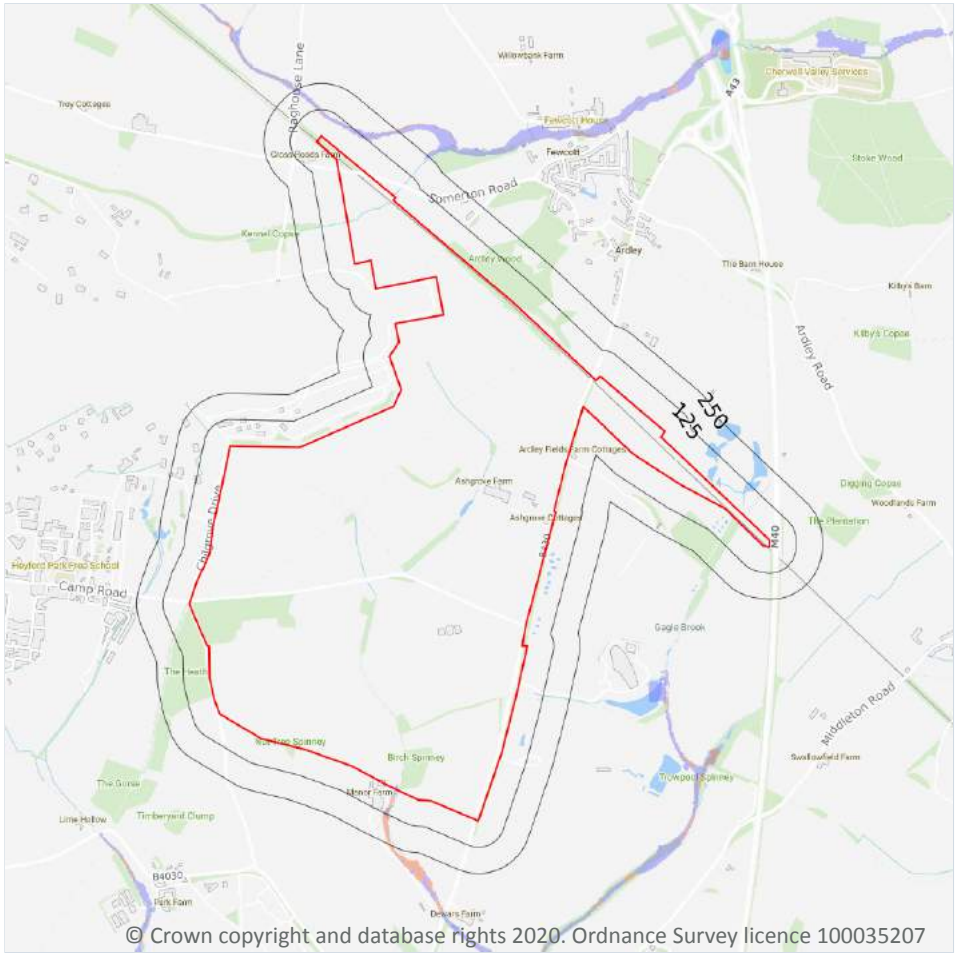
7 River and coastal flooding



Site Outline

Search buffers in metres (m)

Environment Agency river and coastal flooding:

- High
- Medium
- Low
- Very Low
- Historical Flood Events
- Areas Used for Flood Storage
- Areas Benefiting from Flood Defences
- Flood Defences

7.1 Risk of Flooding from Rivers and Sea (RoFRaS)

Records within 50m	2

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition; 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).

Features are displayed on the River and coastal flooding map on **page 89**

Distance	RoFRaS flood risk
On site	**Medium**
0 - 50m	High

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.

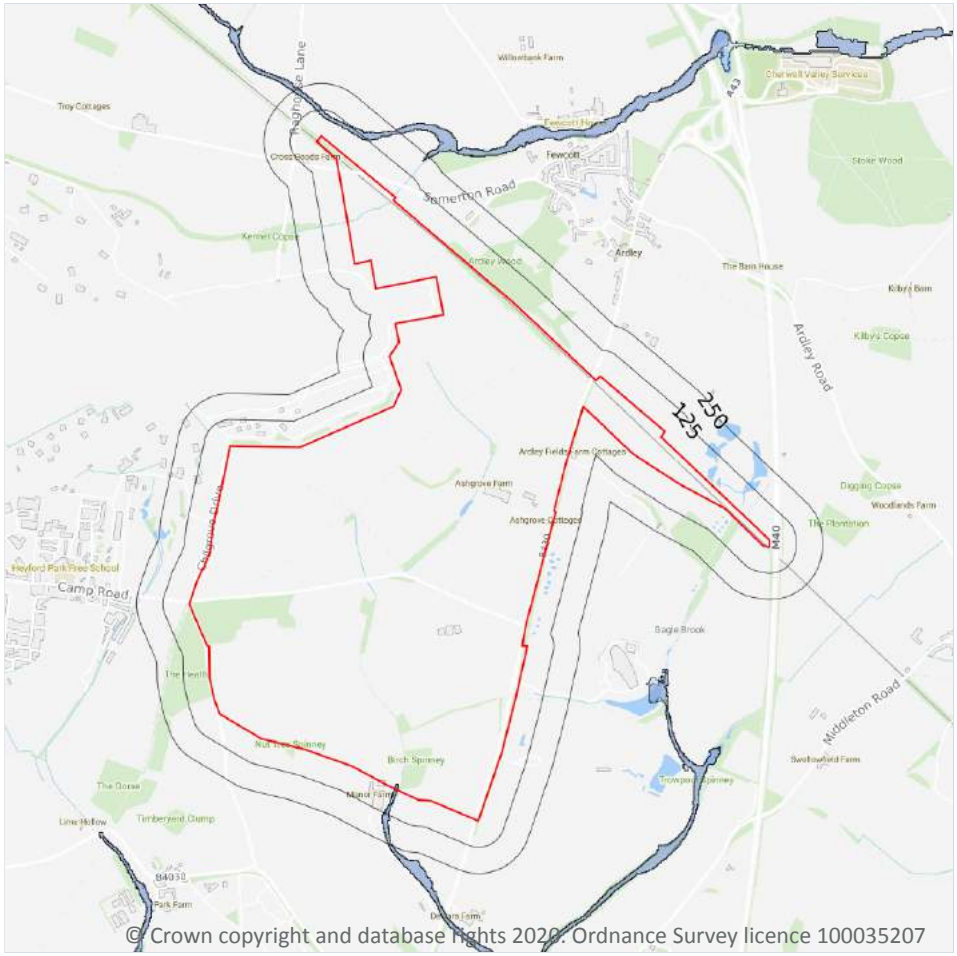
7.5 Flood Storage Areas

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



Site Outline

Search buffers in metres (m)

Flood zone 2

Flood zone 3

7.6 Flood Zone 2

Records within 50m	1

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.

Features are displayed on the River and coastal flooding map on **page 89**

Location	Type
On site	**Zone 2 - (Fluvial /Tidal Models)**

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m	1

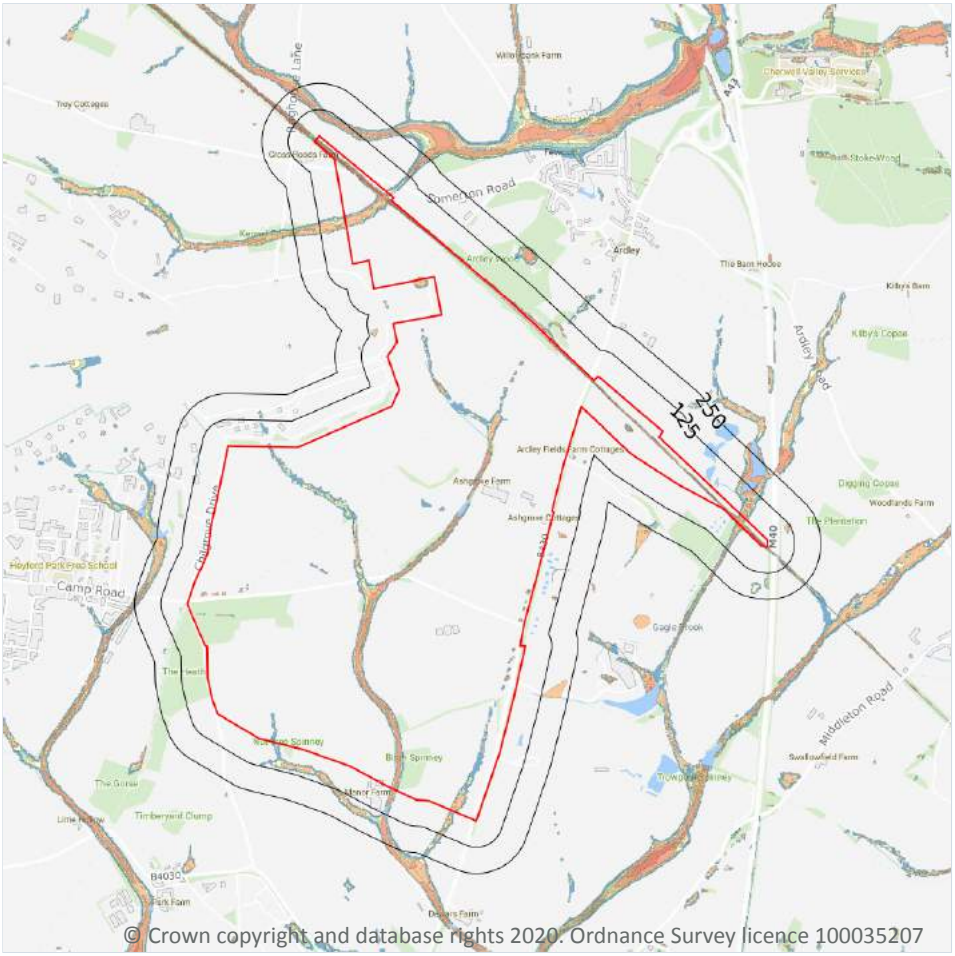
Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

Features are displayed on the River and coastal flooding map on **page 89**

Location	Type
On site	**Zone 3 - (Fluvial Models)**

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



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	**1 in 30 year, Greater than 1.0m**
Highest risk within 50m	**1 in 30 year, Greater than 1.0m**

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 93**

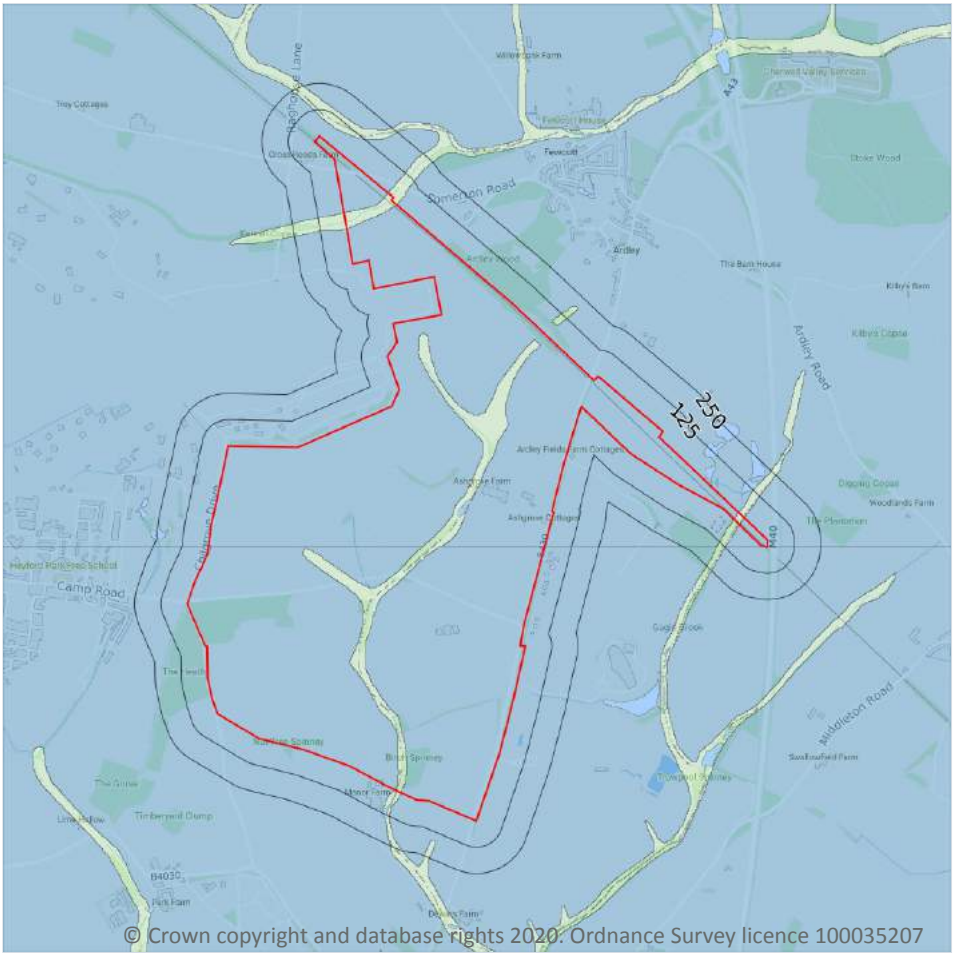
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

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	Greater than 1.0m
1 in 250 year	Greater than 1.0m
1 in 100 year	Greater than 1.0m
1 in 30 year	Greater than 1.0m

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



9.1 Groundwater flooding

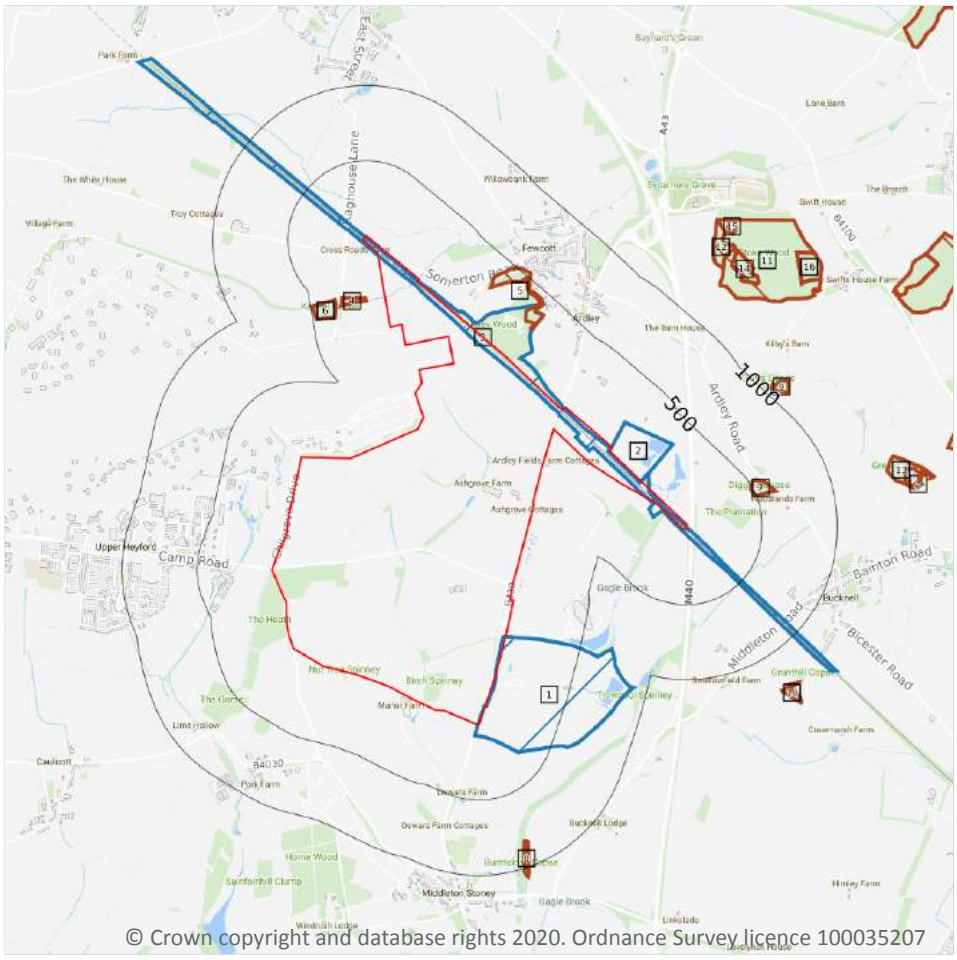
Highest risk on site	**Low**
Highest risk within 50m	**Low**

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 95**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	3

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.

Features are displayed on the Environmental designations map on **page 96**

ID	Location	Name	Data source
1	**On site**	**Ardley Trackways**	**Natural England**

ID	Location	Name	Data source
2	**On site**	**Ardley Trackways**	**Natural England**
3	**On site**	**Ardley Cutting and Quarry**	**Natural England**

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	0

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.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m	18

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 96**

ID	Location	Name	Woodland Type
4	127m W	Unknown	Ancient & Semi-Natural Woodland
5	251m NE	Ardley Wood	Ancient & Semi-Natural Woodland
6	333m W	Kennel Copse	Ancient & Semi-Natural Woodland
7	484m NE	Digging Copse	Ancient & Semi-Natural Woodland
8	827m S	Burntclose Copse	Ancient & Semi-Natural Woodland
9	1041m NE	Unknown	Ancient & Semi-Natural Woodland
10	1238m SE	Grunthill Copse	Ancient & Semi-Natural Woodland
11	1284m NE	Stoke Wood	Ancient & Semi-Natural Woodland
12	1377m NE	Stoke Wood	Ancient Replanted Woodland
13	1381m E	Great Copse	Ancient & Semi-Natural Woodland
14	1401m NE	Stoke Wood	Ancient Replanted Woodland
A	1531m E	Great Copse	Ancient & Semi-Natural Woodland
A	1572m E	Great Copse	Ancient & Semi-Natural Woodland
15	1592m NE	Stoke Wood	Ancient Replanted Woodland

ID	Location	Name	Woodland Type
A	1604m E	Great Copse	Ancient & Semi-Natural Woodland
16	1668m NE	Stoke Wood	Ancient Replanted Woodland
-	1793m E	Nettle Copse	Ancient & Semi-Natural Woodland
18	1810m E	Twelveacre Copse	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	0

Areas designated to prevent urban sprawl by keeping land permanently open.

