GeoReports

British Geological Survey

Example Report
BGS Keyworth

Geological Assessment: Area

This report contains a geological description of the specified site or area. It is based on currently available 1:10 000 scale geological maps, unless otherwise stated, together with other relevant local information such as borehole records. The report includes extracts from digitised 1:50 000 scale geological maps (DigMapGB-50).

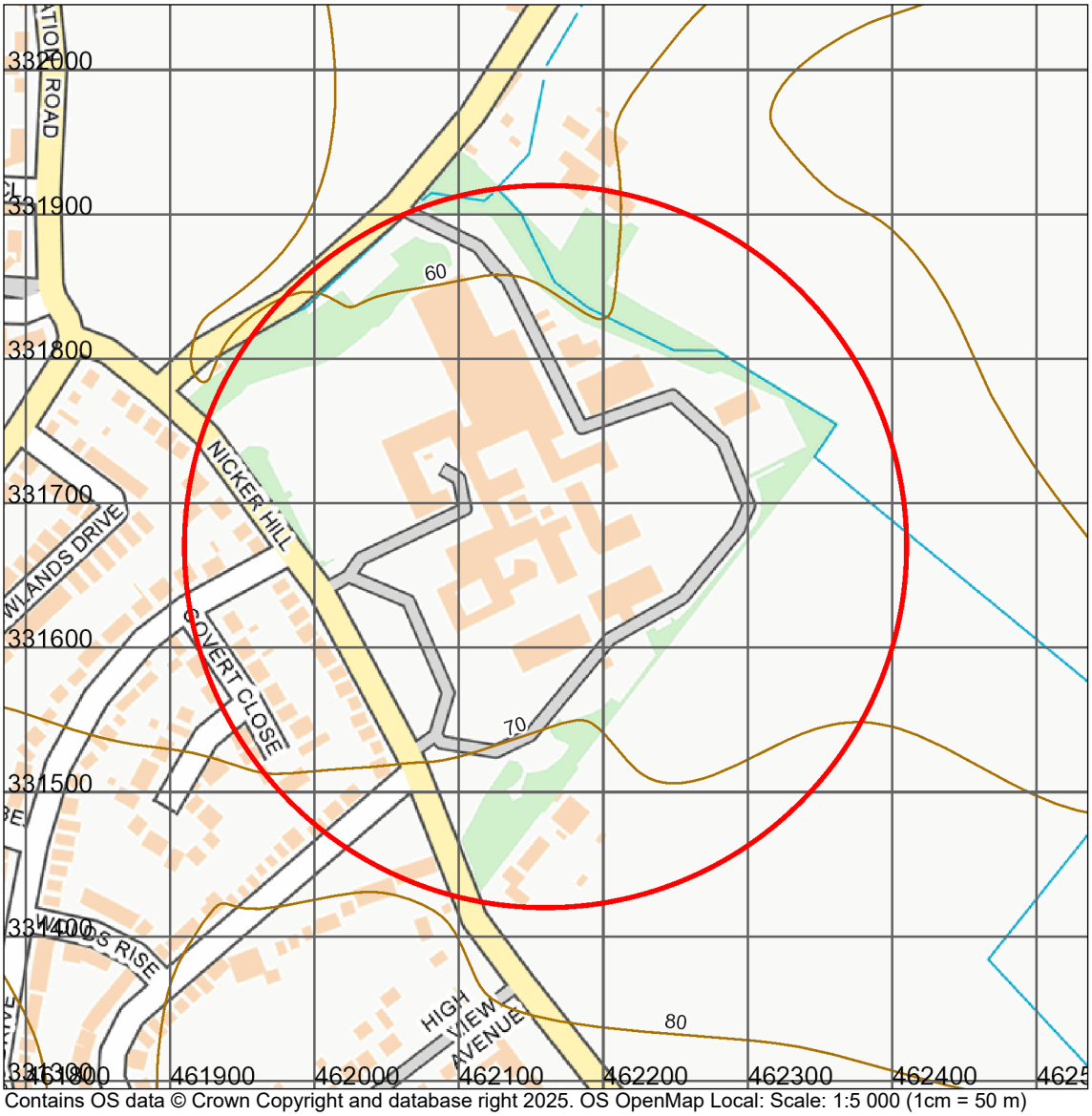
The report contains the following modules:

Geological Map Extracts
Geological Assessment (area)
Geological Cross Section
Geologists Assessment of Geohazard Potential
Hydrogeology (non abstraction)
Engineering Geological and Drilling Considerations
Geoscience Data List

Report Id: ***GR_999999/1***

Client reference:

Search location



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Search location indicated in red

Site Address:

British Geological Survey
Keyworth

Area centred at: 462160,331670
Radius of site area: 250 metres

Geological Map Extracts 1:10,000 Scale

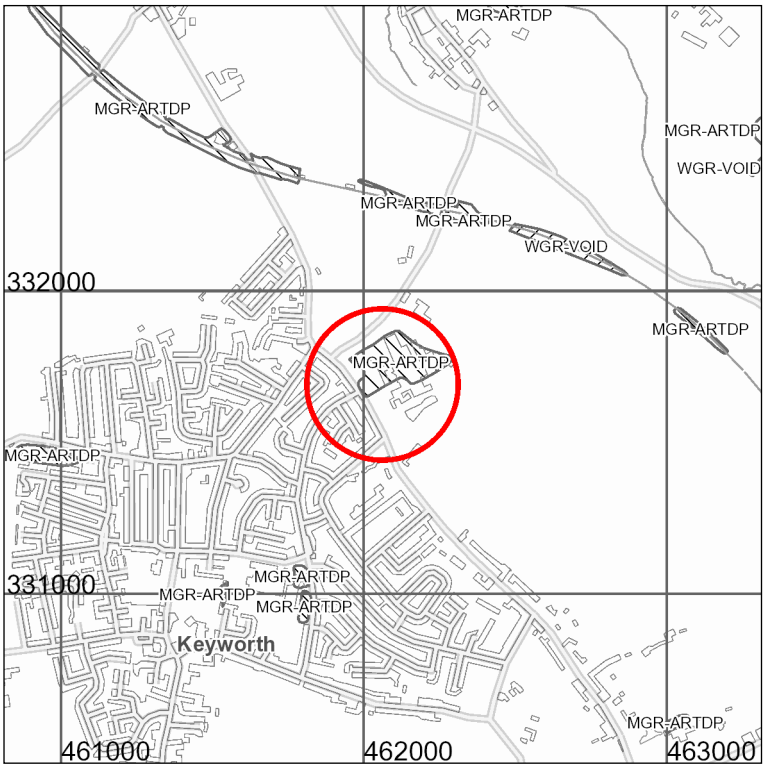
This part of the report contains extracts of geological maps taken from the 1:10 000 scale BGS Digital Geological Map of Great Britain (BGS Geology 10k). The geological information in BGS Geology is divided into four themes: artificial ground, landslide deposits, superficial deposits and bedrock, shown here in separate maps. The fifth 'combined geology' map superimposes all four of these themes, to show the uppermost geological formations.

More information about BGS Geology 10k is available here http://www.bgs.ac.uk/products/digitalmaps/DiGMapGB_10.html and information on the BGS geological classification schemes here http://www.bgs.ac.uk/bgsrcs/. The maps are labelled with two-part computer codes that indicate the name of the geological unit and its composition. Descriptions of the units listed in the map keys may be available in the BGS Lexicon of Named Rock Units (http://www.bgs.ac.uk/lexicon/). If available, these descriptions can be found by searching against the first part of the computer code used on the maps. Please consult the legend and the codes on the map in areas of complex geology. If in doubt, please contact BGS Enquiries for clarification.

In the map legends the geological units are listed in order of their age, as defined in the BGS Lexicon, with the youngest first. However, where units are of the same defined age they are listed alphabetically and this may differ from the actual geological sequence.

Artificial ground

This is ground at or near the surface that has been modified by man. It includes ground that has been deposited (Made Ground) or excavated (Worked Ground), or some combination of these: Landscaped Ground or Disturbed Ground.



