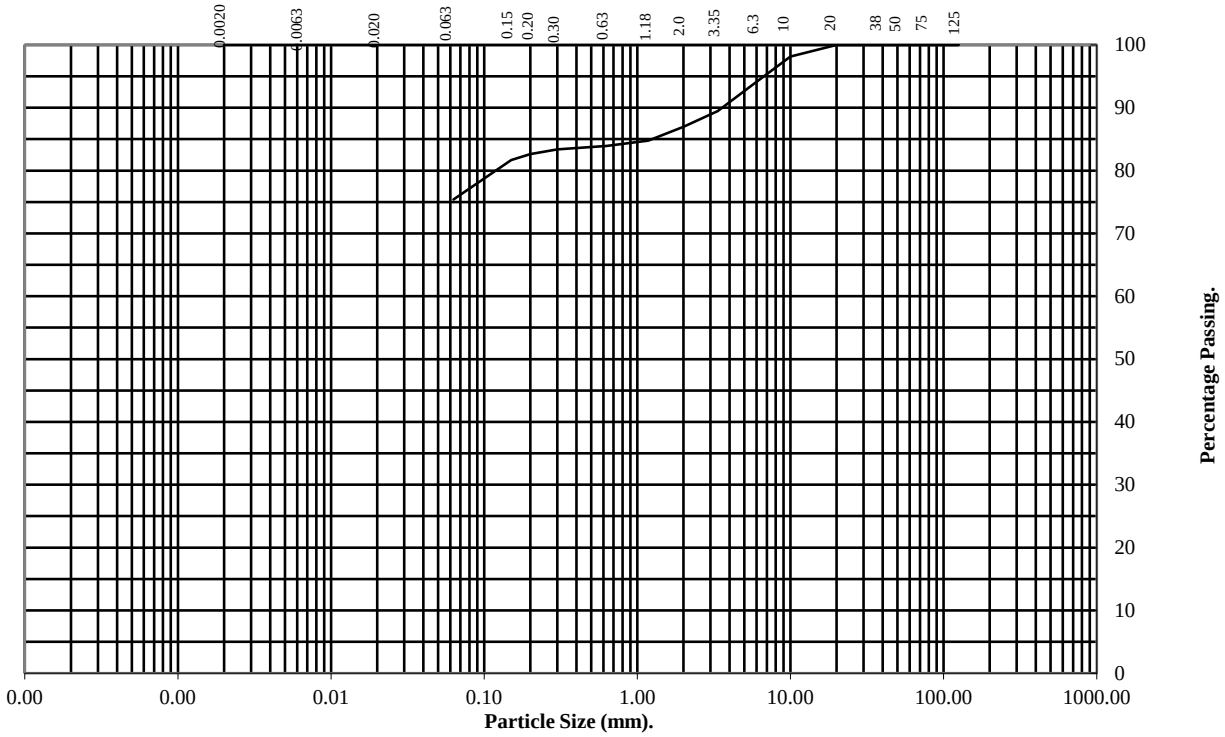
BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2

Hole Number: TP119 **Top Depth (m):** 0.20

Sample Number: 1 **Base Depth (m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
50	100
37.5	100
20	100
10	98
6.3	94
3.35	89
2	87
1.18	85
0.63	84
0.3	83
0.2	83
0.15	82
0.063	75

Soil Fraction	Total Percentage
Cobbles	0
Gravel	13
Sand	12
Silt/Clay	75

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Cliffe Lane, Gomersal

Contract No: PSL26/1894

Client Ref: 5685

Analytical Test Report	**E26/03237/PSL/26-10149**	**Tested on Behalf of**
Clients Project Reference	PSL26/1894 Cliffe Lane, Gomersal	Professional Soils Laboratory
Clients Order Number	PSL26/1894	5/7 Hexthorpe Road
Sample(s) Analysed	16	Hexthorpe
Sample(s) received / instructed	10/03/2026 / 10/03/2026	Doncaster
Sample(s) Tested	10/03/2026 to 13/03/2026	
Report issued	17/03/2026	DN4 0AR
Report issue number	1	

Signed

James Gane
Analytical Services Manager

Notes:

General

This report shall not be reproduce except in full

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples were supplied by customer, results apply to the samples as received.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

U = UKAS Accreditation, M = MCERTS Accreditation, N = Unaccredited, SC = Subcontracted

E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - ENV Analysis Solids

Lab Reference					726826	726827	726828
Client Sample ID					-	-	-
Client Sample Location					TP102	TP103	TP105
Client Sample Type					D	D	D
Client Sample Number					2	2	1
Depth - Top (m)					0.8	0.8	0.8
Depth - Bottom (m)					0.8	0.8	0.8
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
Water Soluble Sulphate (as SO4)	ANIONSS	mg/L	10	N	11	12	15
pH	PHSBRE	pH units	1	M	6.9	7.1	6.7