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

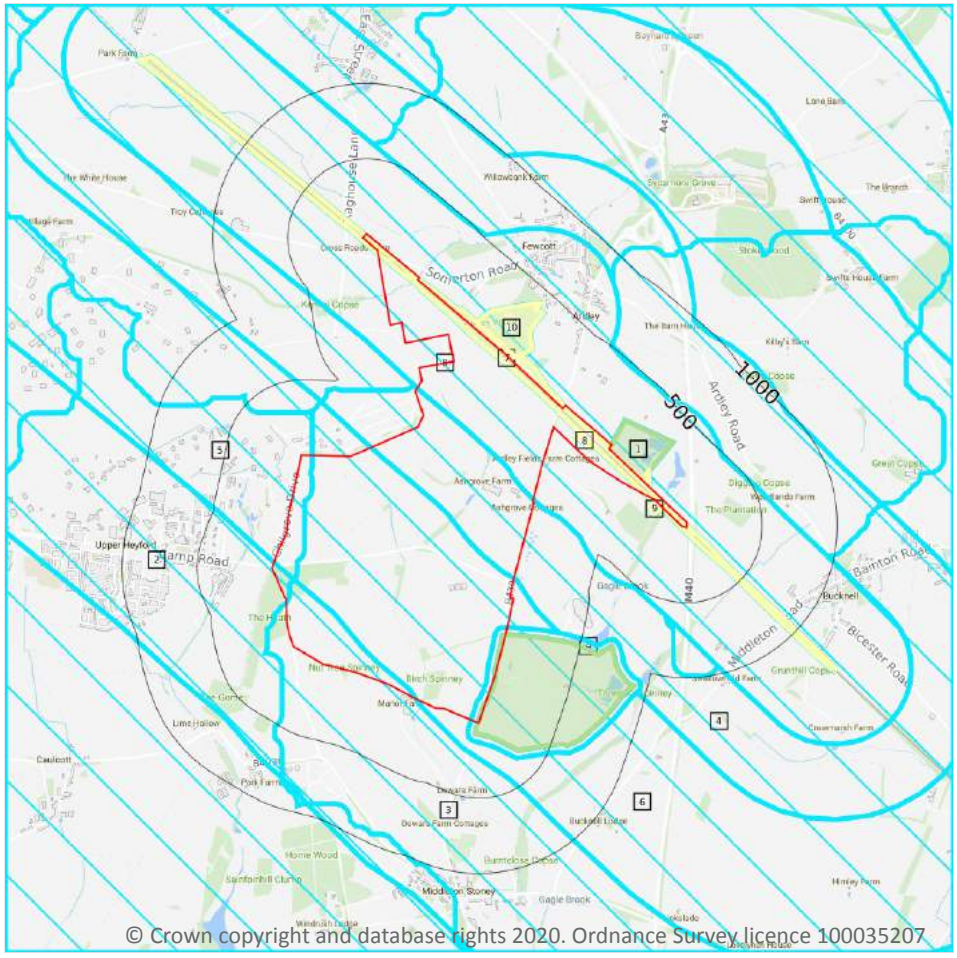
Records within 2000m	10

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	**Great Ouse NVZ**	**Surface Water**	**S391**	**Existing**
On site	**Anglian Great Oolite**	**Groundwater**	**G73**	**Existing**
On site	**Cherwell (Ray to Thames) and Woodeaton Brook NVZ**	**Surface Water**	**S472**	**Existing**
On site	**Cherwell (Ray to Thames) and Woodeaton Brook NVZ**	**Surface Water**	**S472**	**Existing**
On site	**Cherwell (Ray to Thames) and Woodeaton Brook NVZ**	**Surface Water**	**S472**	**Existing**
On site	**Cherwell (Ray to Thames) and Woodeaton Brook NVZ**	**Surface Water**	**S472**	**Existing**
71m NE	Anglian Great Oolite	Groundwater	G73	Existing
457m NE	Great Ouse NVZ	Surface Water	S391	Existing
505m E	Bicester North	Groundwater	G162	Existing
842m E	Bicester North	Groundwater	G162	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	9

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 102**

ID	Location	Type of developments requiring consultation
2	On site	Infrastructure - Airports, helipads and other aviation proposals. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction. Air pollution - Livestock & poultry units with floorspace > 500m², slurry lagoons > 750m² & manure stores > 3500t. Discharges - Any discharge of water or liquid waste of more than 20m³/day to ground (ie to seep away) or to surface water, such as a beck or stream (NB This does not include discharges to mains sewer which are unlikely to pose a risk at this location)
3	On site	Infrastructure - Airports, helipads and other aviation proposals. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction. Air pollution - Livestock & poultry units with floorspace > 500m², slurry lagoons > 750m² & manure stores > 3500t.
4	On site	Infrastructure - Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction. Residential - Residential development of 100 units or more. Rural residential - Any residential development of 50 or more houses outside existing settlements/urban areas. Air pollution - Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, livestock & poultry units with floorspace > 500m², slurry lagoons > 200m² & manure stores > 250t). Combustion - General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion Waste - Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill. Composting - Any composting proposal with more than 500 tonnes maximum annual operational throughput. Incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management. Water supply - Large infrastructure such as warehousing / industry where net additional gross internal floorspace is > 1,000m² or any development needing its own water supply

ID	Location	Type of developments requiring consultation
5	On site	Infrastructure - Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction. Air pollution - Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, livestock & poultry units with floorspace > 500m², slurry lagoons > 200m² & manure stores > 250t). Combustion - General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion Waste - Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill. Composting - Any composting proposal with more than 75000 tonnes maximum annual operational throughput. Incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management Discharges - Any discharge of water or liquid waste of more than 20m³/day to ground (ie to seep away) or to surface water, such as a beck or stream (NB This does not include discharges to mains sewer which are unlikely to pose a risk at this location) Water supply - Large infrastructure such as warehousing / industry where total net additional gross internal floorspace following development is 1,000m² or more.
6	On site	Infrastructure - Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction. Air pollution - Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, livestock & poultry units with floorspace > 500m², slurry lagoons > 200m² & manure stores > 250t). Combustion - General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion Waste - Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill. Composting - Any composting proposal with more than 75000 tonnes maximum annual operational throughput. Incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management Water supply - Large infrastructure such as warehousing / industry where total net additional gross internal floorspace following development is 1,000m² or more.
A	On site	All applications - All Planning Applications - Except Householder Applications.
A	On site	All applications - All Planning Applications.
B	On site	All applications - All Planning Applications - Except Householder Applications.
B	On site	All applications - All Planning Applications.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	6

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.

Features are displayed on the SSSI Impact Zones and Units map on **page 102**

ID: 1
Location: On site
SSSI name: Ardley Trackways
Unit name: Ardley North
Broad habitat: Inland Rock
Condition: Favourable
Reportable features:

Feature name	Feature condition	Date of assessment
EA - Jurassic - Cretaceous Reptilia	Favourable	15/10/2009

ID: 7
Location: On site
SSSI name: Ardley Cutting and Quarry
Unit name: Cutting
Broad habitat: Calcareous Grassland - Lowland
Condition: Unfavourable - Recovering
Reportable features:

Feature name	Feature condition	Date of assessment
ER - Bathonian	Favourable	22/08/2012
Invert. assemblage F112 open short sward	-	-
Lowland calcareous grassland (CG3-5)	Unfavourable - Recovering	22/08/2012
Populations of nationally scarce butterfly species - Hamearis lucina, Duke of Burgundy	-	-

ID: 8
Location: On site
SSSI name: Ardley Cutting and Quarry
Unit name: South East
Broad habitat: Earth Heritage

Condition: Unfavourable - Recovering
Reportable features:

Feature name	Feature condition	Date of assessment
ED - Bathonian	Unfavourable - Recovering	01/10/2009

ID: A
Location: On site
SSSI name: Ardley Trackways
Unit name: Dewars Farm
Broad habitat: Inland Rock
Condition: Favourable
Reportable features:

Feature name	Feature condition	Date of assessment
EA - Jurassic - Cretaceous Reptilia	Favourable	15/10/2009

ID: 9
Location: 8m SW
SSSI name: Ardley Cutting and Quarry
Unit name: South East
Broad habitat: Earth Heritage
Condition: Unfavourable - Recovering
Reportable features:

Feature name	Feature condition	Date of assessment
ED - Bathonian	Unfavourable - Recovering	01/10/2009

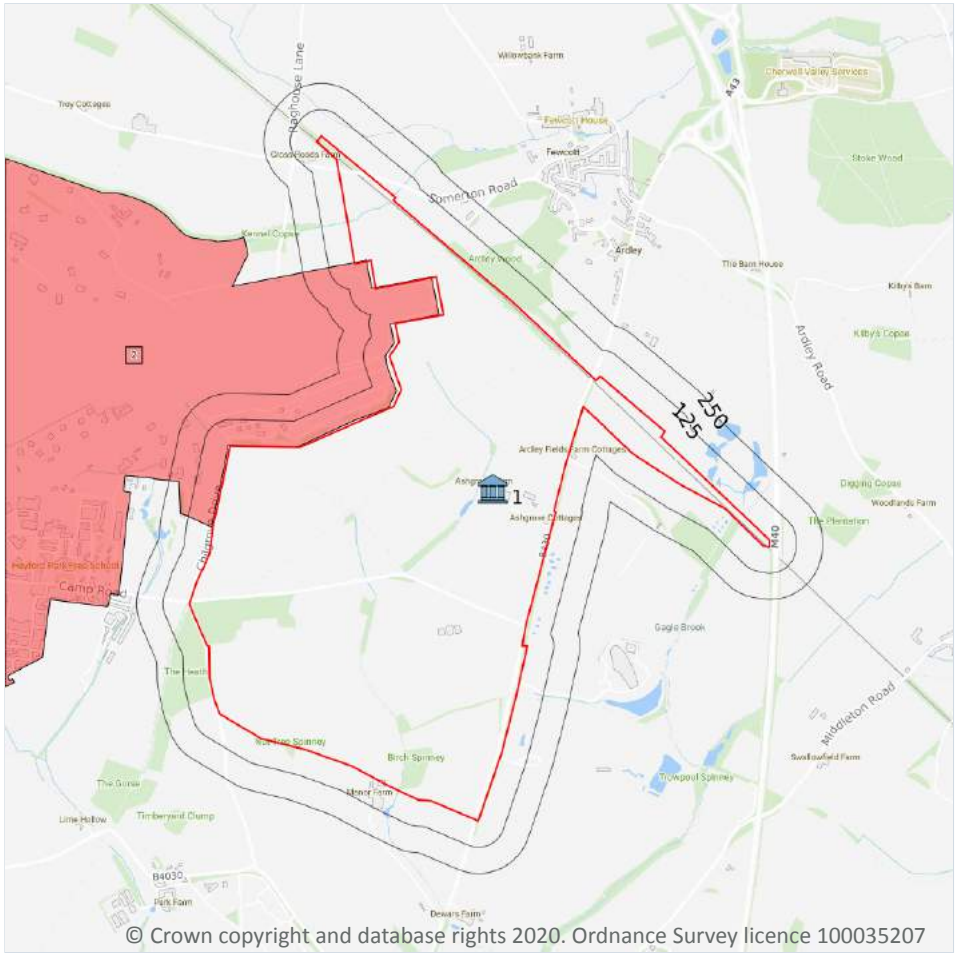
ID: 10
Location: 22m NE
SSSI name: Ardley Cutting and Quarry
Unit name: Ardley Wood
Broad habitat: Calcareous Grassland - Lowland
Condition: Unfavourable - Recovering
Reportable features:

Feature name	Feature condition	Date of assessment
ED - Bathonian	Unfavourable - Recovering	27/09/2012
Invert. assemblage F112 open short sward	-	-

Feature name	Feature condition	Date of assessment
Lowland calcareous grassland (CG3-5)	Unfavourable - Recovering	27/09/2012
Populations of nationally scarce butterfly species - Hamearis lucina, Duke of Burgundy	-	-

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations



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 108**

ID	Location	Name	Grade	Reference Number	Listed date
1	**On site**	**Barn Approximately 30 Metres North Of Ashgrove Farmhouse (Not Included), Ardley, Cherwell, Oxfordshire, OX27**	**II**	**1046879**	**26/02/1988**

This data is sourced from English Heritage, 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 108**

ID	Location	Name	District	Date of designation
2	**On site**	**RAF Upper Heyford**	**Cherwell**	**04/2006**

This data is sourced from English Heritage, 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 English Heritage, Cadw and Historic Environment Scotland.

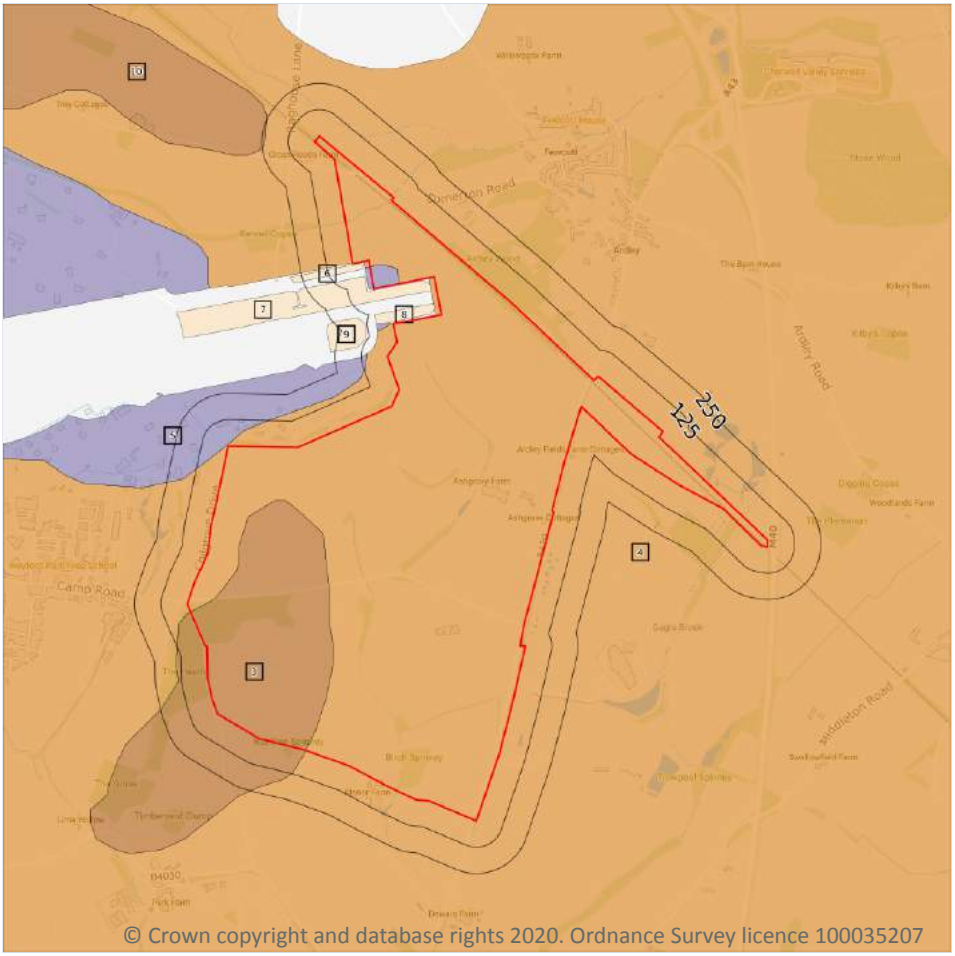
11.7 Registered Parks and Gardens

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 English Heritage, 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	8

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 111**

ID	Location	Classification	Description
3	**On site**	**Grade 2**	**Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.**
4	**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.**
5	**On site**	**Non Agricultural**	**-**
6	4m S	Grade 3b	Moderate quality agricultural land. Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
7	6m S	Grade 3b	Moderate quality agricultural land. Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
8	10m N	Grade 3b	Moderate quality agricultural land. Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
9	130m W	Grade 3b	Moderate quality agricultural land. Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
10	236m W	Grade 2	Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

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	4

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment.

Location	Reference	Scheme	Start Date	End date
On site	**AG00456291**	**Entry Level Stewardship**	**01/10/2013**	**30/09/2018**
On site	**AG00476091**	**Entry Level Stewardship**	**01/09/2013**	**31/08/2018**
On site	**AG00282978**	**Higher Level Stewardship**	**01/07/2010**	**30/06/2020**
159m NW	AG00501589	Entry Level Stewardship	01/10/2013	30/09/2018

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

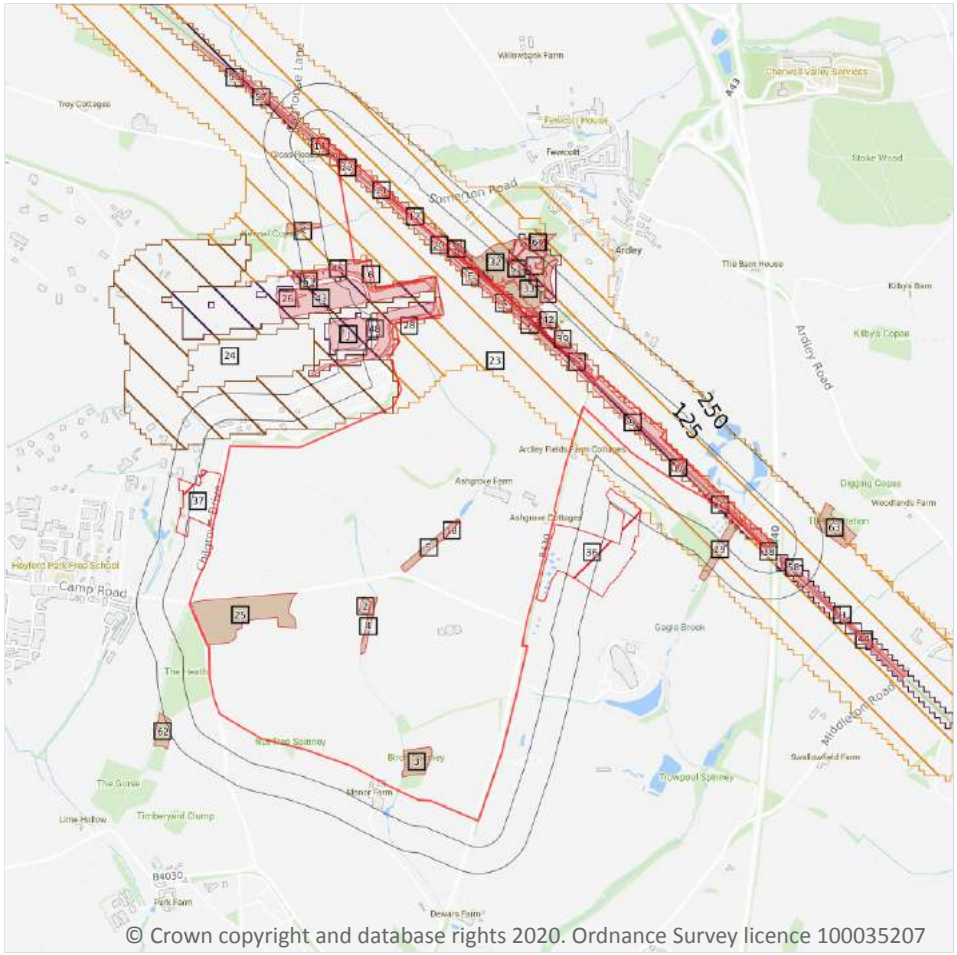
Records within 250m	4

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.

Location	Reference	Scheme	Start Date	End Date
On site	**639896**	**Countryside Stewardship (Middle Tier)**	**01/01/2019**	**31/12/2023**
117m N	639896	Countryside Stewardship (Middle Tier)	01/01/2019	31/12/2023
159m NW	645383	Countryside Stewardship (Middle Tier)	01/01/2019	31/12/2023
170m N	639896	Countryside Stewardship (Middle Tier)	01/01/2019	31/12/2023

This data is sourced from Natural England.