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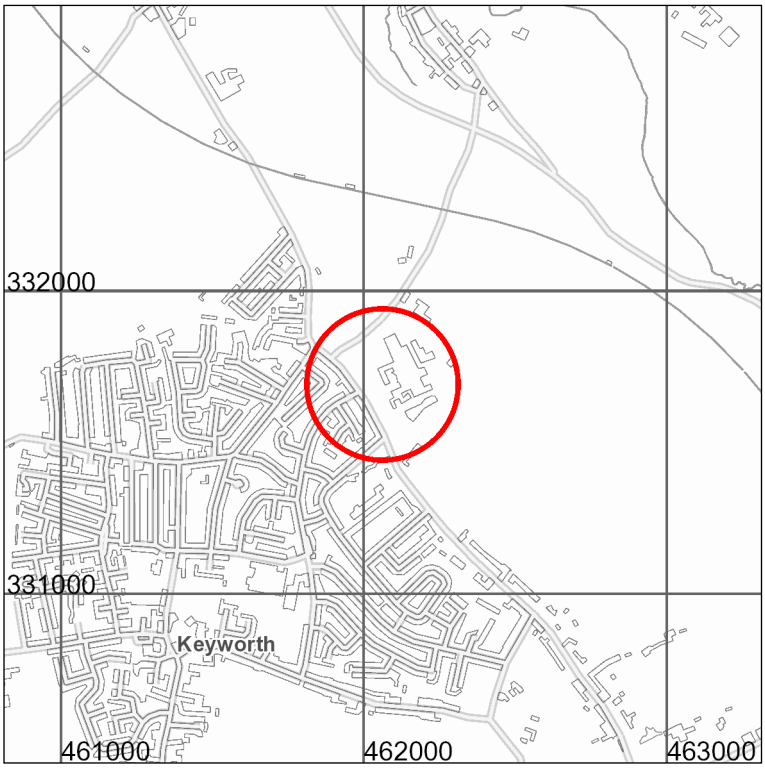
Scale: 1:25 000 (1cm = 250 m)
Search area indicated in red

Key to Artificial ground:

Map colour	Computer Code	Name of geological unit	Composition
	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

Landslide deposits

These are deposits formed by localised mass-movement of soils and rocks on slopes under the action of gravity. Landslides may occur within the bedrock, superficial deposits or artificial ground; and the landslide deposits may themselves be artificially modified.



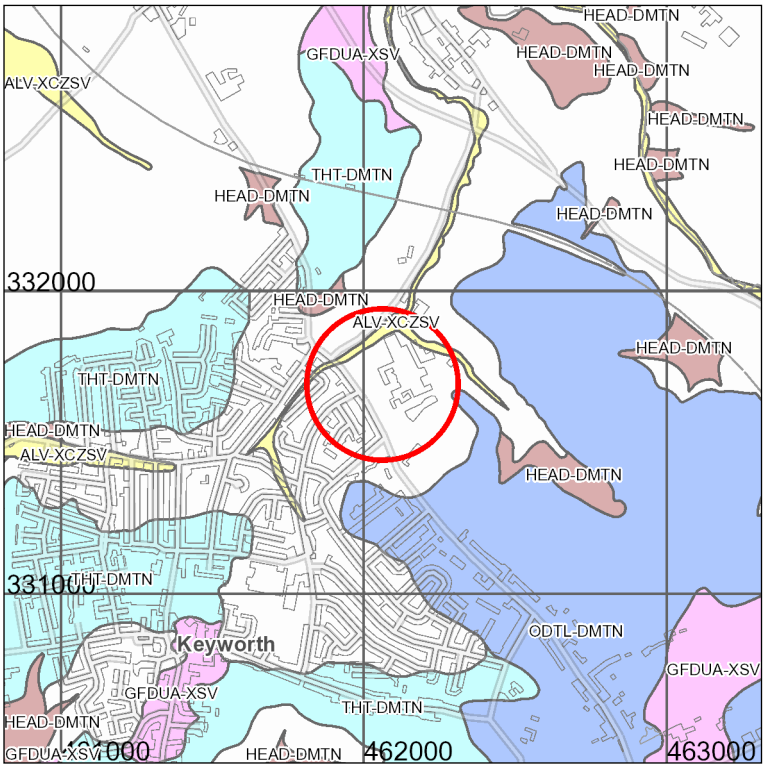
Scale: 1:25 000 (1cm = 250 m)
Search area indicated in red

Key to Landslide deposits:

No deposits found in the search area

Superficial deposits

These are relatively young geological deposits, formerly known as ‘Drift’, which lie on the bedrock in many areas. They include deposits such as unconsolidated sands and gravels formed by rivers, and clayey tills formed by glacial action. They may be overlain by landslide deposits or by artificial deposits, or both.



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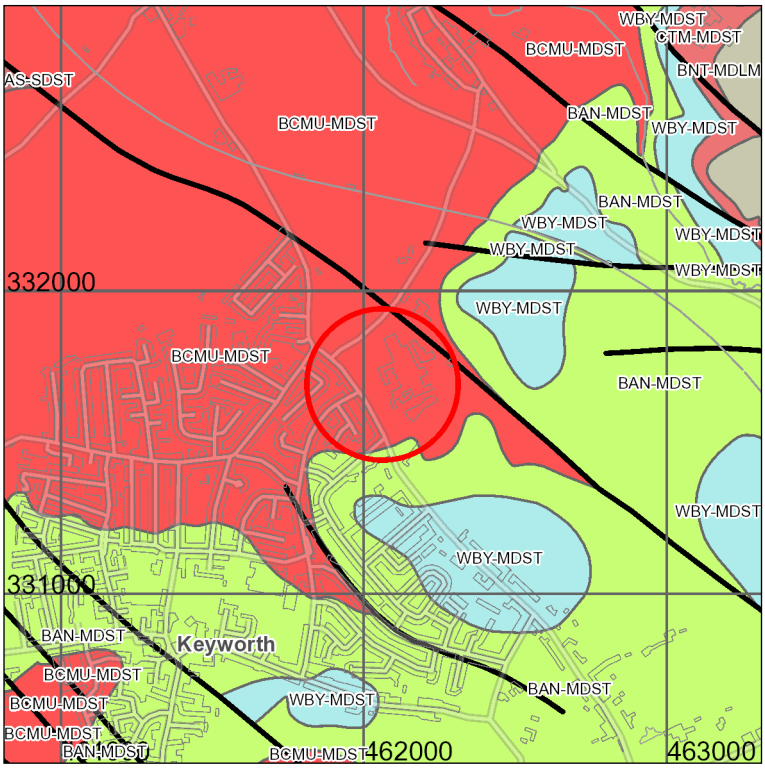
Scale: 1:25 000 (1cm = 250 m)
Search area indicated in red

Key to Superficial deposits:

Map colour	Computer Code	Name of geological unit	Composition
	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
	GFDUA-XSV	GLACIOFLUVIAL DEPOSITS, ANGLIAN	SAND AND GRAVEL
	ODTL-DMTN	OADBY MEMBER (LIAS-RICH)	DIAMICTON
	THT-DMTN	THRUSSINGTON MEMBER	DIAMICTON
	HEAD-DMTN	HEAD	DIAMICTON

Bedrock

Bedrock forms the ground underlying the whole of an area, commonly overlain by superficial deposits, landslide deposits or artificial deposits, in any combination. The bedrock formations were formerly known as the ‘Solid Geology’.



Search area indicated in red

Fault

Coal, ironstone or mineral vein

Note: Faults are shown for illustration and to aid interpretation of the map. Because these maps are generalised from more detailed versions not all such features are shown and their absence on the map face does not necessarily mean that none are present. Coals, ironstone beds and mineral veins occur only in certain rock types and regions of the UK; if present here, they will be described under ‘bedrock’ below.

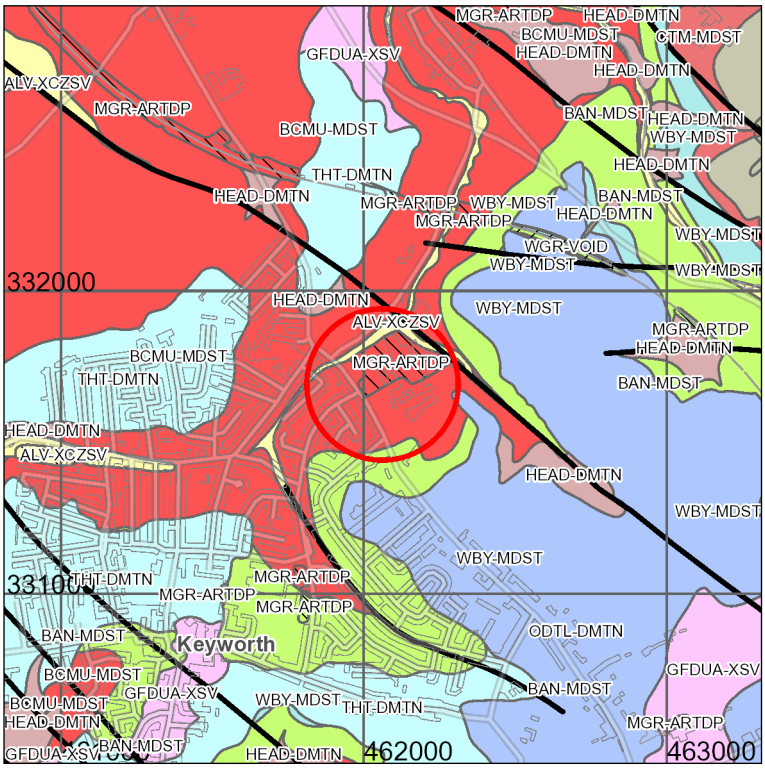
Scale: 1:25 000 (1cm = 250 m)

Key to Bedrock geology:

Map colour	Computer Code	Name of geological unit	Rock type
	BNT-MDLM	BARNSTONE MEMBER	MUDSTONE AND LIMESTONE, INTERBEDDED
	CTM-MDST	COTHAM MEMBER	MUDSTONE
	WBY-MDST	WESTBURY FORMATION	MUDSTONE
	BAN-MDST	BLUE ANCHOR FORMATION	MUDSTONE
	BCMU-MDST	BRANSCOMBE MUDSTONE FORMATION	MUDSTONE
	AS-SDST	ARDEN SANDSTONE FORMATION	SANDSTONE

Combined 'Surface Geology' Map

This map shows all the geological themes from the previous four maps overlaid in order of age.