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

Testing performed at
7-11 Harding Street, Leicester, LE1 4DH

UKAS TESTING 4161
mCERTS

E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - ENV Analysis Solids

Lab Reference					726829	726830	726831
Client Sample ID					-	-	-
Client Sample Location					TP106	TP107	TP108
Client Sample Type					D	D	D
Client Sample Number					2	1	2
Depth - Top (m)					0.9	0.8	0.9
Depth - Bottom (m)					0.9	0.8	0.9
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
Water Soluble Sulphate (as SO4)	ANIONSS	mg/L	10	N	< 10	10	12
pH	PHSBRE	pH units	1	M	7.2	6.7	6.8

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

Testing performed at
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UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - ENV Analysis Solids

Lab Reference					726832	726833	726834
Client Sample ID					-	-	-
Client Sample Location					TP112	TP113	TP114
Client Sample Type					D	D	D
Client Sample Number					2	2	2
Depth - Top (m)					0.8	0.7	1.2
Depth - Bottom (m)					0.8	0.7	1.2
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
Water Soluble Sulphate (as SO4)	ANIONSS	mg/L	10	N	20	19	14
pH	PHSBRE	pH units	1	M	7.0	6.6	7.5

Date of Issue: 21.01.25
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UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - ENV Analysis Solids

Lab Reference					726835	726836	726837
Client Sample ID					-	-	-
Client Sample Location					TP115	TP116	TP117
Client Sample Type					D	D	D
Client Sample Number					2	2	2
Depth - Top (m)					1.2	0.8	1
Depth - Bottom (m)					1.2	0.8	1
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
Water Soluble Sulphate (as SO4)	ANIONSS	mg/L	10	N	43	24	38
pH	PHSBRE	pH units	1	M	6.2	7.7	7.5

Date of Issue: 21.01.25
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Issue No: 1
Rev No: 9

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UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - ENV Analysis Solids

Lab Reference					726838	726839	726840
Client Sample ID					-	-	-
Client Sample Location					TP118	TP111	TP119
Client Sample Type					D	D	D
Client Sample Number					2	2	2
Depth - Top (m)					0.7	1.4	0.5
Depth - Bottom (m)					0.7	1.4	0.5
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
Water Soluble Sulphate (as SO4)	ANIONSS	mg/L	10	N	11	< 10	< 10
pH	PHSBRE	pH units	1	M	7.6	6.3	6.8

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

Testing performed at
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - ENV Analysis Solids

Lab Reference					726841
Client Sample ID					-
Client Sample Location					TP121
Client Sample Type					D
Client Sample Number					2
Depth - Top (m)					1.3
Depth - Bottom (m)					1.3
Date of Sampling					24/02/2026
Time of Sampling					-
Sample Matrix					Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**	
Water Soluble Sulphate (as SO4)	ANIONSS	mg/L	10	N	24
pH	PHSBRE	pH units	1	M	6.9

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

Testing performed at
7-11 Harding Street, Leicester, LE1 4DH

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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - BRE 1377 and TRLs

Lab Reference					726826	726827	726828
Client Sample ID					-	-	-
Client Sample Location					TP102	TP103	TP105
Client Sample Type					D	D	D
Client Sample Number					2	2	1
Depth - Top (m)					0.8	0.8	0.8
Depth - Bottom (m)					0.8	0.8	0.8
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
pH	PHSBRE	pH units	1	M	6.9	7.1	6.7

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

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7-11 Harding Street, Leicester, LE1 4DH

UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - BRE 1377 and TRLs

Lab Reference					726829	726830	726831
Client Sample ID					-	-	-
Client Sample Location					TP106	TP107	TP108
Client Sample Type					D	D	D
Client Sample Number					2	1	2
Depth - Top (m)					0.9	0.8	0.9
Depth - Bottom (m)					0.9	0.8	0.9
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
pH	PHSBRE	pH units	1	M	7.2	6.7	6.8

Date of Issue: 21.01.25
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UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - BRE 1377 and TRLs

Lab Reference					726832	726833	726834
Client Sample ID					-	-	-
Client Sample Location					TP112	TP113	TP114
Client Sample Type					D	D	D
Client Sample Number					2	2	2
Depth - Top (m)					0.8	0.7	1.2
Depth - Bottom (m)					0.8	0.7	1.2
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
pH	PHSBRE	pH units	1	M	7.0	6.6	7.5

Date of Issue: 21.01.25
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UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - BRE 1377 and TRLs