13 Habitat designations



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	72

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 115**

ID	Location	Main Habitat	Other habitats
1	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
2	On site	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
3	On site	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
4	On site	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

ID	Location	Main Habitat	Other habitats
5	On site	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
6	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
7	On site	Lowland calcareous grassland	Main habitat: LCGRA (ENSIS L1)
8	On site	Lowland calcareous grassland	Main habitat: LCGRA (ENSIS L1)
9	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
10	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
11	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
12	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
13	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
14	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
15	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
16	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
17	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
18	On site	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
19	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
20	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
21	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
22	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
25	On site	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
A	On site	Lowland calcareous grassland	Main habitat: LCGRA (ENSIS L1)
A	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
B	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
B	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
C	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
C	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
D	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
D	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
E	On site	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)

ID	Location	Main Habitat	Other habitats
G	1m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
27	3m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (INV > 50%, ENSIS L1)
28	3m N	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
29	3m SW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
30	5m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
31	6m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (INV > 50%, ENSIS L1)
32	7m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
33	7m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
34	8m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
35	10m S	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
G	14m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
G	14m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
38	17m S	Lowland calcareous grassland	Main habitat: LCGRA (ENSIS L1)
39	18m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (INV > 50%, ENSIS L1)
40	19m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
F	20m N	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
41	21m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
42	37m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
43	50m W	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
H	65m SE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
H	75m SE	Lowland calcareous grassland	Main habitat: LCGRA (ENSIS L1)
46	77m SE	Lowland calcareous grassland	Main habitat: LCGRA (ENSIS L1)
47	85m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
51	100m NE	Lowland calcareous grassland	Main habitat: DWOOD (INV > 50%); LCGRA (INV > 50%, ENSIS L1)
52	114m NE	Lowland calcareous grassland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
53	120m NE	Lowland calcareous grassland	Main habitat: DWOOD (INV > 50%); LCGRA (INV > 50%, ENSIS L1)
K	127m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
K	127m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

ID	Location	Main Habitat	Other habitats
54	129m NE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
J	132m W	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%)
55	134m NW	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
56	135m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
57	141m NW	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
58	146m SE	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
59	152m NW	Lowland calcareous grassland	Main habitat: LCGRA (INV > 50%, ENSIS L1)
60	197m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
62	225m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
63	227m E	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
64	231m NE	Deciduous woodland	Main habitat: DWOOD (INV > 50%); LCGRA (ENSIS L1)
65	231m NE	Lowland calcareous grassland	Main habitat: DWOOD (INV > 50%); LCGRA (INV > 50%, ENSIS L1)

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m **13**

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.

Features are displayed on the Habitat designations map on **page 115**

ID	Location	Type	Habitat
23	**On site**	**Network Enhancement Zone 1**	**Not specified**
24	**On site**	**Network Enhancement Zone 2**	**Not specified**
26	**On site**	**Primary Habitat**	**Lowland calcareous grassland**
E	**On site**	**Primary Habitat**	**Lowland calcareous grassland**
F	**On site**	**Primary Habitat**	**Lowland calcareous grassland**
44	51m SE	Primary Habitat	Lowland calcareous grassland
45	69m W	Network Enhancement Zone 2	Not specified
I	81m NE	Primary Habitat	Lowland calcareous grassland

ID	Location	Type	Habitat
48	87m W	Network Enhancement Zone 2	Not specified
49	90m W	Network Enhancement Zone 2	Not specified
50	90m SW	Network Enhancement Zone 2	Not specified
J	112m W	Primary Habitat	Lowland calcareous grassland
61	202m W	Network Enhancement Zone 2	Not specified

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m **3**

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.

Features are displayed on the Habitat designations map on **page 115**

ID	Location	Site reference	Identification confidence	Primary source	Secondary source	Tertiary source
36	13m E	BRITPITS ref: 3603; HLD_refs: EAHLD13215; EAHLD13217	Low	British Geological Survey BRITPITS database	UK Perspectives Aerial Photography	Environment Agency Historic Landfill Sites
37	15m W	NLUD Ref: 310500241; BRITPITS ref: 57206	Low	National Land Use Database - Previously Developed Land	British Geological Survey BRITPITS database	UK Perspectives Aerial Photography
I	100m NE	BRITPITS ref: 6933	Low	British Geological Survey BRITPITS database	Environment Agency Historic Landfill Sites	UK Perspectives Aerial Photography

This data is sourced from Natural England.

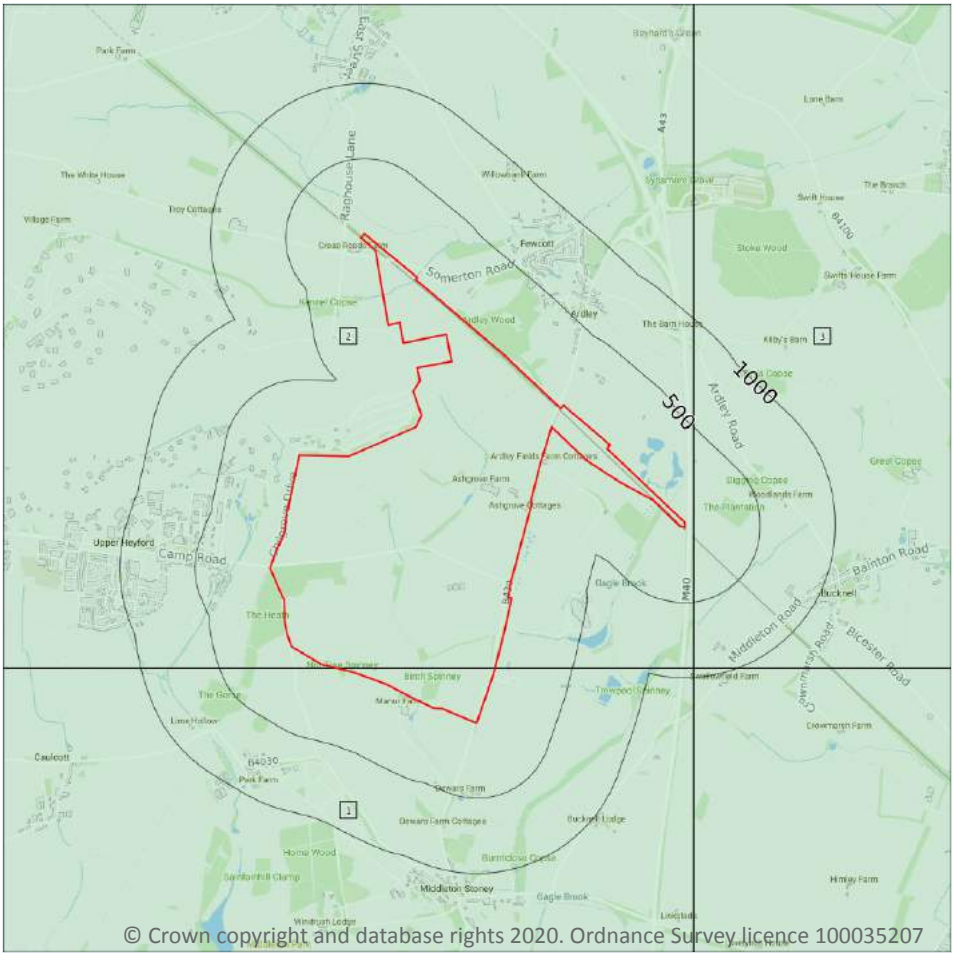
13.4 Limestone Pavement Orders

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



Site Outline

Search buffers in metres (m)

- Full coverage
- Partial coverage
- No coverage

14.1 10k Availability

Records within 500m **3**

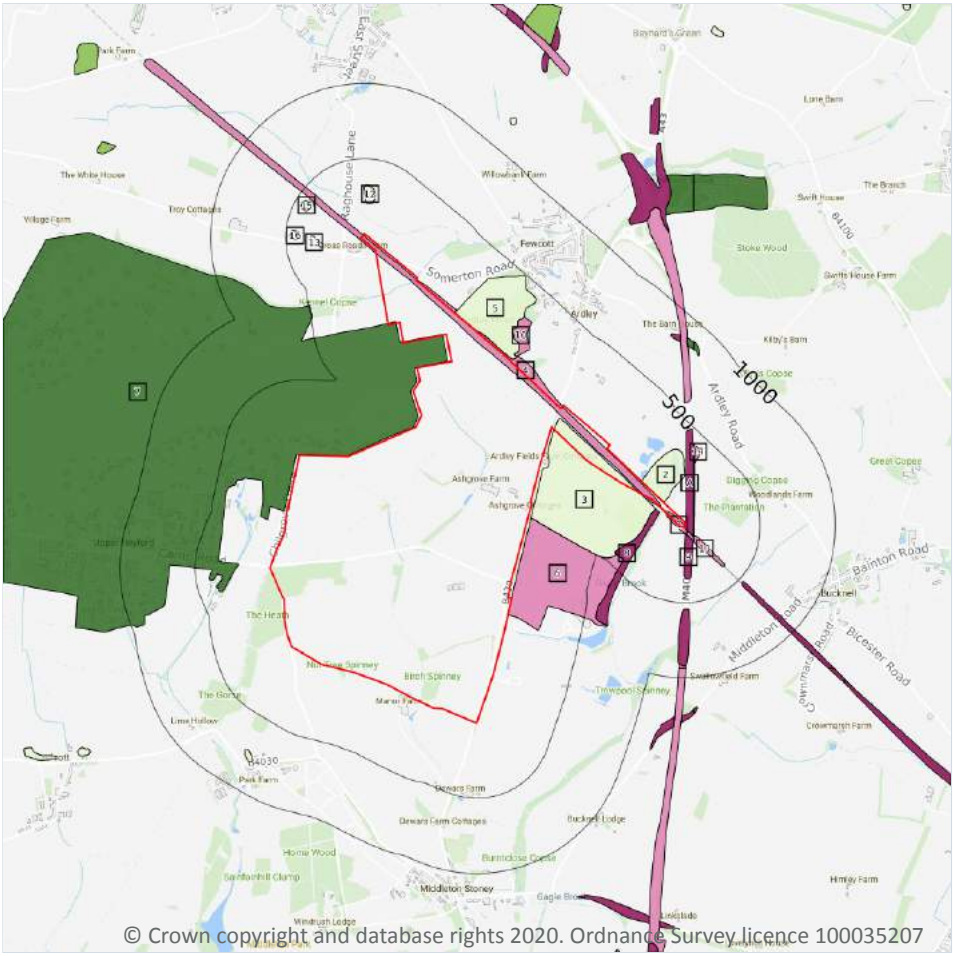
An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 121**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**No coverage**	**SP52SW**
2	**On site**	**Full**	**Full**	**Full**	**No coverage**	**SP52NW**
3	60m E	Full	Full	Full	No coverage	SP52NE

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground



Site Outline

Search buffers in metres (m)

- Reclaimed ground
- Made ground
- Worked ground
- Infilled ground
- Disturbed ground
- Landscaped ground

14.2 Artificial and made ground (10k)

Records within 500m	18

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.

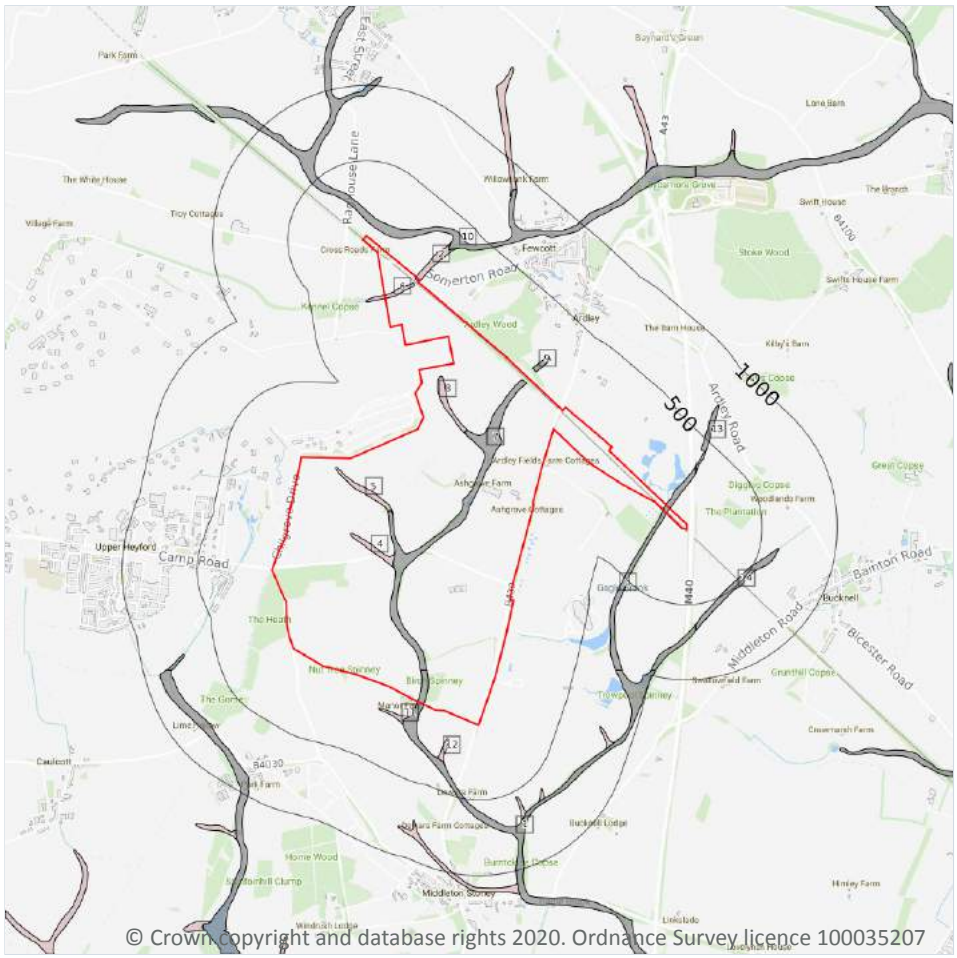
Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 122**

ID	Location	LEX Code	Description	Rock description
1	On site	WGR-VOID	Worked Ground (Undivided)	Void
2	On site	WMGR-ARTDP	Infilled Ground	Artificial Deposit
3	On site	WMGR-ARTDP	Infilled Ground	Artificial Deposit
4	On site	WGR-VOID	Worked Ground (Undivided)	Void

ID	Location	LEX Code	Description	Rock description
5	**On site**	**WMGR-ARTDP**	**Infilled Ground**	**Artificial Deposit**
6	**On site**	**WGR-VOID**	**Worked Ground (Undivided)**	**Void**
7	**On site**	**LSGR-UKNOWN**	**Landscaped Ground (Undivided)**	**Unknown/unclassified Entry**
A	5m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
8	29m SW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
9	42m S	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
10	48m NE	WGR-VOID	Worked Ground (Undivided)	Void
A	60m E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
11	81m SE	WGR-VOID	Worked Ground (Undivided)	Void
12	203m N	WMGR-ARTDP	Infilled Ground	Artificial Deposit
13	259m W	WMGR-ARTDP	Infilled Ground	Artificial Deposit
14	330m NE	WGR-VOID	Worked Ground (Undivided)	Void
15	385m NW	WMGR-ARTDP	Infilled Ground	Artificial Deposit
16	406m W	WMGR-ARTDP	Infilled Ground	Artificial Deposit

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (10k)

Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m	14

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.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 124**

ID	Location	LEX Code	Description	Rock description
1	On site	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly
2	On site	HEAD-XCZ	Head - Clay And Silt	Clay And Silt
3	On site	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly
4	On site	HEAD-XCZ	Head - Clay And Silt	Clay And Silt

ID	Location	LEX Code	Description	Rock description
5	**On site**	**HEAD-XCZ**	**Head - Clay And Silt**	**Clay And Silt**
6	**On site**	**HEAD-XCZ**	**Head - Clay And Silt**	**Clay And Silt**
7	**On site**	**ALV-CSV**	**Alluvium - Sandy Gravelly Clay**	**Clay, Sandy, Gravelly**
8	**On site**	**HEAD-XCZ**	**Head - Clay And Silt**	**Clay And Silt**
9	65m NE	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly
10	77m NE	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly
11	111m SW	HEAD-XCZ	Head - Clay And Silt	Clay And Silt
12	164m SW	HEAD-XCZ	Head - Clay And Silt	Clay And Silt
13	289m NE	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly
14	471m SE	ALV-CSV	Alluvium - Sandy Gravelly Clay	Clay, Sandy, Gravelly

This data is sourced from the British Geological Survey.

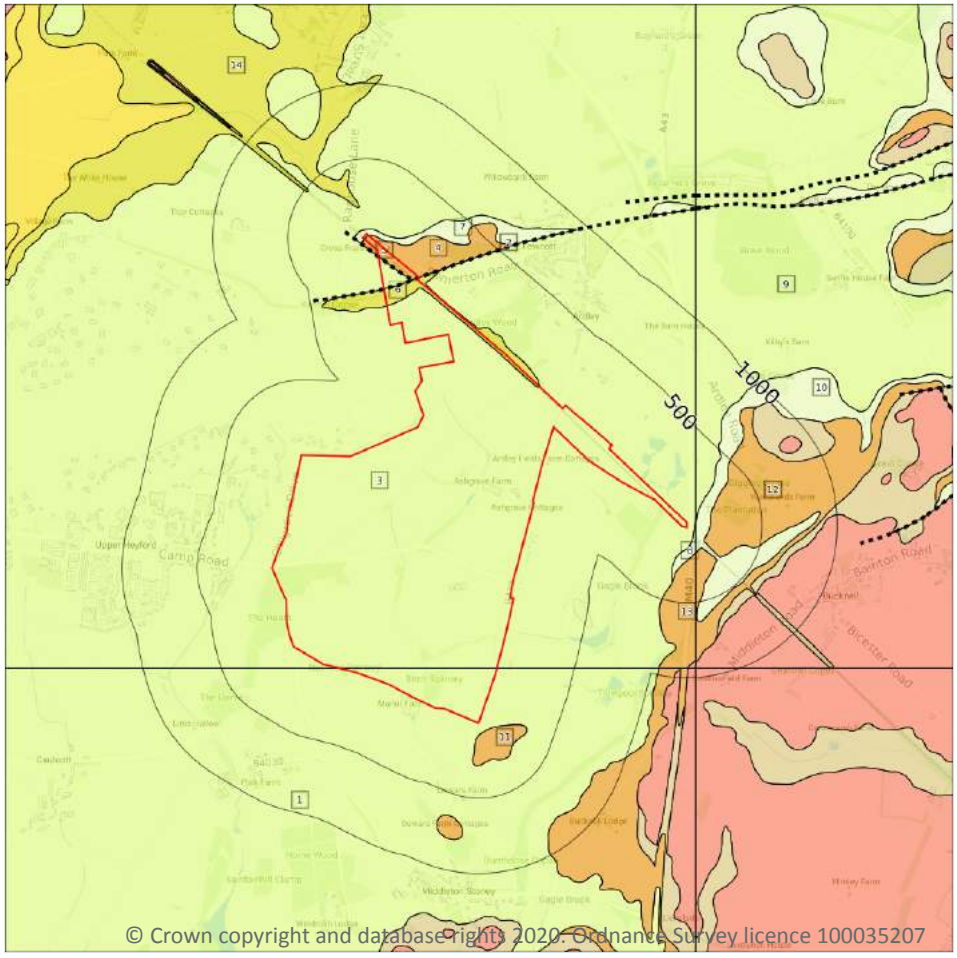
14.4 Landslip (10k)