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Scale: 1:25 000 (1cm = 250 m)
Search area indicated in red

Please see the Keys to the Artificial, Landslide, Superficial and Bedrock geology maps.

Geological Assessment

This module contains a geological description of the site or area specified by the customer. It is based on currently available 1:10 000 scale geological maps unless otherwise stated, together with other relevant local information such as borehole records.

Setting:
The site is bounded on its northern side by an eastward draining stream and on its eastern edge by a northward flowing stream. They join at the north-eastern corner of the site and the resultant stream flows away to the east.

Artificial ground:
This is an extensively developed site. Made ground is present over much of the northern part of the site and may be up to 3 m in thickness. It is likely to comprise mudstone and siltstone bedrock excavated from elsewhere on the site during construction. There is continuing widespread construction on the site, including cut and fill areas prepared for new buildings.

Superficial deposits:
Alluvium, of Holocene age, is present as a narrow ribbon on the northern and eastern edges of the site. This comprises grey silty clay with lenses of fine sand with thin basal gravel. The deposit is up to 2m thick. Oadby Member (of the Wolston Formation), Anglian in age, is present in the south-eastern corner of the site. It is a 'Lias-rich' till (boulder clay, diamicton), up to 5 m thick, that comprises stiff grey clay, weathered to yellow-brown in the upper 2 m, with pebbles and cobbles of flint and rare limestone and chalk. Boreholes in the area show the Oadby Member to be locally underlain by a thin sand which is water bearing.

Rockhead depth:
Over much of the site rockhead is at or near surface. Where covered by made ground or alluvium, rockhead is at about 2 to 3 m depth. Beneath Oadby Member, rockhead is from 1 to 5 m depth.

Bedrock:
The site is underlain by the Branscombe Mudstone Formation and the Blue Anchor Formation. They form the upper part of the Mercia Mudstone Group which is of Triassic Age.

The Branscombe Mudstone Formation comprises red-brown blocky mudstone and siltstone with rare greenish grey lenses and spots. The formation contains common, cross-cutting gypsum veins and lenses up to 5 cm thickness. The mudstones may also contain rare salt pseudomorphs. The formation is about 45 m thick in this area.

Elsewhere in the district the formation contains thick beds and lenses of workable gypsum. However, boreholes on the site (e.g. SK63SW/124) prove that these gypsum beds are not present beneath this site either having not been deposited in this area or having been slowly dissolved away over a long period of time by circulating groundwaters.

The Blue Anchor Formation comprises greyish green to yellow-green, blocky, dolomitic siltstone up to 8 m thick.

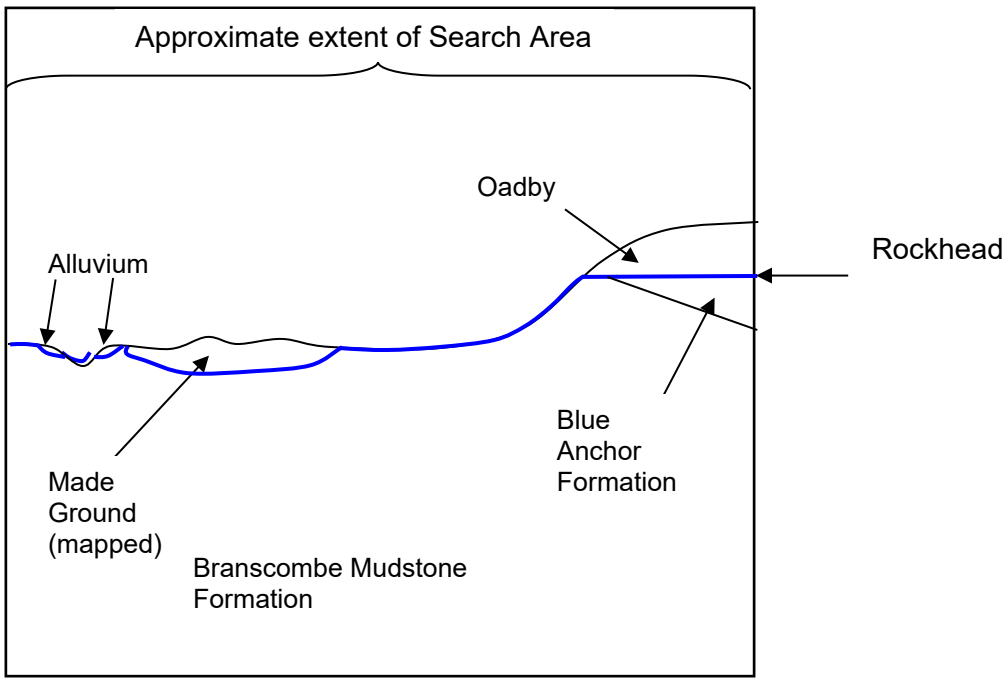
The area is underlain at depth (about 240 m below surface) by the Pennine Middle Coal Measures Formation, of Carboniferous age. The coal seams have not been worked in this area.

The strata dip gently to the south-east at between 1 and 2º. A north-westerly trending fault occurs in the shallow valley on the eastern edge of the site. This has a down throw of about 15 m to the north-east. It is important to understand the nature of geological faults, and the uncertainties which attend their precise position at the surface. Faults are planes of movement about which adjacent blocks of rock strata have moved relative to each other. They commonly consist of zones, perhaps up to several tens of metres wide, containing several fractures. The portrayal of such faults as a single line on the geological map is therefore a generalisation. Geological faults in this area are of ancient origin, are today mainly inactive, and present no threat to property.

Schematic Geological Cross-Section

Not to scale

National grid reference of north side of site	National grid reference of south side of site
46200 33190	**46240 33155**



This sketch represents an interpretation of the geometrical relationships of the main rock units described in the text. It is not to scale.
The blue line indicates ‘rockhead’; that is the base of superficial deposits. This is the ‘geological rockhead’, as distinct from the ‘engineering rockhead’, which is the base of ‘engineering soil’ (in the sense of BS5930:1999).

GeoHazard Potential

This module provides

- **An Automated Assessment of Natural Ground Stability**: An indication of the potential for significant natural ground instability generated automatically from BGS's GeoSure dataset, which is based on 1:50 000 scale digital data. It comprises:
  - A summary table of search results
  - Maps of the natural geological hazards
  - Keys to the table and maps, with generalised advice

- **A Geologist's Assessment of Geohazard Potential:** A geologist's analysis of geological hazard potential for the site of interest, based on available geological information.

- **Definitions and limitations:** an explanation of what this report provides

- **General explanations of the hazards**: a brief description of each hazard considered by this report

Automated Assessment of Natural Ground Stability
This is an automated assessment that indicates the potential for a geological hazard to occur within the site and a 50 m-wide buffer zone around it, or where a site boundary is not available, within a search area centred upon the site. It is not based on detailed site-specific information such as an on-site survey or site investigation. This assessment is intended for use by suitably-qualified professionals involved in conveyancing or development of low-rise properties. If in doubt users should consult a suitably-qualified professional about the results in this report before making any major decisions based upon it.

Search Results:
The following table provides answers to a series of questions about any potential natural ground instability found in the search area and assesses how significant they are.

Question 1	Answer	
	Hazard	**Hazard level**
Which natural geological hazards could be contributing to ground instability in the area? **NOTE: The hazard levels are described as A (least) to E (greatest), or as 'No Hazard'. Levels A and B are not considered significant and are not shown on the maps.** **See key tables for fuller explanations**	**Shrink-Swell:** Clays that can swell when wet and shrink when dry, causing the ground to rise and fall	C
	Landslides (slope instability): Weak or unstable rocks that could slide downhill (usually slopes over 5 degrees)	B
	Soluble Rocks (dissolution): Rocks that can dissolve and develop underground cavities that may lead to surface collapses and hollows	A
	Compressible Ground: Very soft ground that might compress and progressively sink under the weight of a building or other load	D
	Collapsible Deposits: Material that is prone to collapse when it is water-saturated and a load is placed on it	B
	Running Sand: Sand that can wash away or flow into holes or fissures due to presence of water	C

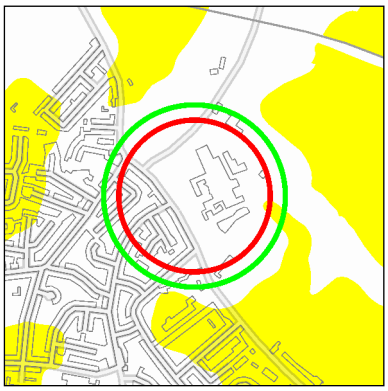
Question 2	Answer
What action should be taken?	If natural geological hazards at level C, D or E have been indicated this means there is potential ground instability in your area that may cause some properties to suffer subsidence damage. However, it does not necessarily mean that your property will be affected, and in order to find out if this is the case or not, you should obtain further advice from a qualified expert, such as a building surveyor. Show them this report and ask them to evaluate the property and its surroundings for any signs of existing subsidence damage and for advice on the likelihood for subsidence to occur in the future. The notes at the end of this report module may be useful in this regard. Note that the type of building and its surroundings (e.g. the presence of trees) are also very important when considering subsidence risk. Many types of properties, particularly newer ones, are well constructed and unlikely to be affected by subsidence, even in areas of significant ground movements.