Lab Reference					726835	726836	726837
Client Sample ID					-	-	-
Client Sample Location					TP115	TP116	TP117
Client Sample Type					D	D	D
Client Sample Number					2	2	2
Depth - Top (m)					1.2	0.8	1
Depth - Bottom (m)					1.2	0.8	1
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
pH	PHSBRE	pH units	1	M	6.2	7.7	7.5

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
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Testing performed at
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UKAS TESTING 4161
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E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - BRE 1377 and TRLs

Lab Reference					726838	726839	726840
Client Sample ID					-	-	-
Client Sample Location					TP118	TP111	TP119
Client Sample Type					D	D	D
Client Sample Number					2	2	2
Depth - Top (m)					0.7	1.4	0.5
Depth - Bottom (m)					0.7	1.4	0.5
Date of Sampling					24/02/2026	24/02/2026	24/02/2026
Time of Sampling					-	-	-
Sample Matrix					Clay	Clay	Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**			
pH	PHSBRE	pH units	1	M	7.6	6.3	6.8

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

Testing performed at
7-11 Harding Street, Leicester, LE1 4DH

UKAS TESTING 4161
mCERTS

E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analytical Test Results - BRE 1377 and TRLs

Lab Reference					726841
Client Sample ID					-
Client Sample Location					TP121
Client Sample Type					D
Client Sample Number					2
Depth - Top (m)					1.3
Depth - Bottom (m)					1.3
Date of Sampling					24/02/2026
Time of Sampling					-
Sample Matrix					Clay
Determinant	**Code**	**Units**	**LOD**	**Accreditation**	
pH	PHSBRE	pH units	1	M	6.9

Date of Issue: 21.01.25
Issued by: J. Gane
Issue No: 1
Rev No: 9

Testing performed at
7-11 Harding Street, Leicester, LE1 4DH

UKAS TESTING 4161
mCERTS

E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
726826	-	TP102	SOIL	-	Mottled brown grey silty clay	-	-	100
726827	-	TP103	SOIL	-	Mottled brown grey silty clay	-	-	100
726828	-	TP105	SOIL	-	Mottled brown grey silty clay	-	-	100
726829	-	TP106	SOIL	-	Mottled brown grey silty clay	-	-	100
726830	-	TP107	SOIL	-	Mottled brown grey silty clay	-	-	100
726831	-	TP108	SOIL	-	Mottled brown grey silty clay	-	-	100
726832	-	TP112	SOIL	-	Mottled brown grey silty clay	-	-	100
726833	-	TP113	SOIL	-	Grey silty clay	-	-	100
726834	-	TP114	SOIL	-	Dark grey silty clay	-	-	100
726835	-	TP115	SOIL	-	Mottled brown grey silty clay	-	-	100
726836	-	TP116	SOIL	-	Mottled brown grey silty clay	-	-	100
726837	-	TP117	SOIL	-	Grey silty clay	-	-	100
726838	-	TP118	SOIL	-	Mottled brown grey silty clay	-	-	100
726839	-	TP111	SOIL	-	Brown silty clay with frequent mudstone	-	-	100
726840	-	TP119	SOIL	-	Brown silty clay with frequent mudstone	-	-	100
726841	-	TP121	SOIL	-	Brown silty clay with frequent mudstone	-	-	100

UKAS TESTING 4161
mCERTS

E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Analysis Methodologies - Please refer to sample comments page (if present) for any changes to methods Methods

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHSBRE	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis

UKAS TESTING 4161
mCERTS

E26/03237/PSL/26-10149

PSL26/1894 Cliffe Lane, Gomersal

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
W - No time of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 2 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
726826		TP102			MS - CL - pH in Soils	R X
726827		TP103			MS - CL - pH in Soils	R X
726828		TP105			MS - CL - pH in Soils	R X
726829		TP106			MS - CL - pH in Soils	R X
726830		TP107			MS - CL - pH in Soils	R X
726831		TP108			MS - CL - pH in Soils	R X
726832		TP112			MS - CL - pH in Soils	R X
726833		TP113			MS - CL - pH in Soils	R X
726834		TP114			MS - CL - pH in Soils	R X
726835		TP115			MS - CL - pH in Soils	R X
726836		TP116			MS - CL - pH in Soils	R X
726837		TP117			MS - CL - pH in Soils	R X
726838		TP118			MS - CL - pH in Soils	R X
726839		TP111			MS - CL - pH in Soils	R X
726840		TP119			MS - CL - pH in Soils	R X
726841		TP121			MS - CL - pH in Soils	R X

Testing performed at
7-11 Harding Street, Leicester, LE1 4DH

UKAS TESTING 4161
MCERTS