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



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 **12**

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 126**

ID	Location	LEX Code	Description	Rock age
1	On site	WHL-LMST	White Limestone Formation - Limestone	Bathonian Age
3	On site	WHL-LMST	White Limestone Formation - Limestone	Bathonian Age
4	On site	FMB-LMST	Forest Marble Formation - Limestone	Bathonian Age
6	On site	RLD-MDST	Rutland Formation - Mudstone	Bathonian Age - Bajocian Age

ID	Location	LEX Code	Description	Rock age
7	**On site**	**BLAD-MDLM**	**Bladon Member - Mudstone And Limestone, Interbedded**	**Bathonian Age**
8	51m E	BLAD-MDLM	Bladon Member - Mudstone And Limestone, Interbedded	Bathonian Age
9	60m E	WHL-LMST	White Limestone Formation - Limestone	Bathonian Age
10	60m E	BLAD-MDLM	Bladon Member - Mudstone And Limestone, Interbedded	Bathonian Age
11	67m SE	FMB-LMST	Forest Marble Formation - Limestone	Bathonian Age
12	141m SE	FMB-LMST	Forest Marble Formation - Limestone	Bathonian Age
13	178m S	FMB-LMST	Forest Marble Formation - Limestone	Bathonian Age
14	181m N	RLD-MDST	Rutland Formation - Mudstone	Bathonian Age - Bajocian Age

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m **2**

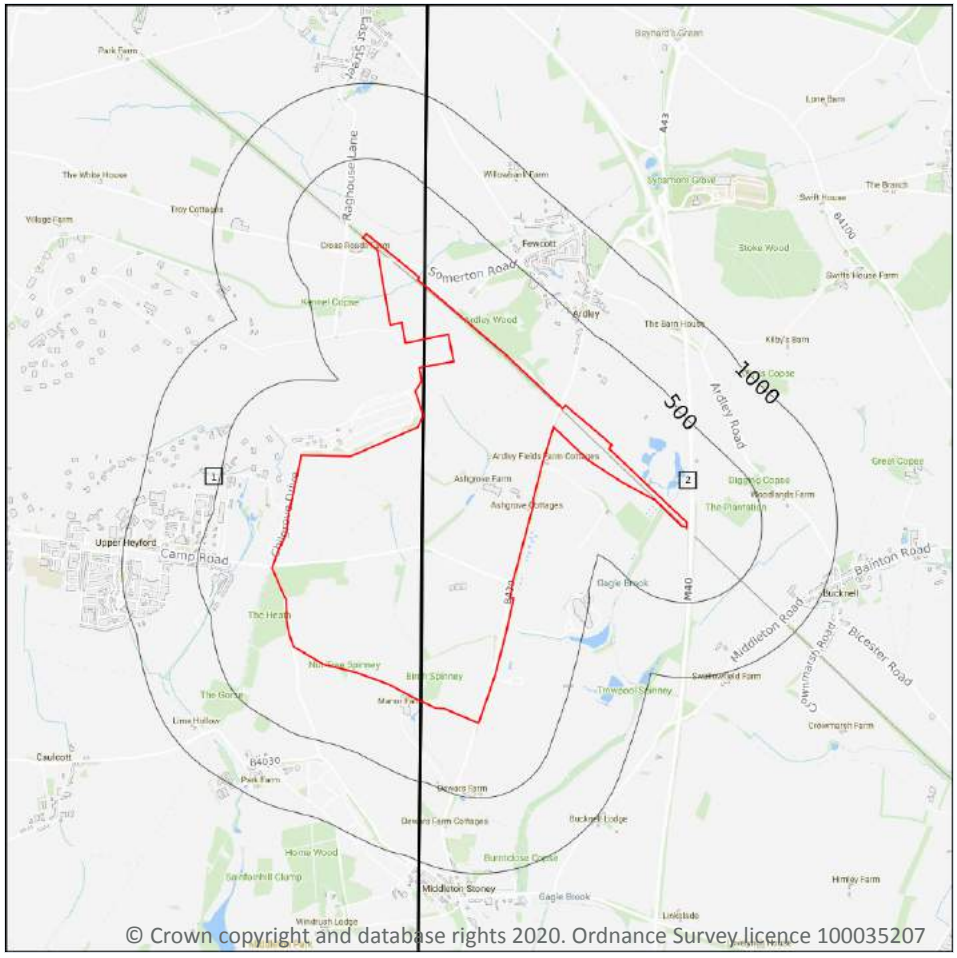
Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 126**

ID	Location	Category	Description
2	**On site**	**FAULT**	**Normal fault, inferred; crossmarks on downthrow side**
5	**On site**	**FAULT**	**Normal fault, inferred; crossmarks on downthrow side**

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



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Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	2

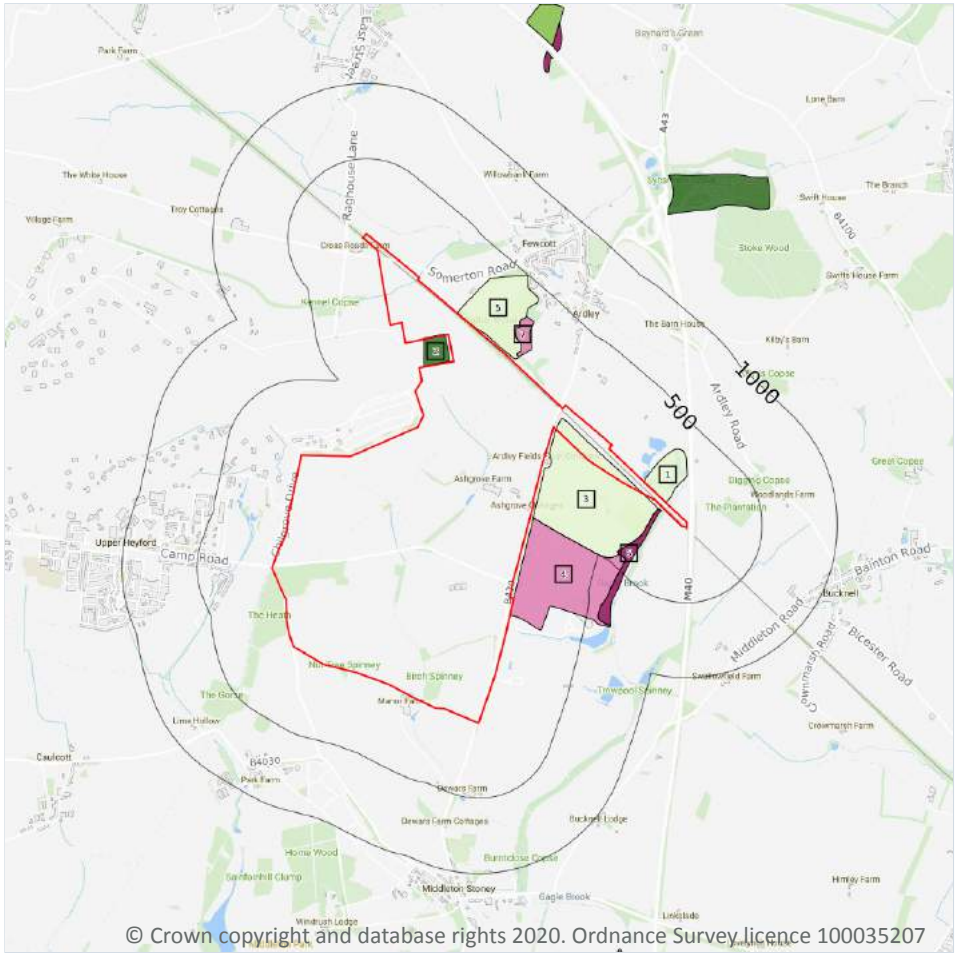
An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 128**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	On site	Full	Full	Full	Full	EW218_chipping_norton_v4
2	On site	Full	Full	Full	Full	EW219_buckingham_v4

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground



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 **7**

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 129**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**WMGR-ARTDP**	**INFILLED GROUND**	**ARTIFICIAL DEPOSIT**
2	**On site**	**LSGR-ARTGR**	**LANDSCAPED GROUND (UNDIVIDED)**	**ARTIFICIALLY MODIFIED GROUND**
3	**On site**	**WMGR-ARTDP**	**INFILLED GROUND**	**ARTIFICIAL DEPOSIT**
4	1m E	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

ID	Location	LEX Code	Description	Rock description
5	3m NE	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
6	20m SW	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
7	49m NE	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

This data is sourced from the British Geological Survey.

15.3 Artificial ground permeability (50k)

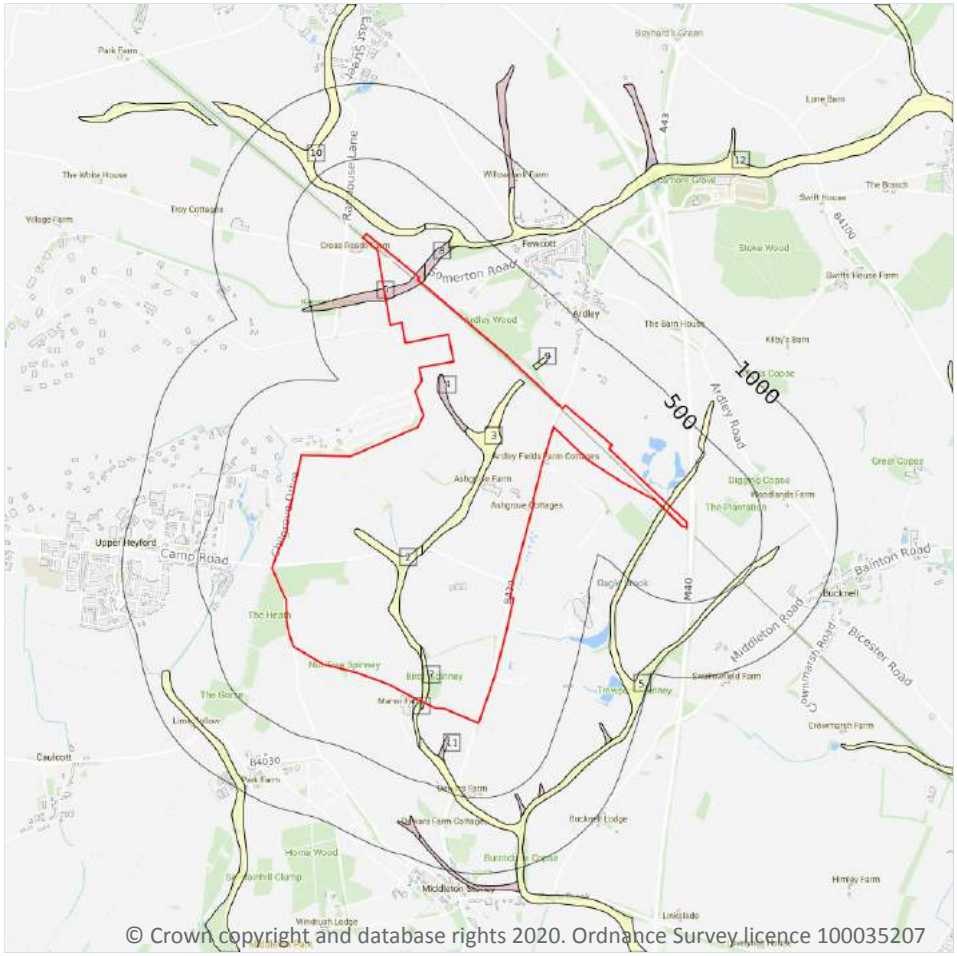
Records within 50m	**5**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Mixed**	**Very High**	**Low**
On site	**Mixed**	**Very High**	**Low**
On site	**Mixed**	**Very High**	**Low**
3m N	Mixed	Very High	Low
20m E	Mixed	Very High	Low

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m	12

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.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 131**

ID	Location	LEX Code	Description	Rock description
1	On site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
2	On site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	On site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

ID	Location	LEX Code	Description	Rock description
4	**On site**	**HEAD-XCZSV**	**HEAD**	**CLAY, SILT, SAND AND GRAVEL**
5	**On site**	**ALV-XCZSV**	**ALLUVIUM**	**CLAY, SILT, SAND AND GRAVEL**
6	**On site**	**HEAD-XCZSV**	**HEAD**	**CLAY, SILT, SAND AND GRAVEL**
7	**On site**	**ALV-XCZSV**	**ALLUVIUM**	**CLAY, SILT, SAND AND GRAVEL**
8	28m NE	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
9	67m NE	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
10	75m NE	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
11	163m SW	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL
12	271m NE	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

This data is sourced from the British Geological Survey.

15.5 Superficial 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 any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Intergranular**	**High**	**Very Low**
On site	**Mixed**	**High**	**Very Low**
On site	**Mixed**	**High**	**Very Low**
On site	**Intergranular**	**High**	**Very Low**
On site	**Intergranular**	**High**	**Very Low**

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.

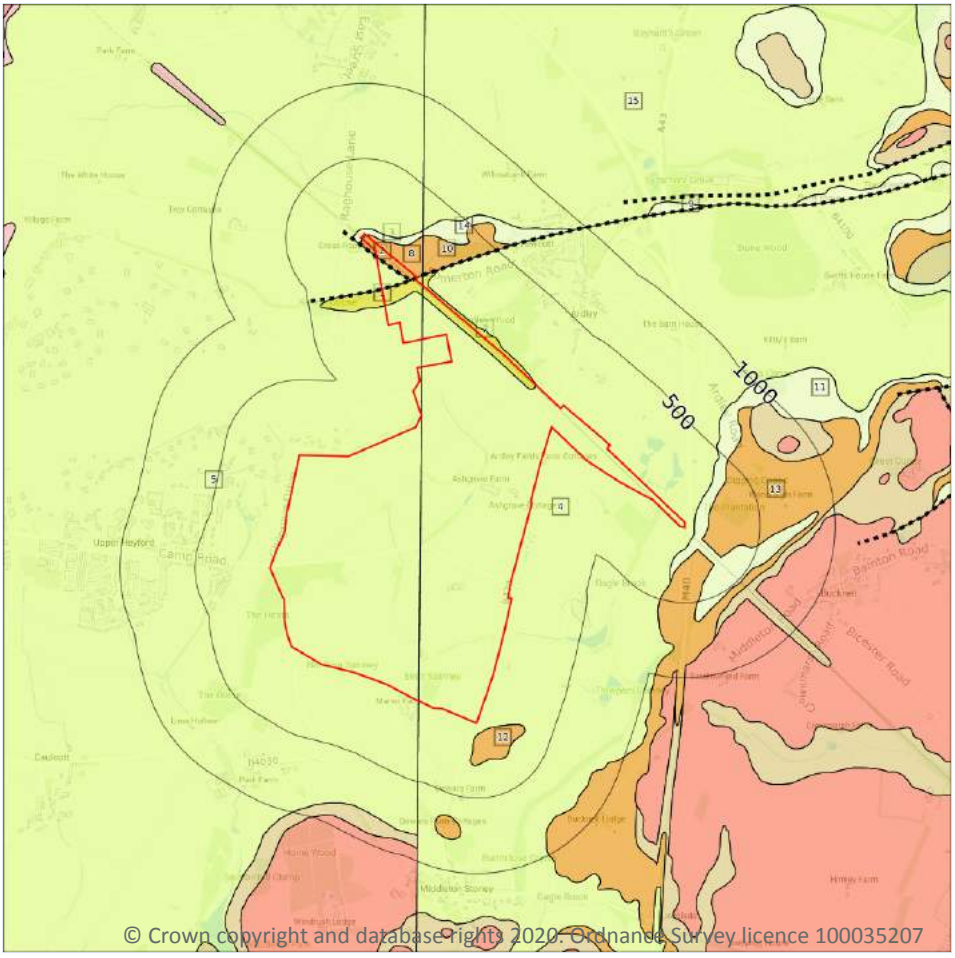
15.7 Landslip permeability (50k)

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 **12**

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 134**

ID	Location	LEX Code	Description	Rock age
1	On site	RLD-MDST	RUTLAND FORMATION - MUDSTONE	BAJOCIAN
3	On site	BLAD-MDLM	BLADON MEMBER - MUDSTONE AND LIMESTONE, INTERBEDDED	BATHONIAN
4	On site	WHL-LMST	WHITE LIMESTONE FORMATION - LIMESTONE	BATHONIAN

ID	Location	LEX Code	Description	Rock age
5	**On site**	**WHL-LMST**	**WHITE LIMESTONE FORMATION - LIMESTONE**	**BATHONIAN**
7	**On site**	**RLD-MDST**	**RUTLAND FORMATION - MUDSTONE**	**BAJOCIAN**
8	**On site**	**FMB-LMST**	**FOREST MARBLE FORMATION - LIMESTONE**	**BATHONIAN**
10	39m NE	FMB-LMST	FOREST MARBLE FORMATION - LIMESTONE	BATHONIAN
11	63m E	BLAD-MDLM	BLADON MEMBER - MUDSTONE AND LIMESTONE, INTERBEDDED	BATHONIAN
12	69m SE	FMB-LMST	FOREST MARBLE FORMATION - LIMESTONE	BATHONIAN
13	137m SE	FMB-LMST	FOREST MARBLE FORMATION - LIMESTONE	BATHONIAN
14	238m NE	BLAD-MDLM	BLADON MEMBER - MUDSTONE AND LIMESTONE, INTERBEDDED	BATHONIAN
15	266m NE	WHL-LMST	WHITE LIMESTONE FORMATION - LIMESTONE	BATHONIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m **7**

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**	**Low**	**Very Low**
On site	**Fracture**	**High**	**High**
On site	**Fracture**	**High**	**Very Low**
On site	**Fracture**	**Very High**	**Very High**
On site	**Fracture**	**Very High**	**Very High**
On site	**Fracture**	**Very High**	**Low**
On site	**Fracture**	**Very High**	**Low**

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	**3**

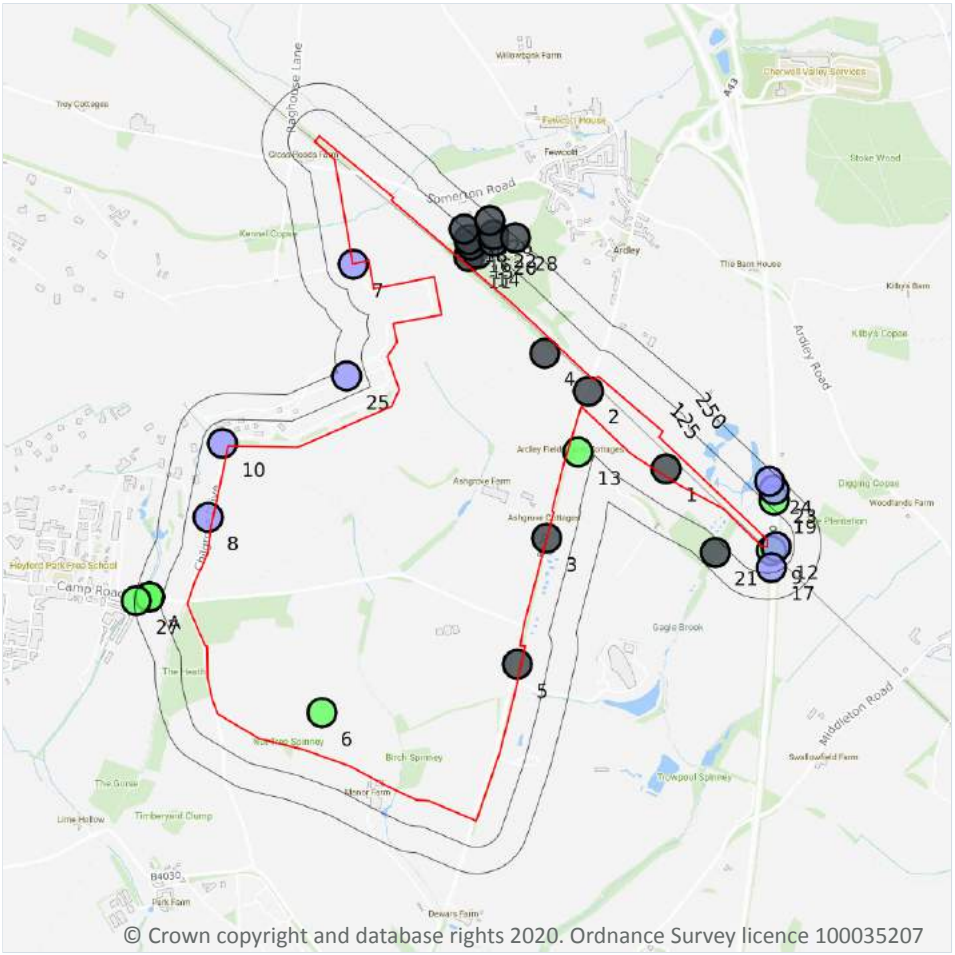
Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 134**

ID	Location	Category	Description
2	**On site**	**FAULT**	**Fault, inferred**
6	**On site**	**FAULT**	**Fault, inferred**
9	39m NE	FAULT	Fault, inferred

This data is sourced from the British Geological Survey.