Question 3	Answer
Where could the natural geological hazards occur in the area?	See the maps that follow

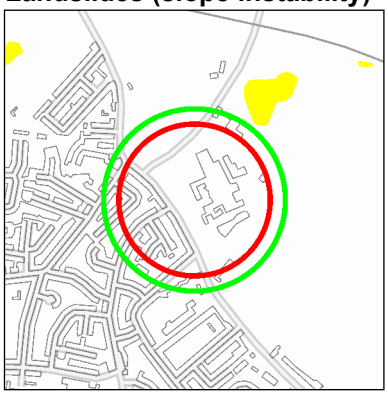
Automatically generated maps of near-surface natural geological hazards

The following maps show where significant natural ground instability at or near the surface could occur in relation to each of six geological hazards: shrink-swell, landslide (slope instability), soluble rocks (dissolution), compressible ground, collapsible deposits and running sand. The relative level of potential is indicated in colour and described in the key. Please note that a hazard is reported as significant for the property if it occurs within the specified site or the surrounding buffer zone.

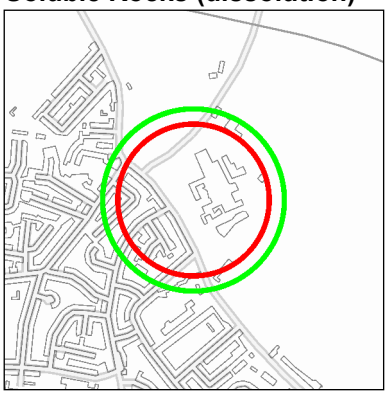
Shrink-Swell



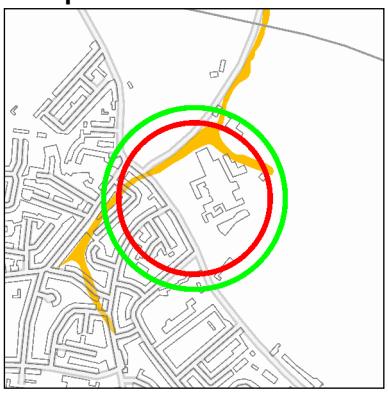
Landslides (slope instability)



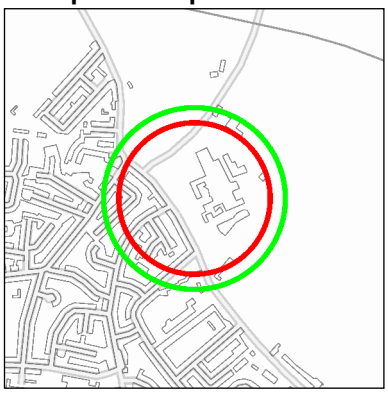
Soluble Rocks (dissolution)



Compressible Ground



Collapsible Deposits



Running Sand

Search area indicated in red
50 m buffer indicated in green

For the key to relative level of potential for natural geological hazards see over the page

The unshaded (white) areas on the map (levels A, B or 'No hazard') represent areas where the conditions that cause natural ground movements due to the six natural geological hazards are considered to be absent or unlikely to be significant.

Key to Shrink-Swell Hazard:

Level	Hazard description	Advice for public	Advice for specialist
C	Ground conditions predominantly medium plasticity.	Do not plant trees with high soil moisture demands near to buildings. Avoid increased infiltration and seek specialist advice before disposing of large amounts of water to the ground through soakaways.	**New build** – Test for plasticity index is recommended. Possible increase in construction cost to remove potential shrink-swell problems. **Existing property** – Possible increase in insurance risk in droughts or where high moisture demand vegetation is present due to shrink-swell clay problems if foundations are not suitable.
D	Ground conditions predominantly high plasticity.	Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. Seek specialist advice before disposing of large amounts of water to the ground through soakaways.	**New build** – Test for plasticity index is necessary. Probable increase in construction cost to remove potential shrink-swell problems. **Existing property** – Probable increase in insurance risk in droughts or where high moisture demand vegetation is present due to shrink-swell clay problems if foundations are not suitable.
E	Ground conditions predominantly very high plasticity.	Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. Seek specialist advice before disposing of large amounts of water to the ground through soakaways.	**New build** – Test for plasticity index is essential. Definite increase in construction cost to remove potential shrink-swell problems. **Existing property** – Significant increase in insurance risk in droughts or where high moisture demand vegetation is present due to shrink swell clay problems if foundations are not suitable.

Key to Landslides (slope instability) Hazard:

Level	Hazard description	Advice for public	Advice for specialist
C	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.	Ask about implication for stability if large changes to drainage or excavations take place near to buildings. Seek specialist advice if major changes in ground conditions are likely and before disposing of large amounts of water to the ground through soakaways.	**New build** – Consider possibility of trench side or slope movement during excavations, or consequence of changes to drainage. Possible increase in construction cost to remove potential slope stability problems. **Existing property** – No significant increase in insurance risk due to natural slope instability problems.
D	Slope instability problems are probably present or have occurred in the past. Land use should consider specifically the stability of the site.	Avoid large amounts of water entering the ground through pipe leakage or soakaways without specialist advice. Do not undercut or place large amounts of material on slopes without technical advice.	**New build** – Assess slope stability of site and consequences of excavation, loading and water content changes during and after construction. **Existing property** – Probable increase in insurance risk due to natural slope instability after changes to ground conditions such as a very long, excessively wet winter.
E	Slope instability problems almost certainly present and may be active. Significant constraint on land use.	Seek expert advice about stability of the ground and its management to maintain and increase its stability.	**New build** – Slope stability assessment necessary, special design may be necessary, construction may not be possible. **Existing property** – Significant increase in insurance risk in some cases. Site-specific consideration is necessary to separate cases where landslide s are stabilised or ancient and stable from those that may be active or may fail.

Key to Soluble Rocks (dissolution) Hazard:

Level	Hazard description	Advice for public	Advice for specialist
C	Soluble rocks are present within the ground. Some dissolution features may be present. Potential for difficult ground conditions are at a level where they may be considered; localised subsidence need not be considered except in exceptional circumstances.	Consider implications for stability when changes to surface drainage or new construction are planned. Seek specialist advice before disposing of surface drainage to the adjacent ground.	**New build** – Site investigation should consider potential for dissolution problems on the site and its surroundings. Care should be taken with local drainage into the adjacent bedrock. **Existing property** – Possible increase in insurance risk due to soluble rocks. Some possibility of potential liability due to groundwater pollution may be present.
D	Soluble rocks are present within the ground. Many dissolution features may be present. Potential for difficult ground conditions are at a level where they should be considered. Potential for subsidence is at a level where it may need to be considered.	Consider obtaining specialist advice before loading the land or undertaking building work. Seek specialist advice before disposing of surface drainage to the adjacent ground. Maintain drainage infrastructure.	**New build** – Specialist site investigation and stability assessment may be necessary before construction. Construction work may cause subsidence. Isolate surface drainage from the karst system and groundwater. Increased construction costs are possible. **Existing property** – Possible increase in insurance risk due to soluble rocks. Some possibility of potential liability due to groundwater pollution may be present.
E	Soluble rocks are present within the ground. Numerous dissolution features may be present. Potential for difficult ground conditions should be investigated. Potential for localised subsidence is at a level where it should be considered.	Obtain specialist advice on need for stabilisation work and/or land management plan to maintain stability. Do not dispose of surface drainage into the adjacent ground. Maintain drainage infrastructure.	**New build** – Specialist land stability assessment necessary. Investigation, remediation and/or mitigation works may be necessary to stabilise the area. Construction work may cause subsidence. Isolate surface drainage from the karst system and groundwater. Increased construction costs. **Existing property** – Probable increase in insurance risk due to soluble rocks. Probable potential liability due to groundwater pollution.

Key to Compressible Ground Hazard:

Level	Hazard description	Advice for public	Advice for specialist
C	Compressibility and uneven settlement potential may be present. Land use should consider specifically the compressibility and variability of the site.	Take technical advice regarding settlement when planning extensions to existing property or when retrofitting soakaways.	**New build** – Consider possibility of settlement during construction due to compressible deposits. Unlikely to be increase in construction costs due to potential compressibility problems. **Existing property** – No significant increase in insurance risk due to compressibility problems.
D	Compressibility and uneven settlement hazards are probably present. Land use should consider the compressibility and variability of the site.	Avoid large differential loadings of ground. Do not drain or dewater ground near the property without specialist advice.	**New build** – Assess the variability and bearing capacity of the ground. May need special foundations to avoid excessive settlement during and after construction. Consider effects of changes to drainage regime and groundwater level. Extra construction costs are likely. **Existing property** – Possible increase in insurance risk from compressibility if groundwater levels drop due to drought or dewatering.
E	Highly compressible strata present. Significant constraint on land use depending on thickness.	Avoid large differential loadings of ground. Do not drain or dewater ground near the property without specialist advice.	**New build** – Assess the variability and bearing capacity of the ground. Probably needs special foundations to avoid excessive settlement during and after construction. Consider effects of changes to drainage regime and groundwater level. Construction may not be possible at economic cost. **Existing property** – Probable increase in insurance risk from compressibility due to drought or dewatering unless appropriate foundations are present.

Key to Collapsible Deposits Hazard:

Level	Hazard description	Advice for public	Advice for specialist
C	Deposits with potential to collapse when loaded and saturated are possibly present in places.	Avoid large amounts of water entering the ground through pipe leakage or soakaways without specialist advice. Do not increase loading on existing foundations without technical advice.	Contact local authorities for information on local occurrence of damage due to collapsible ground. **New build** – Assess the possibility of collapsible (loessic) deposits by ground investigation. If present do not exceed safe bearing capacity during or after construction and maintain site drainage, or carry out ground stabilisation. **Existing property** – Possible increase in insurance risk if collapsible deposits are present and if the load on the ground is increased or ground saturated by leakage or localised flooding.
D	Deposits with potential to collapse when loaded and saturated are probably present in places.	Avoid large amounts of water entering the ground through pipe leakage or soakaways without specialist advice. Do not increase loading on existing foundations without technical advice.	Contact local authorities for information on local occurrence of damage due to collapsible deposits. **New build** – Assess the possibility of collapsible deposits by ground investigation. If present do not exceed safe bearing capacity during or after construction and maintain site drainage, or carry out ground stabilisation. **Existing property** – Possible increase in insurance risk if collapsible deposits are present and if the load on the ground is increased or ground saturated by leakage or localised flooding.
E	Deposits with potential to collapse when loaded and saturated have been identified.	Avoid large amounts of water entering the ground through pipe leakage or soakaways. Do not increase loading on existing foundations without technical advice.	Contact local authorities for information on local occurrence of damage due to collapsible ground. **New build** – Assess the possibility of collapsible deposits by ground investigation. If present do not exceed safe bearing capacity during or after construction and maintain site drainage, or carry out ground stabilisation. **Existing property** – Possible increase in insurance risk if collapsible deposits are present and if the load on the ground is increased or ground saturated by leakage or localised flooding.

Key to Running Sand Hazard:

Level	Hazard description	Advice for public	Advice for specialist
C	Running sand conditions may be present. Constraints may apply to land uses involving excavation or the addition or removal of water.	Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should avoid any problems due to running sands. Seek specialist advice before disposing of large amounts of water to the ground through soakaways.	**New build** – Consider possibility of running sands into trenches or excavations if water table is high. Avoid concentrated water inputs to site. Unlikely to be increase in construction costs due to potential for running sand problems. **Existing property** – No significant increase in insurance risk due to running sand problems.
D	Running sand conditions are probably present. Constraints may apply to land uses involving excavation or the addition or removal of water.	Avoid large amounts of water entering the ground through pipe leakage or soakaways without specialist advice. Do not dig (deep) holes into saturated ground near the property without technical advice.	**New build** – Assess the need for close-boarded sides to excavations and the consequences of soil and groundwater conditions during and after construction. **Existing property** – Possible increase in insurance risk from running conditions due to service leakage, high rainfall events or localised flooding.
E	Running sand conditions are almost certainly present. Constraints will apply to land uses involving excavation or the addition or removal of water.	Avoid large amounts of water entering the ground through pipe leakage or soakaways without specialist advice. Do not dig (deep) holes into saturated ground without technical advice.	**New build** – Assess the need for close-boarded sides to excavations and the consequences of soil and groundwater conditions during and after construction. Possible extra cost during construction and requirement for basements to be water proofed. **Existing property** – Possible increase in insurance risk from running conditions due to service leakage, high rainfall events or localised flooding.

Geologist's Assessment of Geohazard Potential

This module lists some of the principal geological hazards that may affect the specified site. It is a geologist's interpretation of data available at the time of compilation; additional information may be available in BGS files. The assessment is designed to identify potential ground stability hazards at or close to the site and should not be used in place of a detailed site investigation.

Note that the assessment given here may differ from that in the Automated Assessment of Natural Ground Stability or other reports that have been automatically generated from digital datasets such as GeoSure.

Descriptions of the geological units that are associated with the stated potential hazards are given in preceding parts of the report. Definitions and general explanations of the hazards are given in the next part of the

Geological hazard	May be significant within site area (Yes/No)?	Comments
Potential Natural Ground Stability Hazards		
Shrink-Swell	Y	The Oadby Member till (superficial deposit) occurring on the southern margin of the site has a low potential for shrink-swell clay and this should be considered in decisions about construction, building maintenance and land use.
Landslides (slope instability)	Y	The Branscombe Mudstone Formation bedrock, occurring under much of the site, can become unstable on steeper slopes or in excavations and it should be considered in decisions about construction, building maintenance and land use.
Soluble Rocks (dissolution)	Y	The Branscombe Mudstone Formation bedrock, occurring under much of the site is known to contain soluble gypsum layers in some parts of this region. Evaluation of more detailed information for this site indicates, however, that these layers are very unlikely to occur in this area and the potential for this hazard to become active is in fact very low.
Compressible Ground	Y	Alluvium (superficial deposit) occurring along small streams running along the N and E margins of the site, has a moderate to high potential for compressible ground hazard and it should be considered in decisions about construction, building maintenance and land use.
Collapsible Deposits	N	
Running Sand	Y	Alluvium (superficial deposits) occurring along small streams running along the N and E margins of the site, may contain sandy layers with the potential to produce running sand which should be considered in decisions about construction, building maintenance and land use.
Other Potential Hazards		
Mining	N	No mining beneath site.
Flooding	N	Streams flow along the northern and eastern edges of the site but are unlikely to give rise to flooding of the site.
Natural Land Gas	N	Unlikely to encounter gas from bedrock and coal mining; unlikely to encounter gas from peat.
Radon		Level of protective measures: none

Definitions:

- **Natural Geological Hazards** are shrink-swell, landslides (slope instability), soluble rocks (dissolution), compressible ground, collapsible deposits and running sand. This does not include mining related subsidence. Note that these geological hazards may occur in either natural or man-made deposits.
- **Natural Ground Instability** refers to the propensity for upward, lateral or downward movement of the ground that can be caused by a number of natural geological hazards. Some movements associated with particular hazards may be gradual and of millimetre or centimetre scale, whilst others may be sudden and of metre or tens of metres scale.
- **Significant** natural ground instability has the potential to cause damage to some weaker buildings and structures. It should be noted, however, that many buildings, particularly more modern ones, are built to such a standard that they can remain unaffected in areas of significant ground movement.
- Where significant natural ground instability is indicated, its relative **level** of significance is expressed on a scale of C to E ('low' to 'high'), relating to its potential to cause subsidence damage in low-rise buildings.

Limitations

- The maps in this module provide an indication of potential near-surface ground instability related to particular natural geological hazards. These are shrink-swell clay, landslides, soluble rocks (ground dissolution), compressible ground, collapsible deposits, and running sand. They do not give an indication of potential hazards at depth as might be encountered in a borehole, for example.
- The search results in the Automated Assessment of Natural Ground Stability are generated automatically from BGS's GeoSure dataset, based on 1:50 000 digital geological maps and the interpretation of other records in the possession of BGS at the time. Their scope and accuracy is limited by the methods used to create the dataset and they may differ from the geologist's interpretation in the Geologist's Assessment of Geohazard Potential.
- The information is intended for use by suitably-qualified professionals involved in conveyancing or development of low-rise domestic properties. If in doubt users should consult a suitably-qualified professional about the search results in this report before making any major decisions based upon it.
- An indication of natural ground instability does not necessarily mean that a building will be affected by subsidence. Such an assessment can be made only by inspection of the building itself by a suitably qualified professional. This will take into account a variety of other contributing factors, such as building type and build quality and nearby vegetation (in particular, the proximity and type of trees).

General explanation of geological hazards

This is a general description of the hazards that might be described in the Geohazard Potential module.