16 Boreholes



Site Outline

Search buffers in metres (m)

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+
- Unknown

16.1 BGS Boreholes

Records within 250m	32

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 137**

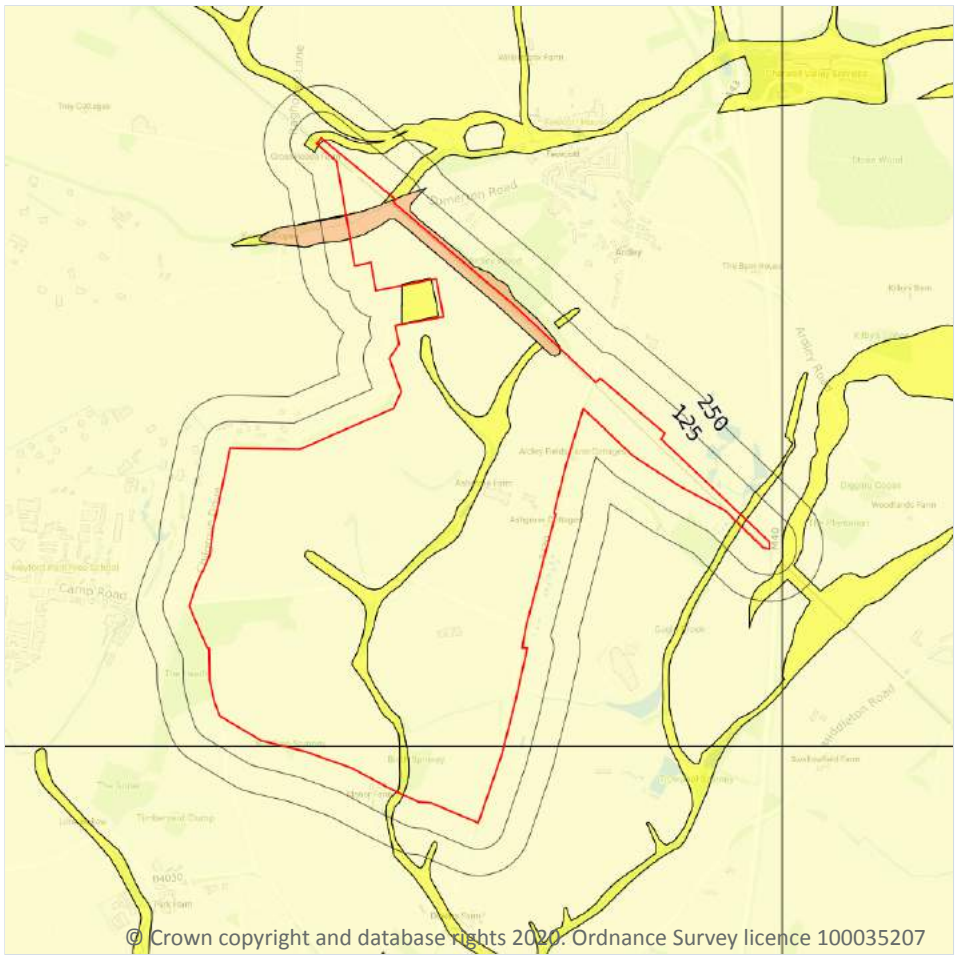
ID	Location	Grid reference	Name	Length	Confidential	Web link
1	On site	454460 226310	ARDLEY FIELDS NO.1	-	Y	N/A
2	On site	454090 226680	ARDLEY FIELDS NO.2	-	Y	N/A
3	On site	453890 225980	ARDLEY FIELDS NO.4	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
4	**On site**	**453880 226860**	**ARDLEY FIELDS NO.9**	**-**	**Y**	**N/A**
5	**On site**	**453750 225380**	**ARDLEY FIELDS NO.7**	**-**	**Y**	**N/A**
6	**On site**	**452820 225150**	**MANOR FARM MIDDLETON STONEY**	**18.28**	**N**	**336693**
7	3m S	452970 227280	RAF UPPER HEYFORD OXFORDSHIRE 24	1.5	N	15951659
8	24m W	452280 226080	RAF UPPER HEYFORD OXFORDSHIRE 37	1.51	N	15951662
9	27m SE	454960 225920	BUCKNELL EMBKMENT E11 24000-24570 BHY3	19.0	N	336467
10	29m NW	452350 226430	RAF UPPER HEYFORD OXFORDSHIRE 32	0.9	N	15951661
11	37m NE	453520 227320	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY RNG29	-	Y	N/A
12	40m E	454980 225940	BUCKNELL EMBKMENT E11 24000-24570 TP534	1.0	N	336468
13	49m E	454040 226390	ARDLEY FIELDS	10.2	N	336639
14	71m NE	453560 227330	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY RNG28	-	Y	N/A
15	82m NE	453530 227370	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG35	-	Y	N/A
16	98m NE	453520 227400	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG36	-	Y	N/A
17	100m S	454960 225840	BUCKNELL EMBKMENT E11 24000-24570 TP531	4.0	N	336466
18	123m NE	453500 227450	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG37/RNG37	-	Y	N/A
19	158m NE	454970 226160	BUCKNELL EMBKMENT E11 24000-24570 BH069	20.0	N	336469
20	168m NE	453640 227390	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG27/RNG27	-	Y	N/A
21	177m SW	454690 225910	ARDLEY FIELDS NO.3	-	Y	N/A
A	185m W	452000 225700	UPPER HEYFORD AERODROME	19.81	N	336692
A	185m W	452000 225700	RAF UPPER HEYFORD OXON 218/33C	18.29	N	336641
A	185m W	452000 225700	RAF UPPER HEYFORD OXON 218/33D	19.81	N	336642
A	185m W	452000 225700	UPPER HEYFORD AERODROME	18.29	N	336691
22	191m NE	453640 227420	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG33	-	Y	N/A
23	194m NE	454970 226210	BUCKNELL EMBKMENT E11 24000-24570 TP537	1.0	N	336470
24	209m NE	454950 226250	BUCKNELL EMBKMENT E11 24000-24570 TP536	1.0	N	336471

ID	Location	Grid reference	Name	Length	Confidential	Web link
25	214m W	452940 226750	RAF UPPER HEYFORD OXFORDSHIRE 28	1.11	N	15951660
26	231m NE	453620 227490	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG34	-	Y	N/A
27	242m W	451940 225680	UPPER HEYFORD AERODROME	26.82	N	336450
28	248m NE	453740 227410	CLOSED LANDFILL SITES OXFORDSHIRE ARDLEY NG26/RNG26	-	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	3

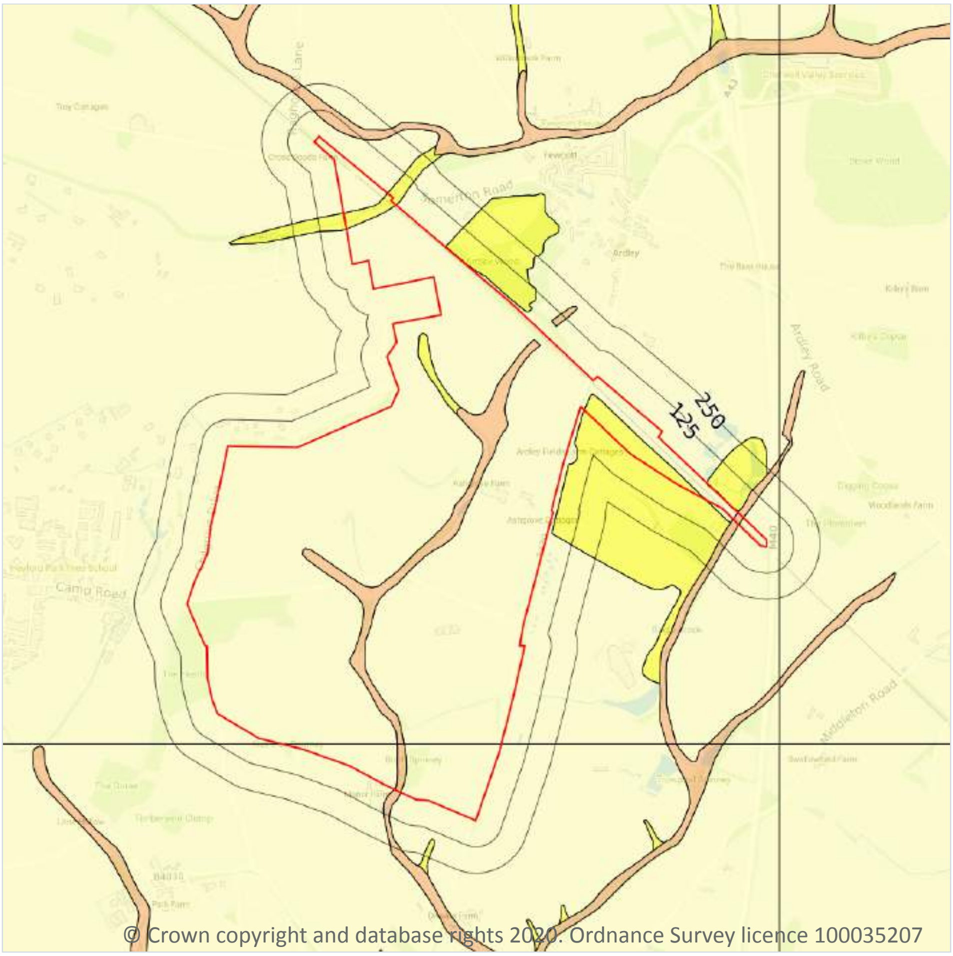
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 140**

Location	Hazard rating	Details
On site	**Negligible**	**Ground conditions predominantly non-plastic.**
On site	**Very low**	**Ground conditions predominantly low plasticity.**
On site	**Low**	**Ground conditions predominantly medium plasticity.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.2 Running sands

Records within 50m	4

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.

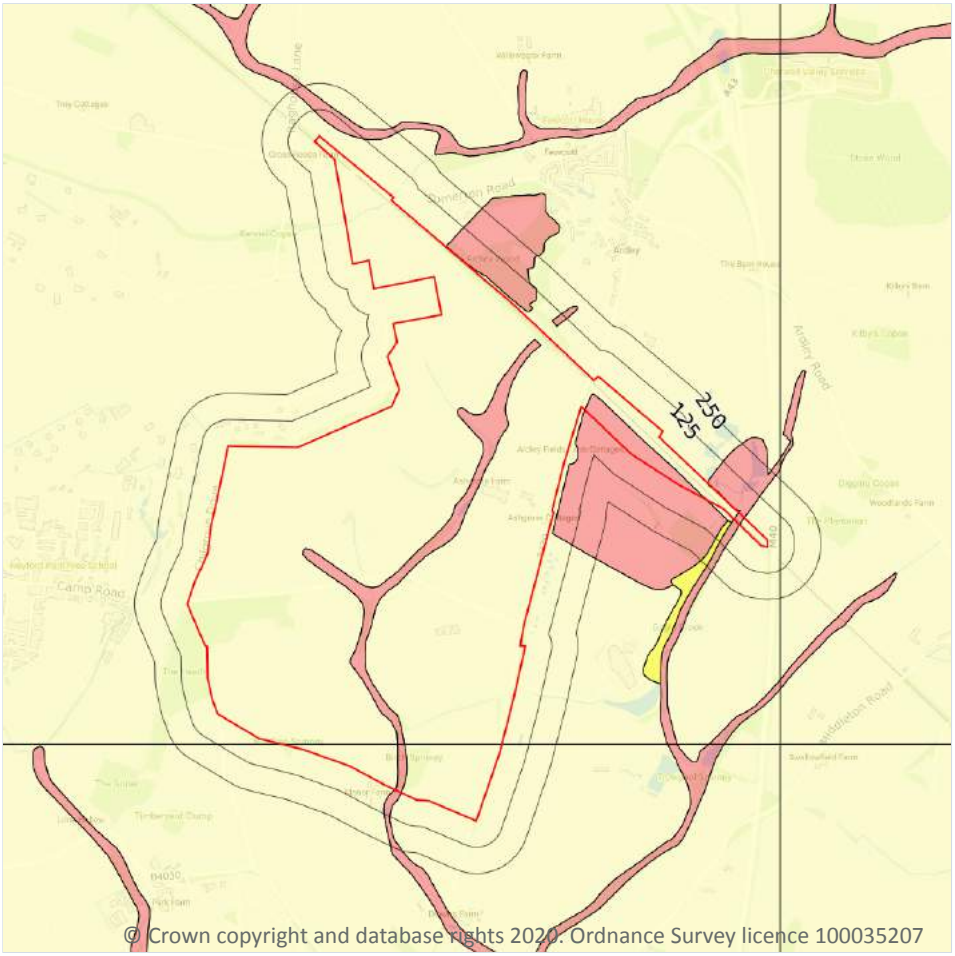
Features are displayed on the Natural ground subsidence - Running sands map on **page 142**

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
On site	**Very low**	**Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.**
On site	**Low**	**Running sand conditions may be present. Constraints may apply to land uses involving excavation or the addition or removal of water.**
3m NE	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



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.3 Compressible deposits

Records within 50m	4

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.

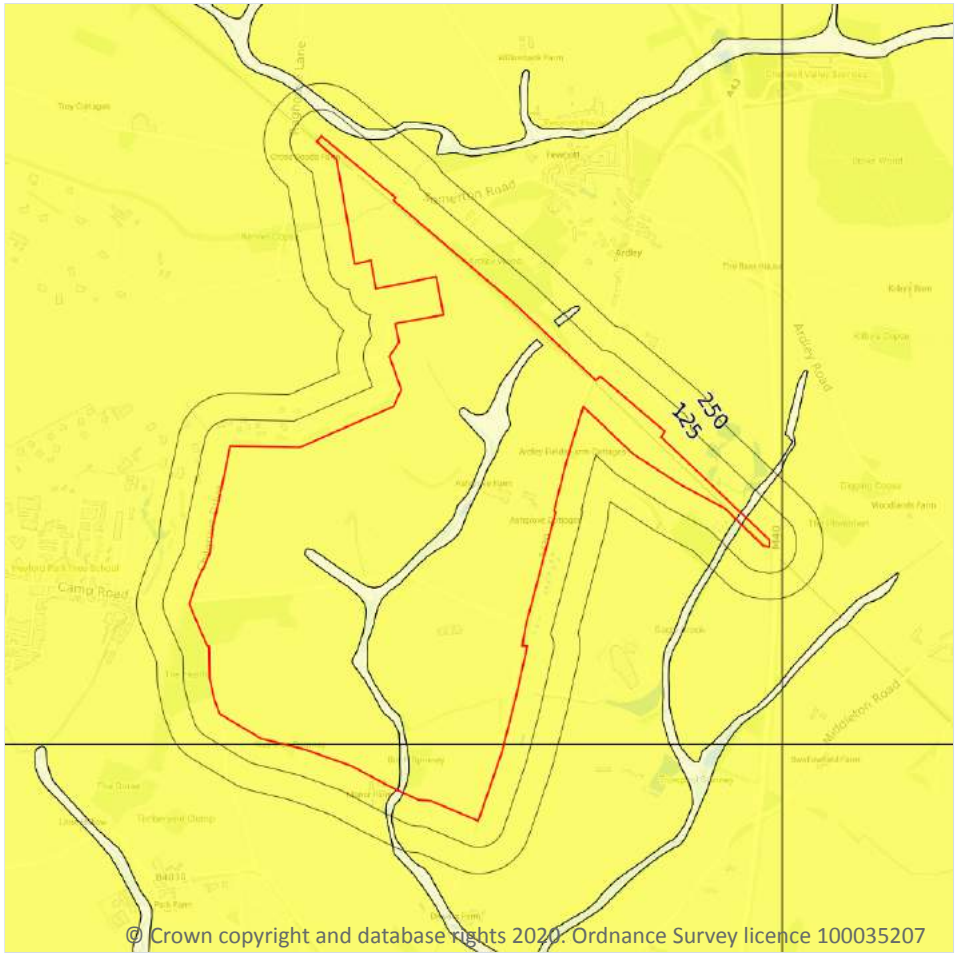
Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 144**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**
On site	**Moderate**	**Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.**

Location	Hazard rating	Details
3m NE	Moderate	Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.
20m SW	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



17.4 Collapsible deposits

Records within 50m	2

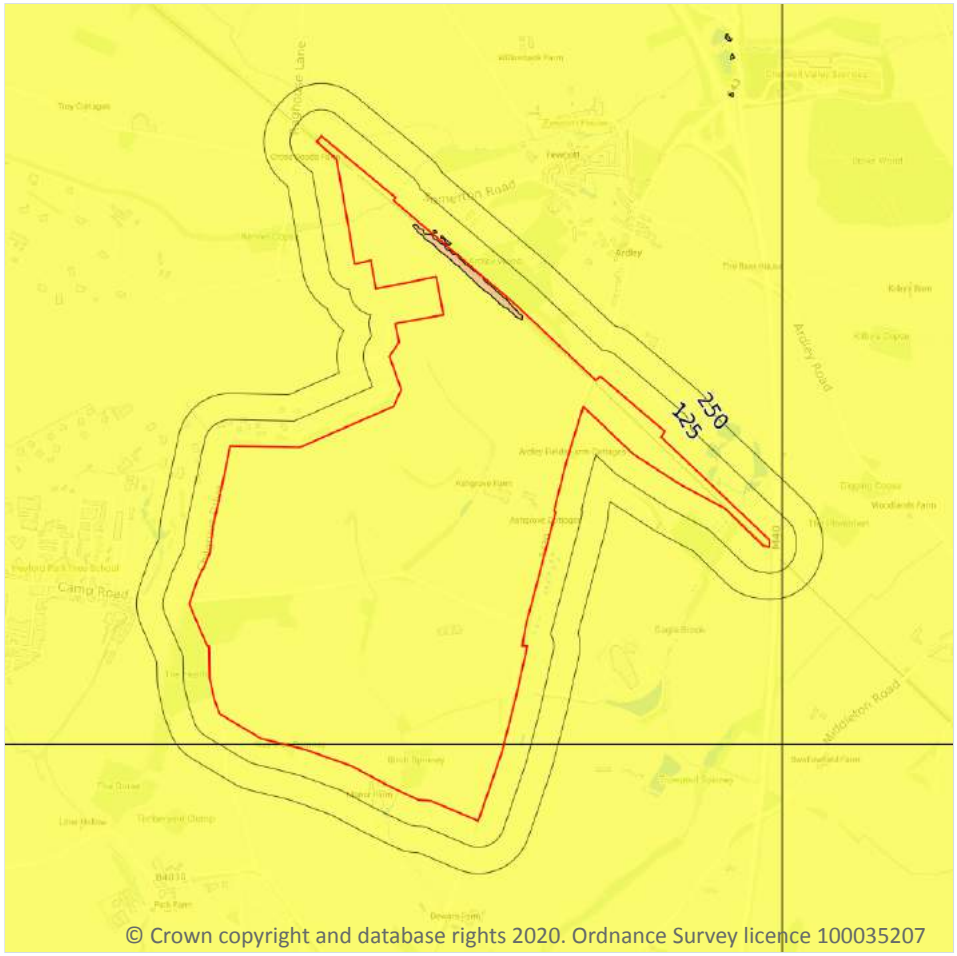
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 146**

Location	Hazard rating	Details
On site	**Negligible**	**Deposits with potential to collapse when loaded and saturated are believed not to be present.**
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



17.5 Landslides

Records within 50m	4

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.