Shrink-Swell
A shrinking and swelling clay changes volume significantly according to how much water it contains. All clay deposits change volume as their water content varies, typically swelling in winter and shrinking in summer, but some do so to a greater extent than others. Most foundations are designed and built to withstand seasonal changes. However, in some circumstances, buildings constructed on clay that is particularly prone to swelling and shrinking behaviour may experience problems. Contributory circumstances could include drought, tree roots drying-out the ground, leaking service pipes, or changes to local drainage such as the creation of soakaways. Shrinkage may remove support from the foundations of a building, whereas clay expansion may lead to uplift (heave) or lateral stress on part or all of a structure; any such movements may cause cracking and distortion.

Landslides (slope instability)
A landslide is a relatively rapid outward and downward movement of a mass of rock or soil on a slope, due to the force of gravity. A slope is under stress from gravity but will not move if its strength is greater than this stress. If the balance is altered so that the stress exceeds the strength, then movement will occur. The stability of a slope can be reduced by removing ground at the base of the slope, increasing the water content of the materials forming the slope or by placing material on the slope, especially at the top. Property damage by landslide can occur through the removal of supporting ground from under the property or by the movement of material onto the property.

The assessment of landslide hazard refers to the stability of the present land surface. It does not encompass a consideration of the stability of excavations.

Soluble Rocks (dissolution)
Some rocks are soluble in water and can be progressively removed by the flow of water through the ground. This process tends to create cavities, potentially leading to the collapse of overlying materials and possibly subsidence at the surface. The collapse of the materials above a cavity can be aggravated by natural or induced ingress of surface of subsurface water into the ground. Collapse can also be aggravated by groundwater abstraction.

Compressible Ground
Many ground materials, including artificial deposits, can be compressed when a load, such as a building, is placed upon them. If ground is extremely compressible the building may sink. If the ground is not uniformly compressible, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion.

Collapsible Deposits
Collapsible deposits consist of certain fine-grained loessic (wind-blown) materials that have relatively large spaces between the solid particles. Such deposits are prone to collapse (they may undergo rapid subsidence) when they are loaded and then

saturated with water. If the material below a building collapses it may cause the building to sink. If the collapsible ground is variable in thickness or distribution, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. This hazard is most likely to be encountered in parts of southern England.

Running Sand
Running sand conditions occur when loosely-packed sand, saturated with water, flows into an excavation, borehole or other type of void. The pressure of the water filling the spaces between the sand grains reduces the contact between the grains and they are carried along by the flow. This can lead to subsidence of the surrounding ground.

If sand below a building runs it may remove support and the building may sink. Different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion.

Mining
If the site is located above geological formations that have been mined for coal or other commodities, it might be prone to subsidence. Modern extraction activities will include the construction of underground roadways, shafts and adits. Past mining activities that were not documented may also include shafts, adits and, in the case of shallow mining, bell-pits and pillar-and-stall workings. Any of these activities can give rise to general subsidence and fracturing of the ground, and shallow mining may additionally cause voids at shallow or intermediate depths, which may lead to the formation of crown-holes in the ground above. The voids created by shallow underground mining activity may pose a potential hazard to both life and assets and the associated risk of ground movement can reduce property values. Further, spoil from mineral workings can present a pollution hazard.

For more information regarding underground and opencast **coal mining** or **brine extraction**, the location of mine entries (shafts and adits) and matters relating to subsidence or other ground movement induced by coal mining please contact the Coal Authority, Mining Reports, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG; telephone 0845 762 6848 or at www.coal.gov.uk .

Flooding
Flooding due to natural causes can occur following run-off or ponding of surface water (pluvial flooding, which is not considered by this report), or overflow from a river or stream (fluvial flooding), or because of rising groundwater levels (groundwater flooding), or because of inundation by the sea (coastal flooding), or through a combination of these factors. The table indicates whether there is geological evidence that flooding has occurred in this vicinity and the susceptibility to groundwater flooding.

For further information on flood-risk, the likely frequency of its recurrence in relation to any proposed development of the site, and the status of any flood prevention measures in place, you are advised to contact the local office of the Environment Agency (England and Wales) at www.environment-agency.gov.uk/homeandleisure/floods/ or the Scottish Environment Protection Agency (Scotland) at www.sepa.org.uk.

Groundwater flooding occurs when the level of water in the ground rises to the surface. Ratings of susceptibility to groundwater flooding given in this report are based on a computer model that indicates whether the rocks below the site have the potential to contain shallow groundwater that may enter excavations or basements, or even rise above the ground surface. This computer model does not indicate whether groundwater flooding will necessarily occur at a particular site in the future: the risk of this happening also depends on considerations such as the past history of flooding and the mode of construction at the site.

Natural Land Gas
The table indicates whether or not there is any potential susceptibility of the site to emissions of methane or carbon dioxide, or both, from natural sources. Most methane and carbon dioxide emissions appear to originate from abandoned shallow coal mines although a number originate from peat and other natural deposits of organic materials, such as in buried ponds or river channels. The exact extent of potential sources of natural land gas, particularly that of peat, can be difficult to predict.

The relatively rare incidence of gas emission from natural sources in most areas of the UK suggests that the hazard is of relatively minor and local significance, except in some parts of the coal fields. An indication of potential for gas emissions does not necessarily indicate that there is a problem. Although accumulations of methane and carbon dioxide can cause severe and, sometimes, expensive or dangerous problems, most gas emissions from natural sources and mining can usually be dealt with readily if they do arise.

A site-specific coal mining search from the Coal Authority (http://www.coal.gov.uk/services/propertysearch/index.cfm) will indicate whether any shafts or adits, which may act as pathways for gas, are located within 20 m of the site. Where the Coal Authority is aware that a site which is the subject of a search has been affected by mine gas, this information will be included in the Coal Mining Search Report.

The information in this report should not be used in place of a site investigation. The existence of gas emissions at specific sites can be established only by detailed site investigation. The level of risk from methane or carbon dioxide in a particular building or underground cavity can be established only by monitoring the spaces in which it may accumulate.

Radon

Radon is a naturally-occurring radioactive gas. It diffuses from the ground and occurs in greater concentrations in some areas, depending on the local geology. It can accumulate in buildings, unless measures are taken to prevent this, and can then cause ill-health.

The above table indicates the level of Radon Protective Measures required at the site during the construction of new buildings or extensions to existing buildings. This determination complies with information set out in *BR211 Radon: Guidance on protective measures for new dwellings (2007 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required (please see BRE Website for more details: www.bre.co.uk/radon). This assessment is based on the Radon Potential Dataset produced jointly by the BGS and the Health Protection Agency (for more information please see the BGS website at www.bgs.ac.uk/radon).

Hydrogeology (Non Abstraction)

This module is intended for clients assessing a site for development, including the installation of a closed loop ground heat pump system, and contains hydrogeological information such as aquifer descriptions, groundwater levels, direction of groundwater flow, groundwater quality and groundwater vulnerability. It does not contain detailed information on yields or borehole design and is therefore not suitable for customers proposing to drill a water borehole, or establish an open-loop ground heat pump system.

Hydrogeology (not site specific)
In lowland areas of the UK with little topographic variation, groundwater is likely to be found at shallow depths of only a few metres. Water table fluctuations will be small as they will be constrained by the ground surface and the base level of the local perennial streams and rivers.

In upland areas, precipitation is usually high and the dominantly metamorphic and igneous rocks often have relatively shallow groundwater levels. This is due to preferential groundwater storage in near-surface weathered and fractured zones with limited drainage into the underlying unweathered lower permeability rock. Exceptions can occur where higher permeability rocks, such as sandstone or limestone, allow faster throughflow of groundwater towards the nearest stream or other discharge point.

Perched water tables occur where a less permeable horizon (e.g. a clay layer) in an otherwise permeable sequence retains a body of groundwater above the level of the regional water table. They usually occur at shallow depths in alluvial and glacial sediments and can be difficult to identify or to delimit.

An aquifer becomes confined when it is overlain by a less permeable horizon that restricts the upward movement of groundwater. When this less permeable horizon is penetrated (e.g. by drilling), the groundwater level rises above where struck to a level controlled by the hydrostatic pressure. If this is above ground level, overflowing artesian conditions will be encountered. Confined conditions should be anticipated, where possible, in order to plan for the problems they can generate.

Hydrogeology of the site

Geological unit	Groundwater potential	Water level and strikes	Quality	Environment Agency Groundwater vulnerability classification
Alluvium	Likely to contain some groundwater in hydraulic continuity with associated surface water	Shallow	Similar to associated surface water	Minor Aquifer
Oadby Member	Likely to contain some groundwater in basal sand	Shallow	Glacial deposits often contain ferruginous groundwater	Low permeability superficial cover, however some groundwater flow may still occur (particularly in the basal sand) and this should be taken into consideration when assessing persistent pollutants
Blue Anchor Formation	Generally of low permeability. Some water possible in weathered or fractured horizons			Non-Aquifer, however some groundwater flow may still occur and this should be taken into consideration when assessing persistent pollutants
Branscombe Mudstone Formation	Generally of low permeability; small amounts of groundwater may be encountered in the coarser-grained horizons	Water level is anticipated to be between 5 and 20 m below the ground surface depending on the position within the site. Seasonal water fluctuations may be several metres.	Water likely to be very hard with a total dissolved solids content possibly in excess of 2000 mg/l, with high calcium and sulphate derived from gypsum; water therefore may be corrosive to metal and concrete	Non-Aquifer, however some groundwater flow may still occur and this should be taken into consideration when assessing persistent pollutants

The groundwater gradient in the Mercia Mudstone Group is westwards and borehole evidence indicates that it is steep at about 1 in 17.