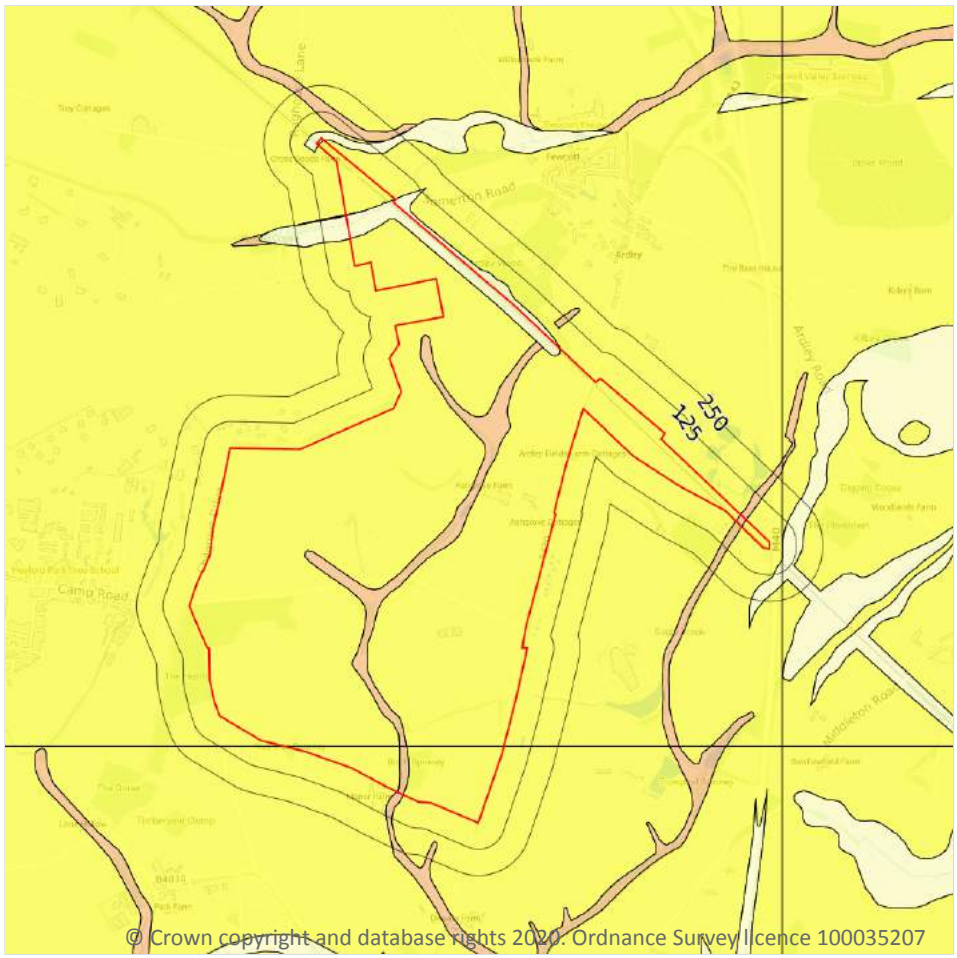
Features are displayed on the Natural ground subsidence - Landslides map on **page 147**

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.**
6m NE	Low	Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site.
9m NE	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



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	3

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.

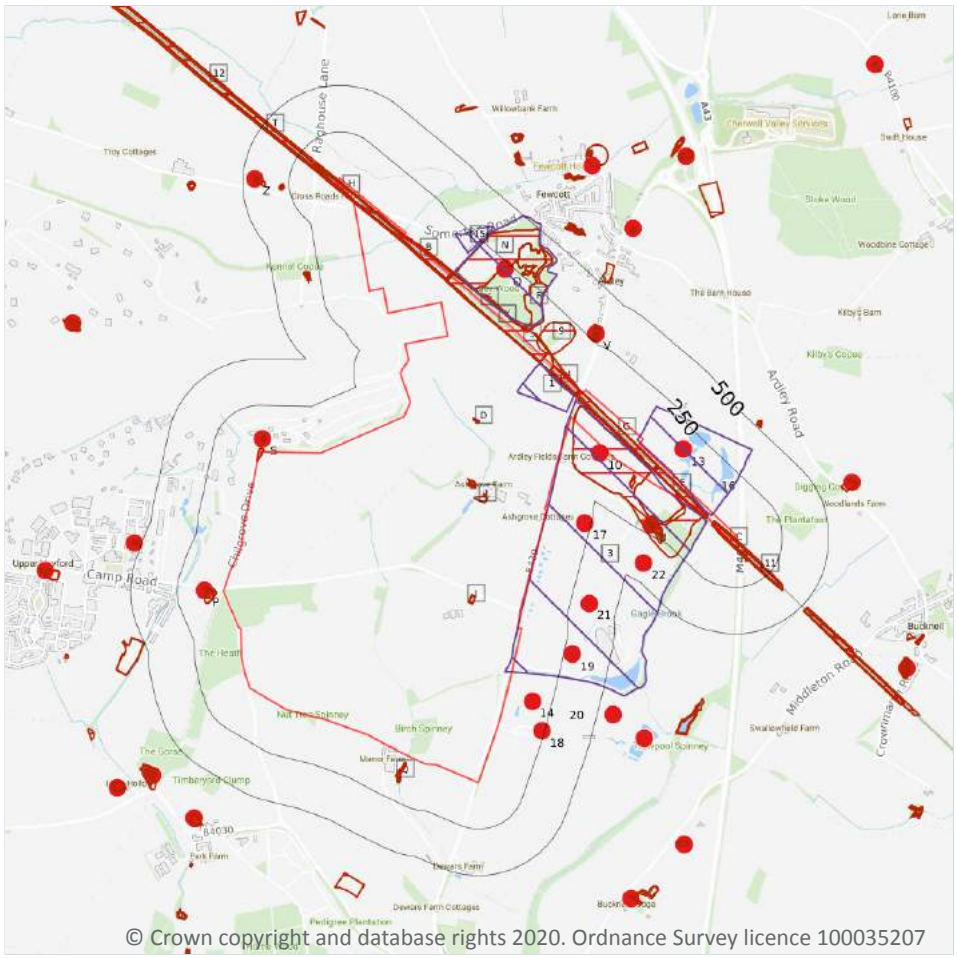
Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 149**

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.**

Location	Hazard rating	Details
On site	**Very low**	**Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.**
On site	**Low**	**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.**

This data is sourced from the British Geological Survey.

18 Mining, ground workings and natural cavities



18.1 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 Peter Brett Associates (PBA).

18.2 BritPits

Records within 500m	17

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, ground workings and natural cavities map on **page 151**

ID	Location	Details	Description
10	31m SW	Name: Ardley Quarry Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
S	72m N	Name: North Leys Farm Address: Upper Heyford, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
P	101m W	Name: Leys Farm Address: Upper Heyford, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
13	139m NE	Name: Ardley Quarry Extension Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
14	144m E	Name: Dewar's Farm Quarry Address: Middleton Stoney, BICESTER, Oxfordshire Commodity: Limestone Status: Active	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which is actively extracting mineral products, or in the case of wharfs and rail depots, is actively handing minerals

ID	Location	Details	Description
16	157m NE	Name: Ardley Quarry Extension Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
U	200m SW	Name: Ardley Fields Farm Address: Bucknell, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
U	209m SW	Name: Ardley Fields Farm Address: Bucknell, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
O	214m NE	Name: Ardley Woods Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
17	217m E	Name: Ardley Quarry Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
18	237m E	Name: Dewar's Farm Quarry Address: Middleton Stoney, BICESTER, Oxfordshire Commodity: Incinerator Bottom Ash Status: Active	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which is actively extracting mineral products, or in the case of wharfs and rail depots, is actively handing minerals

ID	Location	Details	Description
V	285m NE	Name: Manor Farm Address: Ardley, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
19	298m E	Name: Ardley Quarry Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
20	301m E	Name: Dewar's Farm Quarry Address: Middleton Stoney, BICESTER, Oxfordshire Commodity: Limestone Status: Inactive	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, is not extracting minerals, but which still has a valid planning permission to do so, and can restart at any time. May be considered Mothballed by operator.May be considered to have Active or Dormant planning permission
21	349m E	Name: Ardley Quarry Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
22	398m SW	Name: Ardley Quarry Address: Ardley, BICESTER, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
Z	435m W	Name: Troy Farm Address: Ardley, OXFORD, Oxfordshire Commodity: Limestone Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m	71

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, ground workings and natural cavities map on **page 151**

ID	Location	Land Use	Year of mapping	Mapping scale
4	On site	Cuttings	1923	1:10560
5	On site	Cuttings	1954	1:10560
6	On site	Cuttings	1923	1:10560
7	On site	Unspecified Quarry	1992	1:10000
8	On site	Unspecified Pit	1880	1:10560
A	On site	Cuttings	1923	1:10560
A	On site	Cuttings	1923	1:10560
B	On site	Cuttings	1980	1:10000
B	On site	Cuttings	1992	1:10000
B	On site	Cuttings	1954	1:10560
C	On site	Cuttings	1980	1:10000
C	On site	Cuttings	1992	1:10000
C	On site	Cuttings	1954	1:10560
D	On site	Pond	1923	1:10560
D	On site	Pond	1880	1:10560
E	On site	Pond	1923	1:10560
E	On site	Pond	1954	1:10560
E	On site	Pond	1898	1:10560
E	On site	Pond	1923	1:10560
E	On site	Pond	1880	1:10560
F	On site	Cuttings	1980	1:10000
F	On site	Cuttings	1992	1:10000
F	On site	Cuttings	1954	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
G	**On site**	**Cuttings**	**1980**	**1:10000**
G	**On site**	**Cuttings**	**1992**	**1:10000**
G	**On site**	**Cuttings**	**1954**	**1:10560**
H	**On site**	**Cuttings**	**1980**	**1:10000**
H	**On site**	**Cuttings**	**1992**	**1:10000**
H	**On site**	**Cuttings**	**1954**	**1:10560**
I	**On site**	**Covered Reservoir**	**1980**	**1:10000**
I	**On site**	**Covered Reservoir**	**1992**	**1:10000**
J	**On site**	**Cuttings**	**1980**	**1:10000**
J	**On site**	**Cuttings**	**1992**	**1:10000**
K	**On site**	**Cuttings**	**1980**	**1:10000**
K	**On site**	**Cuttings**	**1992**	**1:10000**
L	**On site**	**Unspecified Pit**	**1923**	**1:10560**
L	**On site**	**Refuse Heap**	**1880**	**1:10560**
M	**On site**	**Unspecified Disused Quarry**	**1980**	**1:10000**
N	19m NE	Refuse Heap	1980	1:10000
N	19m NE	Refuse Heap	1992	1:10000
M	21m SW	Pond	1980	1:10000
M	21m SW	Pond	1992	1:10000
9	22m NE	Unspecified Old Quarry	1898	1:10560
P	40m W	Unspecified Quarry	1954	1:10560
Q	42m SW	Pond	1898	1:10560
R	43m NE	Unspecified Disused Quarry	1980	1:10000
R	43m NE	Unspecified Disused Quarry	1992	1:10000
Q	44m SW	Pond	1981	1:10000
Q	44m SW	Pond	1954	1:10560
P	50m W	Unspecified Quarry	1923	1:10560
P	51m W	Unspecified Quarry	1923	1:10560

ID	Location	Land Use	Year of mapping	Mapping scale
S	53m N	Unspecified Pit	1923	1:10560
S	56m N	Unspecified Pit	1923	1:10560
S	56m N	Unspecified Quarry	1898	1:10560
S	60m N	Unspecified Pit	1954	1:10560
A	70m SE	Cuttings	1992	1:10000
Q	77m SW	Pond	1919	1:10560
Q	77m SW	Pond	1923	1:10560
Q	77m SW	Pond	1875	1:10560
P	78m W	Unspecified Quarry	1898	1:10560
P	81m W	Sand Pit	1880	1:10560
11	87m SE	Cuttings	1950	1:10560
12	136m NW	Cuttings	1954	1:10560
T	136m NW	Cuttings	1980	1:10000
T	136m NW	Cuttings	1992	1:10000
U	180m SW	Unspecified Pit	1923	1:10560
U	184m SW	Unspecified Quarry	1923	1:10560
U	184m SW	Unspecified Quarries	1898	1:10560
U	185m SW	Unspecified Quarry	1923	1:10560
U	188m SW	Unspecified Quarry	1954	1:10560
U	216m SW	Sand Pit	1880	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m	0

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

This is data is sourced from Ordnance Survey/Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	5

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.

Features are displayed on the Mining, ground workings and natural cavities map on **page 151**

ID	Location	Site Name	Mineral	Type	Planning Status	Planning Status Date
1	**On site**	**Ardley Fields**	**Limestone**	**Surface mineral working**	**Valid**	**17/1/51**
2	**On site**	**Ardley Fields**	**Limestone**	**Surface mineral working**	**Valid**	**17/1/51**
3	**On site**	**Ardley Fields**	**Limestone**	**Surface mineral working**	**Valid**	**17/1/51**
O	23m NE	Ardley Woods	Limestone	Surface mineral working	Valid	17/1/51
15	152m NE	Ardley Woods	Limestone	Surface mineral working	Refused	Not available

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	0

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).

This data is sourced from the British Geological Survey.

18.7 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 Peter Brett Associates (PBA).

18.8 JPB mining areas

Records on site	0

Areas which could be affected by former coal mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site	0

Areas which could be affected by past, current or future coal mining.

This data is sourced from the Coal Authority.

18.10 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.

18.11 Gypsum areas

Records on site	0

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Mining Searches UK.

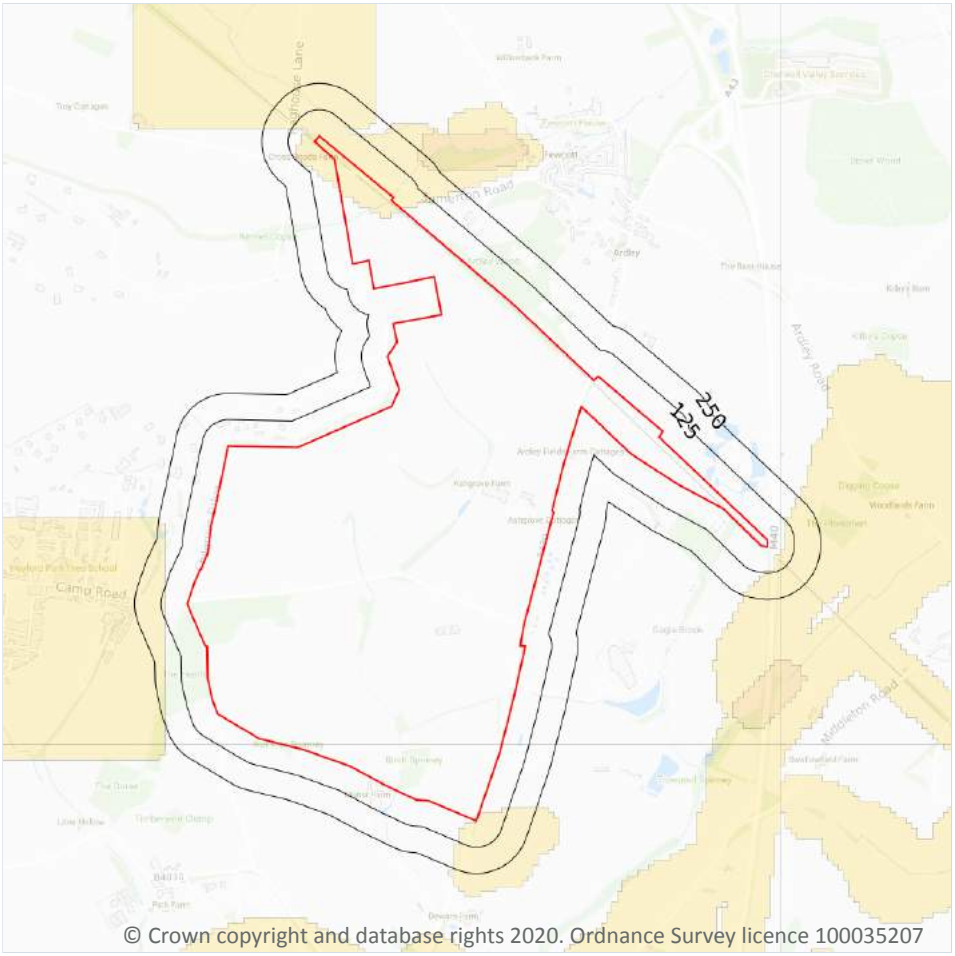
18.13 Clay mining

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 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%

19.1 Radon

Records on site	2

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 161**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 1% and 3%**	**None**
On site	**Less than 1%**	**None****

This data is sourced from the British Geological Survey and Public Health England.

20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m **111**

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	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**30 - 45 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 - 25 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
17m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
18m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
24m NE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
28m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
35m SW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
35m SW	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
39m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
50m E	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

20.2 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.