Individual sites will always require more detailed assessments to determine the specific impact on groundwater resources. The maps represent conditions only at the ground surface. Where the soil and/or underlying formations have been disturbed or removed the vulnerability class may have been changed and site specific data will be required. Sites in urban areas and restored or current mineral workings are classified as having high (urban) soil leaching potential until proved otherwise.

Engineering Geological and Drilling Considerations

The information provided below is based on the interpretation of maps and records held by the British Geological Survey. It is intended to be used as a preliminary guide for highlighting issues the site geology may pose for drilling and ground engineering. The information and comments provided are not intended to be used for design purposes or as a substitute for appropriate ground investigation.

Engineering Consideration	Should be considered at this site	Comments
Trafficability	Y	Clays within the Alluvium, Oadby Till Formation, Blue Anchor Formation and Branscombe Mudstone Formation may 'putty' when wet.
Excavatability	N	
Thickness of superficial deposits greater than 5 m	N	
Greater than 5 m of weathered bedrock	Y	Rockhead, variably weathered to clay or clay matrix with harder lithorelicts, likely to be encountered down to c. 10 m depth.
Variable rockhead	N	
Bedrock geology likely to be chemically/physically altered from original material.	N	
Variable lithology in bedrock geology	Y	Majority of site underlain by bedrock of mudstone, but thin layers of siltstone and sandstone are likely to be present at depth.
Presence of highly fractured zones in the rock mass	N	
Very to extremely strong rock strength	N	
Aggressive sulphate conditions	Y	Possibility of high sulphate content with associated problems for buried concrete.
Running sand conditions at depth	N	

Geotechnical characteristics

The main geotechnical issues related to drilling are the nature and strength of the bedrock geology; the thickness and nature of the superficial deposits and the effective depth to hard rock drilling.

No site investigation reports or boreholes in proximity to the report area were found to have information on the drilling rate.

No site investigation reports or boreholes in proximity to the report area were found to have detailed information on the specific strength of formations. A few boreholes close to the report area were found to have descriptive information on the strength of the artificial, superficial and bedrock formations encountered. Indications of the strength and density of the artificial, superficial and bedrock deposits expected at this site are given in the table below:

BSI 1999. BS5930. *Code of practice for site investigations.* Amendment 1. British Standards Institution, London.

	Strength based on BS5930 (1999)	Typical range of SPT blow N Values	Typical range of UCS Values (MPa)
Made Ground	Variable	N/A	N/A
Alluvium	Very Soft to Stiff / Loose to Dense	4 - 50	<0.04 – 0.30
Oadby Till Formation	Firm to Hard	8 - >30	0.08 – 1.0
Blue Anchor Formation	Firm to Very Weak	8 - >30	0.08 - 5
Cropwell Bishop Formation	Firm to Medium Strong	8 - >30	0.08 - 50

Geotechnical information and datasets

In addition to borehole, shaft and well records held in the BGS National Geoscience Data Centre, some 50 400 Site Investigation reports describing geotechnical data from over 420 000 boreholes provide a geotechnical information source for UK bedrock and superficial deposits. Additional Site Investigation reports (both digital and analogue) are being acquired annually. Drilling information and in situ and laboratory-derived geotechnical parameter data extracted from these reports are held in the Corporate National Geotechnical Properties Database. Currently, some 182 400 geotechnical data 'sample suites' from 67 000 boreholes are held in the database, with approximately 25 000 parameter records from 6000 boreholes being added on average each year.

Where geotechnical information is required for sites not currently entered into the National Geotechnical Properties Database, a search of the original site investigation reports and related boreholes can be undertaken. A small percentage of the borehole and site investigation records are held as commercial-in-confidence for various reasons and cannot be released without the written permission of the originator. If any of the records you need are listed as confidential apply in the normal way. If possible, the BGS Enquiry Service staff will release the data or provide you with the information needed to contact the originator.

For enquiries principally requiring geotechnical related information please contact the Keyworth office.

Geoscience Data List

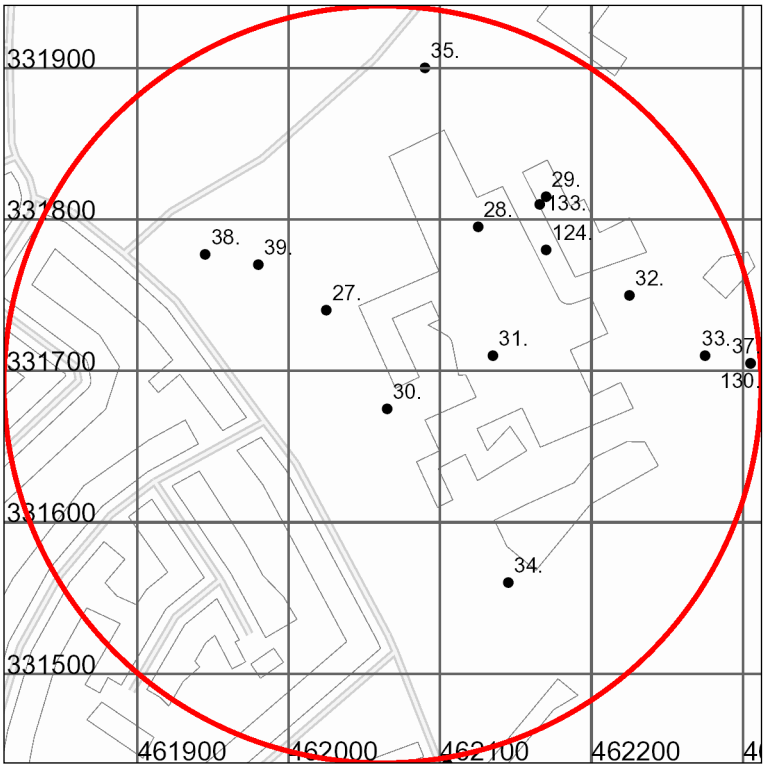
List of available geological data

This part of the report lists the principal data sets held in the National Geoscience Records Centre that are relevant to your enquiry and explains how to obtain copies of the records. Users can make their own index searches using the BGS web page (go to 'Online shops' at www.bgs.ac.uk). This will give access to the BGS Bookshop, Publications catalogue, GeoRecords (borehole browser) and GeoReports.

For current pricing see these internet pages or contact us using the list found at the back of this report.

Note that this report contains selective datasets and is not a definitive listing of all data held in BGS.

Borehole location map



Scale: 1:5 000 (1cm = 50 m)

Borehole records

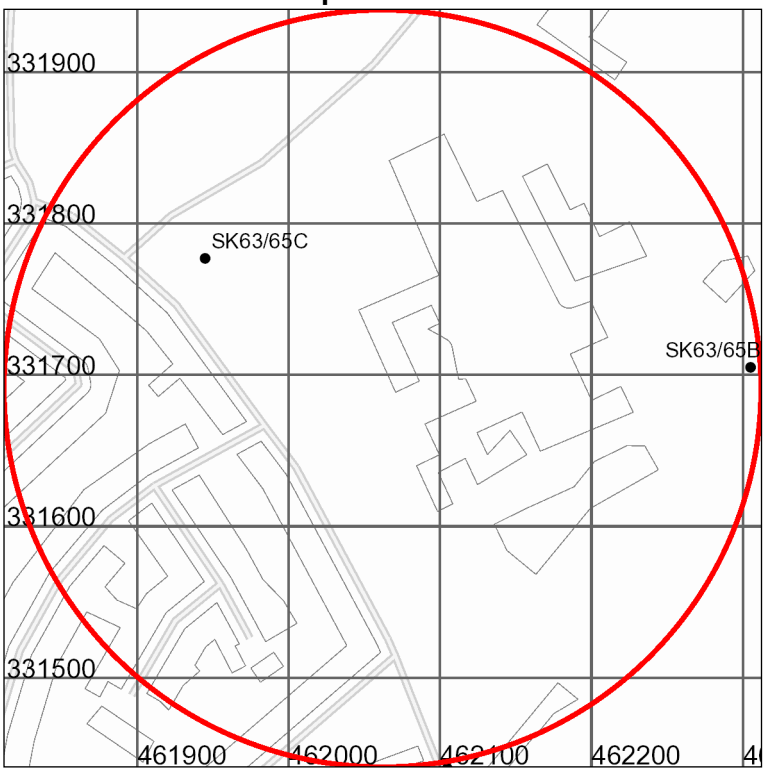
Number of records in map area: 15

In the following table a blank 'Length' field indicates that the borehole is confidential or that no depth has been recorded digitally.
Enquiry staff may be able to provide you with contact details for the originator if you wish to seek release of confidential information.