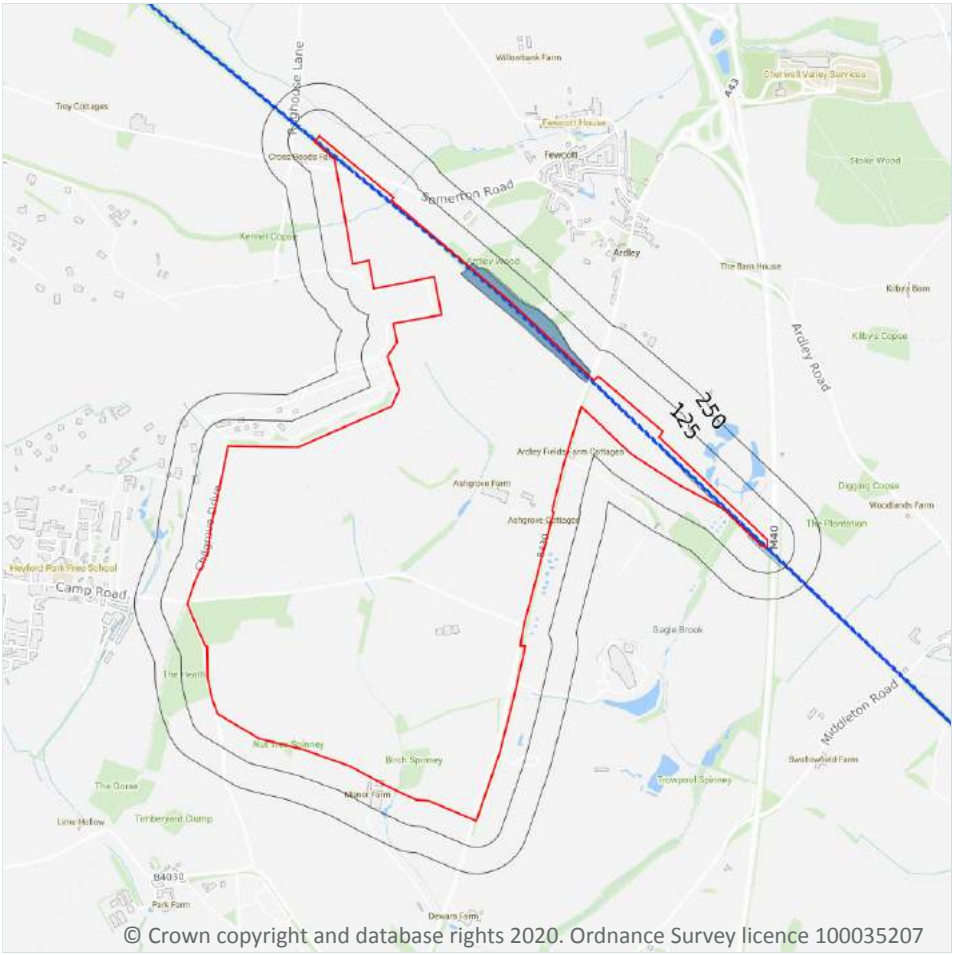
20.3 BGS Measured Urban Soil Chemistry

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.

21 Railway infrastructure and projects



Site Outline

Search buffers in metres (m)

- Crossrail 1 Stations
- Crossrail 1 Route
- Crossrail 1 Worksites
- 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

21.1 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.

21.2 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.

21.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 Historical railway and tunnel features

Records within 250m	6

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 170**

Location	Land Use	Year of mapping	Mapping scale
On site	**Railway Sidings**	**1975**	**2500**
On site	**Railway Sidings**	**1974**	**2500**
On site	**Railway Sidings**	**1922**	**2500**
On site	**Railway Sidings**	**1923**	**10560**
On site	**Railway Sidings**	**1954**	**10560**
14m NE	Railway Sidings	1922	2500

This data is sourced from Ordnance Survey/Groundsure.

21.5 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.

21.6 Historical railways

Records within 250m	0

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

21.7 Railways

Records within 250m	12

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

Features are displayed on the Railway infrastructure and projects map on **page 170**

Location	Name	Type
On site	**Chiltern Main Line**	**rail**
On site	**Chiltern Main Line**	**rail**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
On site	**Not given**	**Multi Track**
72m SE	Not given	Multi Track
153m NW	Not given	Multi Track

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m	0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

21.9 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.

21.10 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

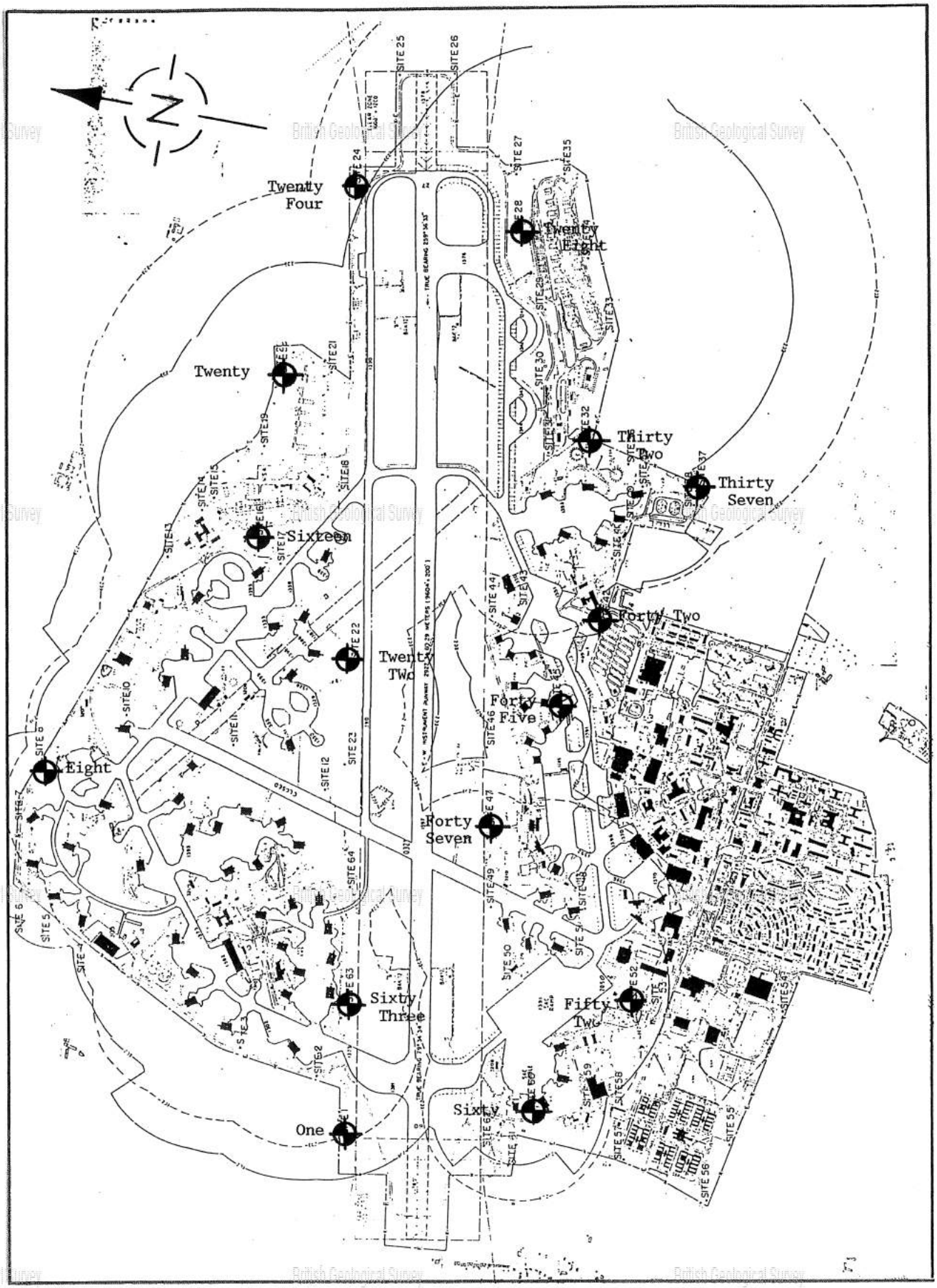
Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference.

Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: https://www.groundsure.com/terms-and-conditions-jan-2020/.

Publicly available borehole data

BGS archive records - Heyford Park



Borehole Locations

Scale 1:16320

Date	BOREHOLE LOCATION PLAN	Report No.
June 1987	TYRONE	S.894

LOCATION : R.A.F. Upper Heyford, Oxfordshire

BOREHOLE No. Twenty Four

DATE OF BORING : 01.07.1987

Description of Strata	STRATA CHANGE LEGEND	STRATA CHANGE DEPTH M	S P T / C P T N-VALUE	SAMPLES DEPTH M	SAMPLES TYPE	WATER LEVEL M	DEPTH of CASING M
TOPSOIL Grass over dark brown clayey silty TOPSOIL							
WEATHERED ZONE Soft to firm light brown silty CLAY with abundant limestone fragments		0.50					
- increasing clay content - becoming creamy buff							
Buff creamy yellow rubbly moderately strong weathered LIMESTONE		1.00		1.00	B		
- highly weathered		1.50		1.50	B	DRY	
		2.00					

BOREHOLE DIAMETER : 100mm
LINING TUBES : None
GROUND LEVEL :
REMARKS : Borehole sunk from existing ground level

▽ - Water strike
▼ - Water (standing level)
W - Water Sample
B/J - Bulk/Jar Sample
S.P.T. - Standard Penetration Test
C.P.T. - Cone Penetration Test
(U) - Undisturbed Sample (38mm & 100mm)

Date.	BOREHOLE LOG	Report No.
June 1987		S.894

LOCATION : R.A.F. Upper Heyford, Oxfordshire

BOREHOLE No. Twenty Eight

DATE OF BORING : 30.06.1987

Description of Strata	STRATA CHANGE LEGEND	STRATA CHANGE DEPTH M	S P T / C P T N-VALUE	SAMPLES DEPTH M	SAMPLES TYPE	WATER LEVEL M	DEPTH of CASING M
TOPSOIL Grass overlying dark brown clayey silty TOPSOIL							
WEATHERED ZONE Buff yellow rubbly moderately strong weathered LIMESTONE		0.50					
- interlaminated hard and soft horizons		1.00		1.00	B	DRY	
GREAT OOLITE LIMESTONE Buff yellow moderately strong LIMESTONE		1.50					
		2.00					

BOREHOLE DIAMETER : 100mm
LINING TUBES : None
GROUND LEVEL :
REMARKS : Borehole sunk from existing ground level

▽ - Water strike
▼ - Water (standing level)
W - Water Sample
B/J - Bulk/Jar Sample
S.P.T. - Standard Penetration Test
C.P.T. - Cone Penetration Test
(U) - Undisturbed Sample (38mm & 100mm)

Date.	BOREHOLE LOG	Report No.
June 1987		S.894

LOCATION : R.A.F. Upper Heyford, Oxfordshire

BOREHOLE No. Thirty Two

DATE OF BORING : 30.06.1987

Description of Strata	STRATA CHANGE LEGEND	STRATA CHANGE DEPTH M	S P T / C P T N-VALUE	SAMPLES DEPTH M	SAMPLES TYPE	WATER LEVEL M	DEPTH of CASING M
TOPSOIL. Grass over dark brown clayey silty TOPSOIL							
WEATHERED ZONE Medium to coarse buff yellow clayey silty SAND with included limestone fragments		0.50					
GREAT OOLITE LIMESTONE Buff yellow moderately strong LIMESTONE				0.80	B	DRY	
		1.00					
		1.50					
		2.00					

BOREHOLE DIAMETER : 100mm

LINING TUBES : None

GROUND LEVEL :

REMARKS : Borehole sunk from existing ground level

▽ - Water strike
▼ - Water (standing level)
W - Water Sample
B/J - Bulk/Jar Sample
S.P.T. - Standard Penetration Test
C.P.T. - Cone Penetration Test
(U) - Undisturbed Sample (38mm & 100mm)

Date.	BOREHOLE LOG	Report No.
June 1987		S.894

LOCATION : R.A.F. Upper Heyford, Oxfordshire

BOREHOLE No. Thirty Seven

DATE OF BORING : 30.06.1987

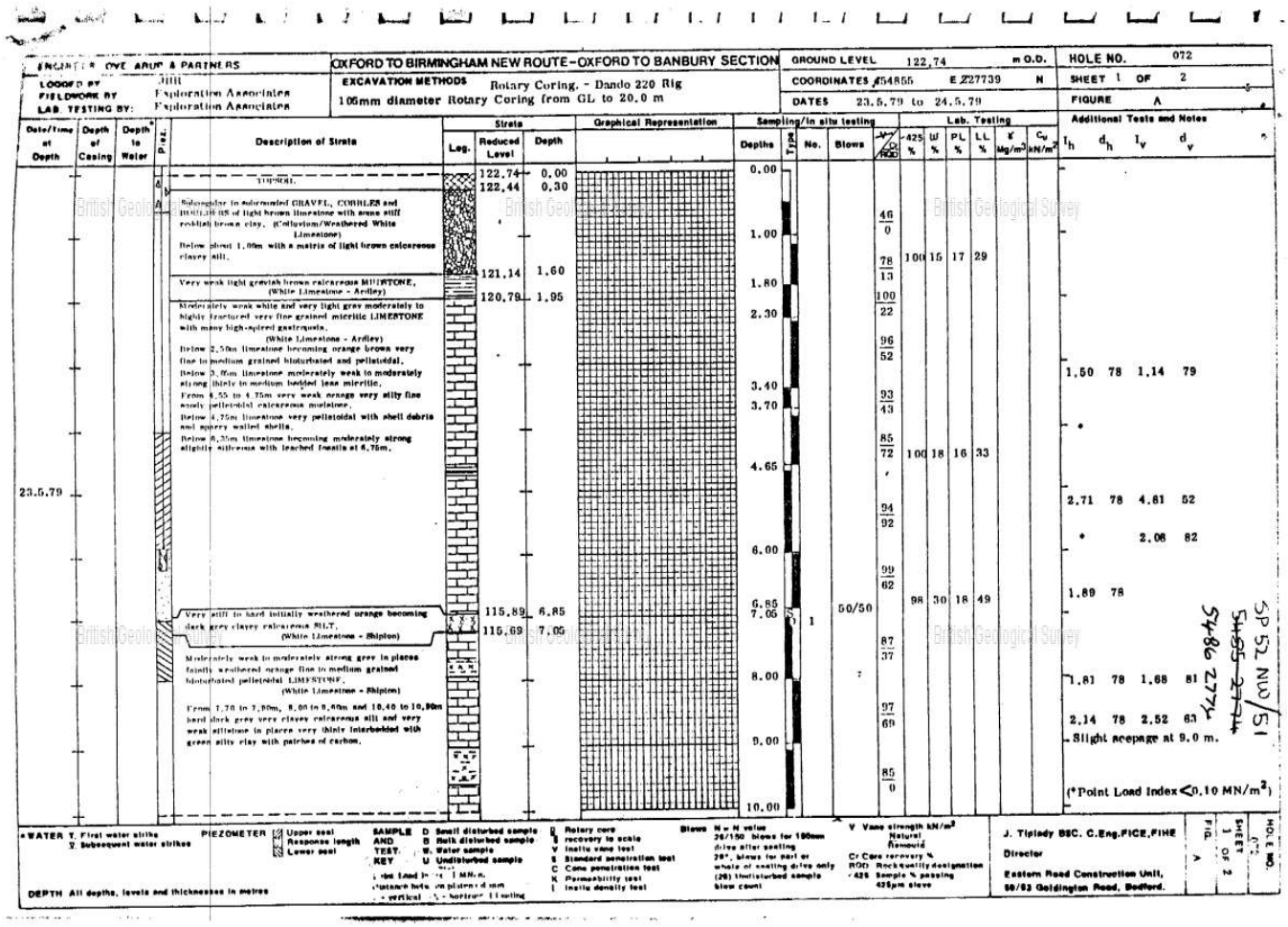
Description of Strata	STRATA CHANGE LEGEND	STRATA CHANGE DEPTH M	S P T / C P T N-VALUE	SAMPLES DEPTH M	SAMPLES TYPE	WATER LEVEL M	DEPTH of CASING M
MADE GROUND Red brick, concrete and limestone rubble Firm brown sandy clay with included fragments of red brick		0.50					
WEATHERED ZONE Medium to coarse dark brown clayey sandy SILT with included fragments of limestone rubble		1.00		1.00	B		
-occasional coarse hard limestone rubble							
GREAT OOLITE LIMESTONE Buff yellow moderately strong LIMESTONE		1.50		1.50	B	DRY	
		2.00					

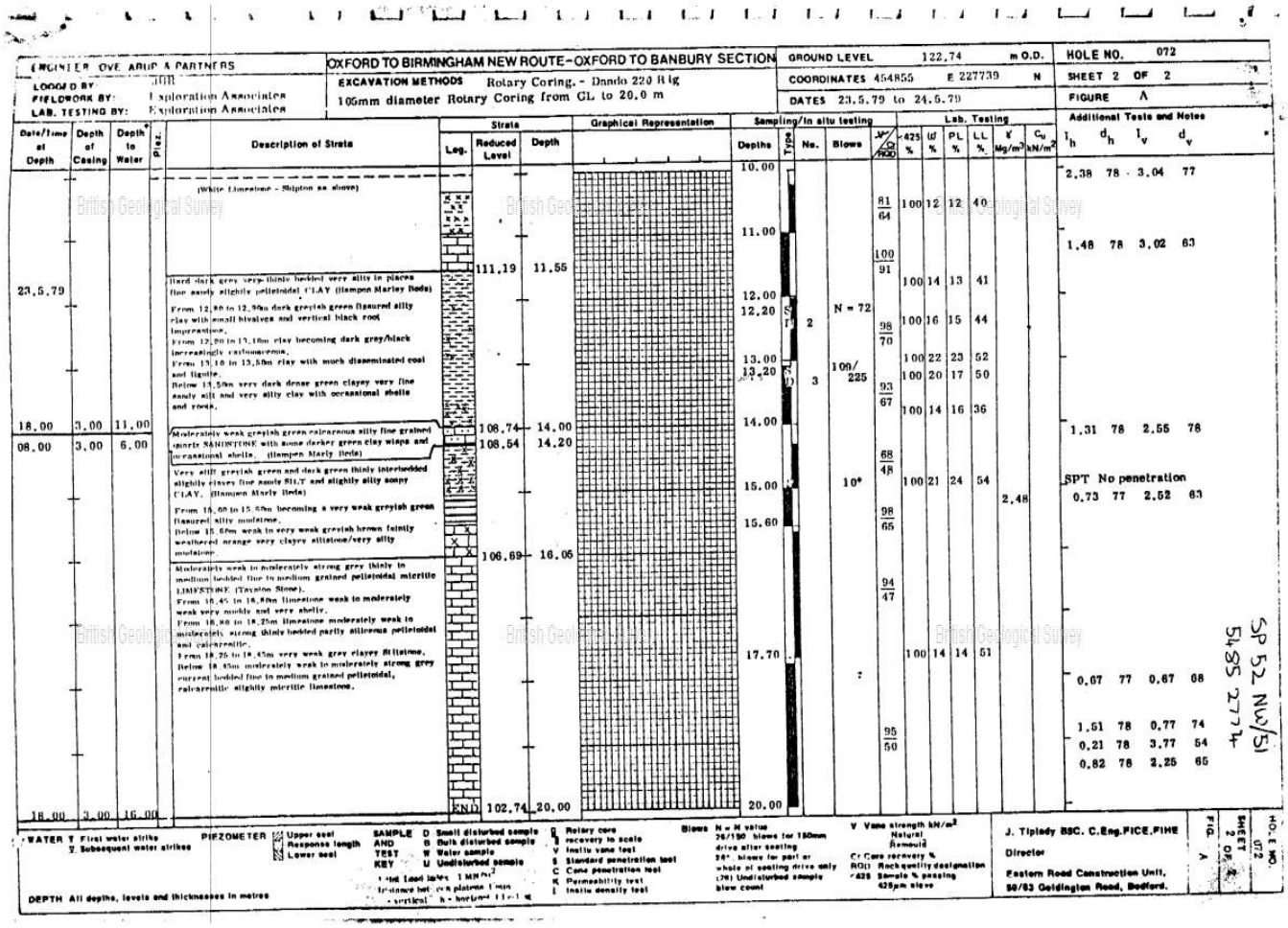
BOREHOLE DIAMETER : 100mm
LINING TUBES : None
GROUND LEVEL :
REMARKS : Borehole sunk from existing ground level