Borehole registered no	Grid reference	Borehole name	Length (m)
SK63SW124	SK 62170 31780	KEYWORTH OPEN DAY TEST BORE	50.35
SK63SW130	SK 62305 31705	I.G.S. KEYWORTH	63.8
SK63SW133	SK 62166 31810	BGS KEYWORTH EQUIPMENT STORE BOREHOLE	-1
SK63SW27	SK 62025 31740	BGS KEYWORTH BH1	10.2
SK63SW28	SK 62125 31795	BGS KEYWORTH BH2	5
SK63SW29	SK 62170 31815	BGS KEYWORTH BH3	5
SK63SW30	SK 62065 31675	BGS KEYWORTH BH4	5
SK63SW31	SK 62135 31710	BGS KEYWORTH BH5	5
SK63SW32	SK 62225 31750	BGS KEYWORTH BH6	5
SK63SW33	SK 62275 31710	BGS KEYWORTH BH7	5
SK63SW34	SK 62145 31560	BGS KEYWORTH BH8	4.5
SK63SW35	SK 62090 31900	BGS KEYWORTH BH9	5
SK63SW37	SK 62305 31705	BGS KEYWORTH B	63.8

Borehole registered no	Grid reference	Borehole name	Length (m)
SK63SW38	SK 61945 31777	BGS KEYWORTH C	62
SK63SW39	SK 61980 31770	BGS KEYWORTH	-1

Water well location map



Scale: 1:5 000 (1cm = 50 m)

Water Well records

Number of records in map area: 2

All of these records are registered in the main Borehole Records collections (see Borehole Records Table and map above), but please note that some may be duplicate or part duplicate copies. This map shows records of water wells and boreholes in the National Well Record Archive held at Wallingford (WL) or Murchison House (MH). Each record has a Well Registration number which should be quoted when applying for copies.

Additional index information may be held for the Water Well Records as shown below, indicating the information that can be found on the well record itself. If fields are blank, then the well record has not been examined and its contents are unknown. A ‘Yes’ or a ‘No’ indicates that the well record has been examined and the information indicated is, or is not, present. This information should help you when requesting copies of records.

Water Well records

Well Reg No.	BH Reg No.	Name	Easting	Northing	Depth (m)	Date	Aquifer	G	C	W	Ch
SK63/65B	SK63SW130/BJ	I.G.S. KEYWORTH	462305	331705	63.8	1978	MERCIA MUDSTONE GROUP	Yes	Yes	Yes	No
SK63/65C	SK63SW38/BJ	I.G.S. KEYWORTH	461945	331777	61.9	1978	MERCIA MUDSTONE GROUP	Yes	Yes	Yes	No

KEY:
Aquifer = The principal aquifer recorded in the borehole
G = Geological Information present on the log
C = Borehole construction information present on the log
W = Water level or yield information present on the log
Ch = Water chemistry information present on the log

Boreholes with water level readings
Number of records in map area: 0
BGS holds no boreholes with water level readings for the selected area

Locations with aquifer properties
Number of records in map area: 0
BGS holds no locations with aquifer properties for the selected area

Site investigation reports
Number of records in search area: 5

Additional laboratory and test data may be available in these reports, subject to any copyright and confidentiality conditions. The grid references used are based on an un-refined rectangle and therefore may not be applicable to a specific site. Borehole records in these reports will be individually referenced within the borehole records collection, described above.

Number	Site investigation title
508	GAMSTON TO LINGS BAR
3838	RESEARCH PROGRAMME TO ASSESS THE POTENTIALLY WORKABLE SAND AND GRAVEL RESOURCES IN THE SOAR VALLEY LEICESTERSHIRE
12934	OWTHORPE LANE COTGRAVE
23324	KEYWORTH
51709	LAND OFF SELBY LANE KEYWORTH

National Grid geological maps (1:10 000 and 1:10 560 scale)
Number of records in search area: 1

Map	Type	Survey
SK63SW	C	1988

County Series geological maps (1:10 560 scale)
Number of records in search area: 4

Map	Type	Published
Nottinghamshire46NE		1906
Nottinghamshire46NE	C	0
Nottinghamshire46SE	C	0
Nottinghamshire46SE		1906

New Series medium scale geological maps (1:50 000 and 1:63 360 scale)
Number of records in search area: 4

Sheet number	Sheet name	Type	Published
142	Melton Mowbray	C	2002
142	Melton Mowbray	D	1909
142	Melton Mowbray	D	1959
142	Melton Mowbray	D	1969

Old Series one inch geological maps (1:63 360 scale)
Number of records in search area: 1

Sheet number	Sheet name	Type	Published
71SE	Loughborough	S	1879

Hydrogeological maps (various scales)
Number of records in search area: 0
BGS holds no hydrogeological maps for the selected area

Geological Memoirs
Number of records in search area: 2

Geological memoir	Date
Melton Mowbray	2002
Melton Mowbray & SE Notts	1909

Technical reports
Technical reports may be available for this area. Please email sales@bgs.ac.uk for further information.

BGS non-coal mining plans
Number of records in search area: 102

This listing shows mining plans, including abandonment plans. The coverage is not comprehensive.

Record Type	Plan No.	Title
KP	10515	COTGRAVE COLLIERY DEEP HARD SEAM SOUTH SIDE
KP	10516	COTGRAVE COLLIERY DEEP HARD PIPER TUPTON &BLACKSHALE SEAMS
KP	10524	COTGRAVE COLLIERY DEEP HARD SEAM SOUTH SIDE
KP	10525	COTGRAVE COLLIERY DEEP HARD SEAM SOUTH SIDE
KP	10549	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10550	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10551	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10552	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10555	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10556	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10557	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10558	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10559	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10560	COTGRAVE COLLIERY DEEP SOFT SEAM
KP	10561	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10562	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10564	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10565	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10566	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10567	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10568	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10569	COTGRAVE COLLIERY BLACKSHALE SEAM
KP	10571	COTGRAVE COLLIERY DEEP HARD SEAM
KP	10572	COTGRAVE COLLIERY BLACKSHALE SEAM

Record Type	Plan No.	Title
KP	12002	INTERPRETATION OF FAULTING AT DEEP HARD LEVEL
KP	12004	INTERPRETATION OF FAULTUNG AT DEEP HARD LEVEL
KP	12006	SEAM PLAN
KP	12027	INTERPRETATION OF FAULTING AT DEEP HARD LEVEL
KP	12028	INTERPRETATION OF FAULTING AT DEEP HARD LEVEL
KP	12030	COTGRAVE COLLIERY
KP	12143	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12145	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12154	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12155	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12160	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12161	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12162	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12163	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12164	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12165	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12166	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12167	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12168	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12169	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12170	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12171	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12172	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12173	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12174	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12175	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT

Record Type	Plan No.	Title
KP	12176	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12177	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12178	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12179	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12180	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12181	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12182	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12183	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12184	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12200	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12210	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12211	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12212	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12225	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12226	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12228	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12245	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12246	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12254	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12257	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12258	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12259	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12260	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT

Record Type	Plan No.	Title
KP	12261	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12262	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12281	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12294	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12295	ASFORDBY MINE NORTH EAST LEICESTERSHIRE PROSPECT VALE OF BELVOIR PROSPECT
KP	12428	COTGRAVE PROSPECT 1985 SURVEY SP MAP
KP	12430	COTGRAVE PROSPECT GEOPHONE LOCATION MAP
KP	14029	MINING AREAS UNDERGROUND DEEP MINING AND GYPSUM
KP	18138	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18139	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18152	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18159	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18165	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18173	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18188	BELVOIR PROSPECT NORTH EAST LEICESTERSHIRE PROSPECT
KP	18191	WESTPHALIAN A & B OF THE COALFIELDS OF ENGLAND & WALES (INCLUDING CANONBIE)
KP	18352	MINING LOCATIONS DEEP HARD SEAM SEE ALSO MICROFICH EM1406
KP	2490	DEEP HARD SEAM
KP	2510	PIPER SEAM
KP	2511	PIPER SEAM
KP	4637	WEST YORKSHIRE GRAVEL SURVEY
KP	4696	EXAMINATION PLAN DEEP HARD SEAM
KP	8278	CONCEALED YORKS-NOTTS COALFIELD 3RD EDIT (MEM GEOL SURVEY) PLATE 1.
KP	8350	LOCATIONS OF COLLIERIES AND BOREHOLES. NORTH MIDLANDS AND LINCOLNSHIRE PITS.
KP	8353	NOTTINGHAMSHIRE AND NORTH DERBYSHIRE SEAM PLANS. LOCATIONS OF MAIN COLLIERIES.
KP	9826	NOTTINGHAMSHIRE COALFIELD COTGRAVE COLLIERY
KP	9839	NOTTINGHAMSHIRE COALFIELD COTGRAVE COLLIERY
KP	9864	NOTTINGHAMSHIRE COALFIELD COTGRAVE COLLIERY
KP	987	DEEP HARD SEAM WORKINGS

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