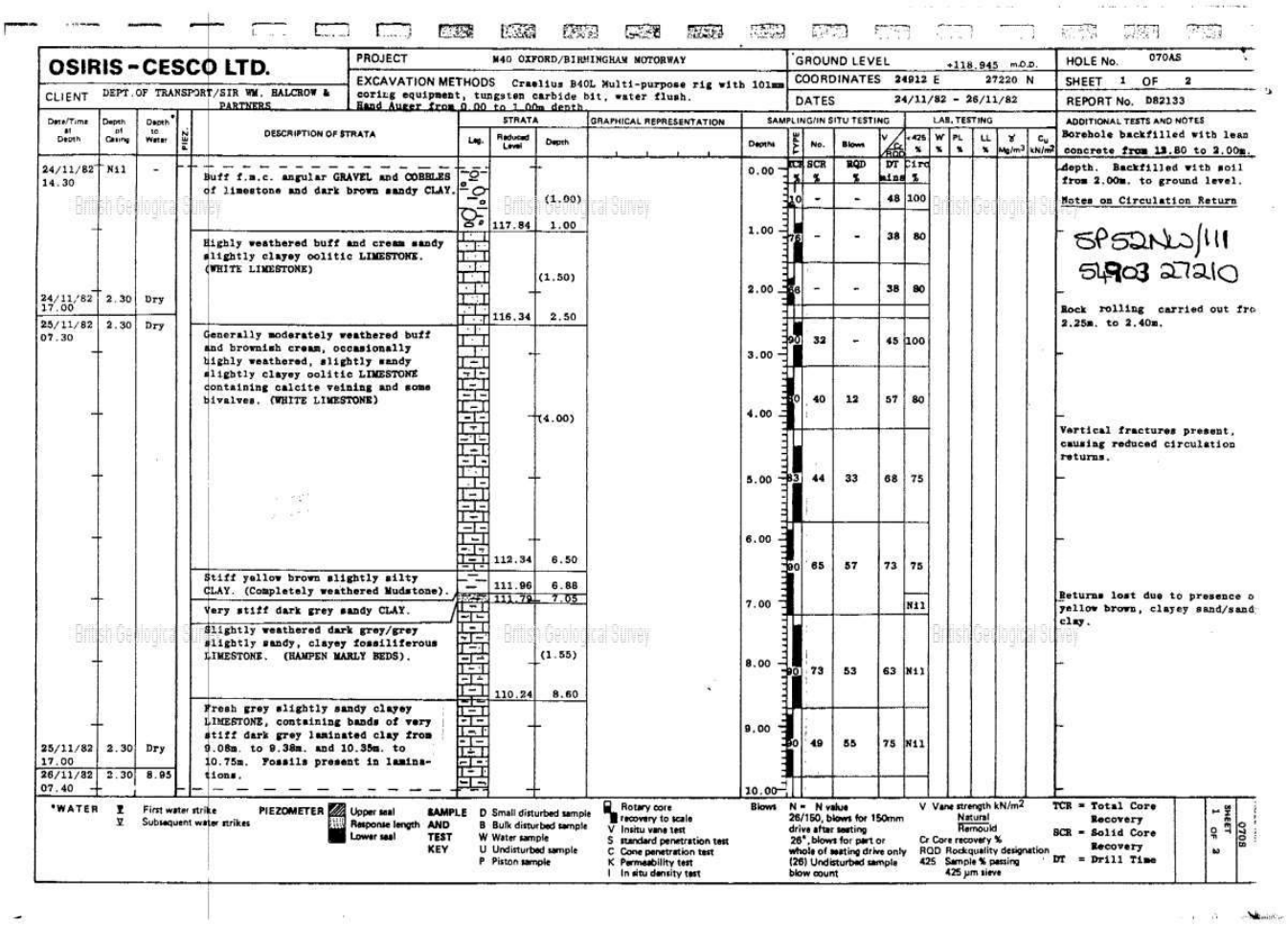
▽ - Water strike
▼ - Water (standing level)
W - Water Sample
B/J - Bulk / Jar Sample
S.P.T. - Standard Penetration Test
C.P.T. - Cone Penetration Test
(U) - Undisturbed Sample (38mm & 100mm)

Date.	BOREHOLE LOG	Report No.
June 1987		S.894

BGS archive records - M40


OXFORD TO BIRMINGHAM NEW ROUTE - OXFORD TO BANBURY SECTION
Rotary Coring. - Dando 220 Rig
105mm diameter Rotary Coring from GL to 20.0 m
Exploration Associates
Exploration Associates
GROUND LEVEL 122.74 m O.D.
COORDINATES 454855 E 227739 N
DATES 23.5.79 to 24.5.79
HOLE NO. 072
SHEET 1 OF 2
FIGURE A
Description of Strata
Strata
Graphical Representation
Sampling/in situ testing
Lab. Testing
Additional Tests and Notes
TOPSOIL.
Subangular to subrounded GRAVEL, COBBLES and BOULDERS of light brown limestone with some stiff reddish brown clay. (Colluvium/Weathered White Limestone)
Below about 1.00m with a matrix of light brown calcareous clayey silt.
Very weak light greyish brown calcareous MUDSTONE, (White Limestone - Ardley)
Moderately weak white and very light grey moderately to highly fractured very fine grained micritic LIMESTONE with many high-spired gastropods. (White Limestone - Ardley)
Below 2.50m limestone becoming orange brown very fine to medium grained bioturbated and pelletoidal.
Below 3.80m limestone moderately weak to moderately strong thinly to medium bedded less micritic.
From 4.55 to 4.75m very weak orange very silty fine sandy pelletoidal calcareous mudstone.
Below 4.75m limestone very pelletoidal with shell debris and sparry walled shells.
Below 6.20m limestone becoming moderately strong slightly siliceous with leached fossils at 6.70m.
Very stiff to hard initially weathered orange becoming dark grey clayey calcareous SILT. (White Limestone - Shipton)
Moderately weak to moderately strong grey in places faintly weathered orange fine to medium grained bioturbated pelletoidal LIMESTONE. (White Limestone - Shipton)
From 7.70 to 7.80m, 8.00 to 8.40m and 10.40 to 10.80m hard dark grey very clayey calcareous silt and very weak siltstone in places very thinly interbedded with green silty clay with patches of carbon.
23.5.79
122.74 0.00
122.44 0.30
121.14 1.60
120.79 1.95
115.89 6.85
115.69 7.05
50/50
1.50 78 1.14 79
2.71 78 4.61 52
2.08 82
1.89 78
1.81 78 1.68 81
2.14 78 2.52 63
Slight seepage at 9.0 m.
(*Point Load Index <0.10 MN/m²)
SP 52 NW/51
5485 2274
WATER T. First water strike
Subsequent water strikes
PIEZOMETER
Upper seal
Response length
Lower seal
DEPTH All depths, levels and thicknesses in metres
J. Tiplady BSC. C.Eng.FICE,FIHE
Director
Eastern Road Construction Unit,
50/53 Goldington Road, Bedford.
FIG. A
SHEET 1 OF 2
HOLE NO.


ENGINEER OVE ARUP & PARTNERS
LOGGED BY: JDR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates
OXFORD TO BIRMINGHAM NEW ROUTE - OXFORD TO BANBURY SECTION
EXCAVATION METHODS Rotary Coring. - Dando 220 Rig
106mm diameter Rotary Coring from GL to 20.0 m
GROUND LEVEL 122.74 m O.D.
COORDINATES 454855 E 227739 N
DATES 23.5.79 to 24.6.79
HOLE NO. 072
SHEET 2 OF 2
FIGURE A
Strata
Graphical Representation
Sampling/in situ testing
Lab. Testing
Additional Tests and Notes
Description of Strata
Reduced Level
Depth
Date/Time at Depth
Depth of Casing
Depth to Water
Plez.
(White Limestone - Shipton as above)
111.19 11.55
Hard dark grey very thinly bedded very silty in places fine sandy slightly pelletoidal CLAY (Hampen Marley Beds)
From 12.80 to 12.90m dark greyish green fissured silty clay with small bivalves and vertical black root impressions.
From 12.90 to 13.10m clay becoming dark grey/black increasingly calcareous.
From 13.10 to 13.50m clay with much disseminated coal and lignite.
Below 13.50m very dark dense green clayey very fine sandy silt and very silty clay with occasional shells and roots.
23.5.79
18.00 3.00 11.00
Moderately weak greyish green calcareous silty fine grained quartz SANDSTONE with some darker green clay wisps and occasional shells. (Hampen Marly Beds)
108.74 14.00
08.00 3.00 6.00
Very stiff greyish green and dark green thinly interbedded slightly clayey fine sandy SILT and slightly silty sandy CLAY. (Hampen Marly Beds)
108.54 14.20
From 15.00 to 15.50m becoming a very weak greyish green fissured silty mudstone.
Below 15.50m weak to very weak greyish brown faintly weathered orange very clayey siltstone/very silty mudstone.
106.69 16.05
Moderately weak to moderately strong grey thinly to medium bedded fine to medium grained pelletoidal micritic LIMESTONE (Taynton Stone).
From 16.45 to 16.80m limestone weak to moderately weak very muddy and very shelly.
From 16.80 to 18.25m limestone moderately weak to moderately strong thinly bedded partly siliceous pelletoidal and calcareous.
From 18.25 to 18.45m very weak grey clayey siltstone.
Below 18.45m moderately weak to moderately strong grey current bedded fine to medium grained pelletoidal, calcareous slightly micritic limestone.
END 102.74 20.00
18.00 3.00 16.00
10.00
11.00
12.00
12.20
13.00
13.20
14.00
15.00
15.60
17.70
20.00
N = 72
10*
100/225
2.38 78 3.04 77
1.48 78 3.02 63
1.31 78 2.55 78
SPT No penetration
0.73 77 2.52 63
0.07 77 0.67 68
1.51 78 0.77 74
0.21 78 3.77 54
0.82 78 2.25 65
2.48
SP 52 NW/51
5485 2774
WATER 1. First water strike
2. Subsequent water strikes
PIEZOMETER
Upper seal
Response length
Lower seal
SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
W Water sample
U Undisturbed sample
R Rotary core recovery to scale
V Insitu vane test
S Standard penetration test
C Cone penetration test
K Permeability test
I Insitu density test
Blows N = N value 26/150 blows for 150mm drive after seating
26* blows for part or whole of seating drive
(78) Undisturbed sample blow count
V Vane strength kN/m²
Natural
Remould
Cr Core recovery %
RQD Rock quality designation
425 Sample % passing 425μm sieve
DEPTH All depths, levels and thicknesses in metres
J. Tiplady BSC. C.Eng.FICE.FIHE
Director
Eastern Road Construction Unit,
50/53 Goldington Road, Bedford.
FIG. A
SHEET 2 OF 2
HOLE NO. 072



OSIRIS - CESCO LTD.

CLIENT DEPT. OF TRANSPORT/SIR WM. HALCROW & PARTNERS

PROJECT M40 OXFORD/BIRMINGHAM MOTORWAY

EXCAVATION METHODS Craelius B40L Multi-purpose rig with 101mm coring equipment, tungsten carbide bit, water flush. Hand Auger from 0.00 to 1.00m depth.

GROUND LEVEL +118.945 m.O.D.

COORDINATES 24912 E 27220 N

DATES 24/11/82 - 26/11/82

HOLE No. 070AS

SHEET 1 OF 2

REPORT No. D82133

Date/Time at Depth	Depth of Casing	Depth to Water	Piez.	DESCRIPTION OF STRATA	Leg.	Reduced Level	Depth
24/11/82 14.30	Nil	-		Buff f.m.c. angular GRAVEL and COBBLES of limestone and dark brown sandy CLAY.			(1.00)
				Highly weathered buff and cream sandy slightly clayey oolitic LIMESTONE. (WHITE LIMESTONE)		117.84	1.00
							(1.50)
24/11/82 17.00	2.30	Dry				116.34	2.50
25/11/82 07.30	2.30	Dry		Generally moderately weathered buff and brownish cream, occasionally highly weathered, slightly sandy slightly clayey oolitic LIMESTONE containing calcite veining and some bivalves. (WHITE LIMESTONE)			(4.00)
				Stiff yellow brown slightly silty CLAY. (Completely weathered Mudstone).		112.34	6.50
				Very stiff dark grey sandy CLAY.		111.96	6.88
				Slightly weathered dark grey/grey slightly sandy, clayey fossiliferous LIMESTONE. (HAMPEN MARLY BEDS).		111.79	7.05
							(1.55)
				Fresh grey slightly sandy clayey LIMESTONE, containing bands of very stiff dark grey laminated clay from 9.08m. to 9.38m. and 10.35m. to 10.75m. Fossils present in laminations.		110.24	8.60
25/11/82 17.00	2.30	Dry					
26/11/82 07.40	2.30	8.95					

Depths	TYPE	No.	Blows	V	+425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²
	TCR %	SCR %	RQD %	DT mins	Circ %					
0.00										
	10	-	-	48	100					
1.00	78	-	-	38	80					
2.00	86	-	-	38	80					
	90	32	-	45	100					
3.00										
	80	40	12	57	80					
4.00										
5.00	83	44	33	68	75					
6.00										
	90	65	57	73	75					
7.00					Nil					
8.00	90	73	53	63	Nil					
9.00	80	49	55	75	Nil					
10.00										

ADDITIONAL TESTS AND NOTES

Borehole backfilled with lean concrete from 13.80 to 2.00m. depth. Backfilled with soil from 2.00m. to ground level.

Notes on Circulation Return

SP52NW/111
454903 227210

Rock rolling carried out fro 2.25m. to 2.40m.

Vertical fractures present, causing reduced circulation returns.

Returns lost due to presence o yellow brown, clayey sand/sand clay.

*WATER ▼ First water strike ▽ Subsequent water strikes

PIEZOMETER Upper seal Response length Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample

Rotary core recovery to scale; V Insitu vane test; S standard penetration test; C Cone penetration test; K Permeability test; I In situ density test

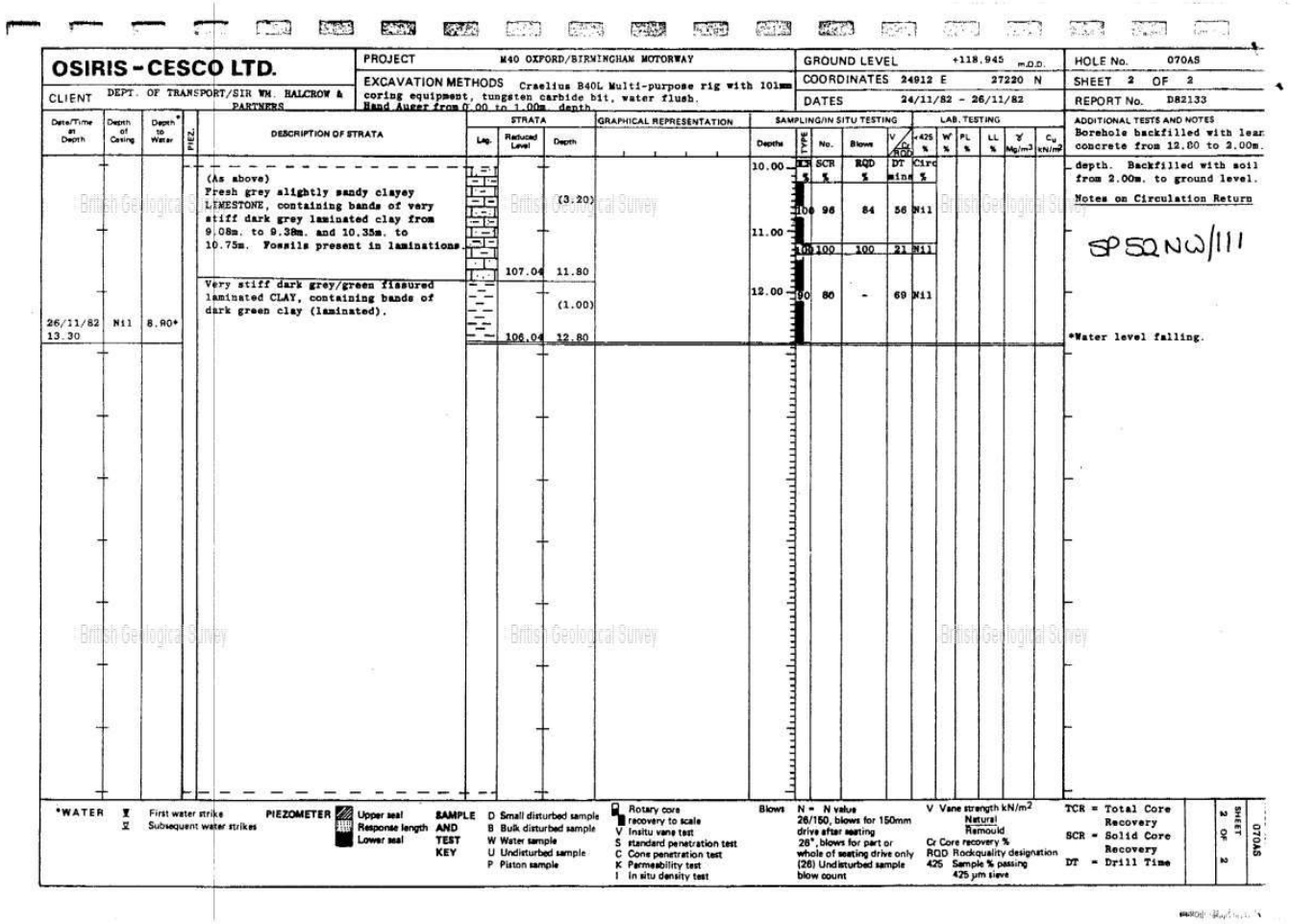
Blows N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count

V Vane strength kN/m² Natural Remould

Cr Core recovery % RQD Rockquality designation 425 Sample % passing 425 µm sieve

TCR = Total Core Recovery; SCR = Solid Core Recovery; DT = Drill Time

SHEET 1 OF 2 070B



OSIRIS - CESCO LTD.

PROJECT M40 OXFORD/BIRMINGHAM MOTORWAY
CLIENT DEPT. OF TRANSPORT/SIR WM. HALCROW & PARTNERS
EXCAVATION METHODS Craelius B40L Multi-purpose rig with 101mm coring equipment, tungsten carbide bit, water flush. Hand Auger from 0.00 to 1.00m depth
GROUND LEVEL +118.945 m.O.D.
COORDINATES 24912 E 27220 N
DATES 24/11/82 - 26/11/82
HOLE No. 070AS
SHEET 2 OF 2
REPORT No. DS2133

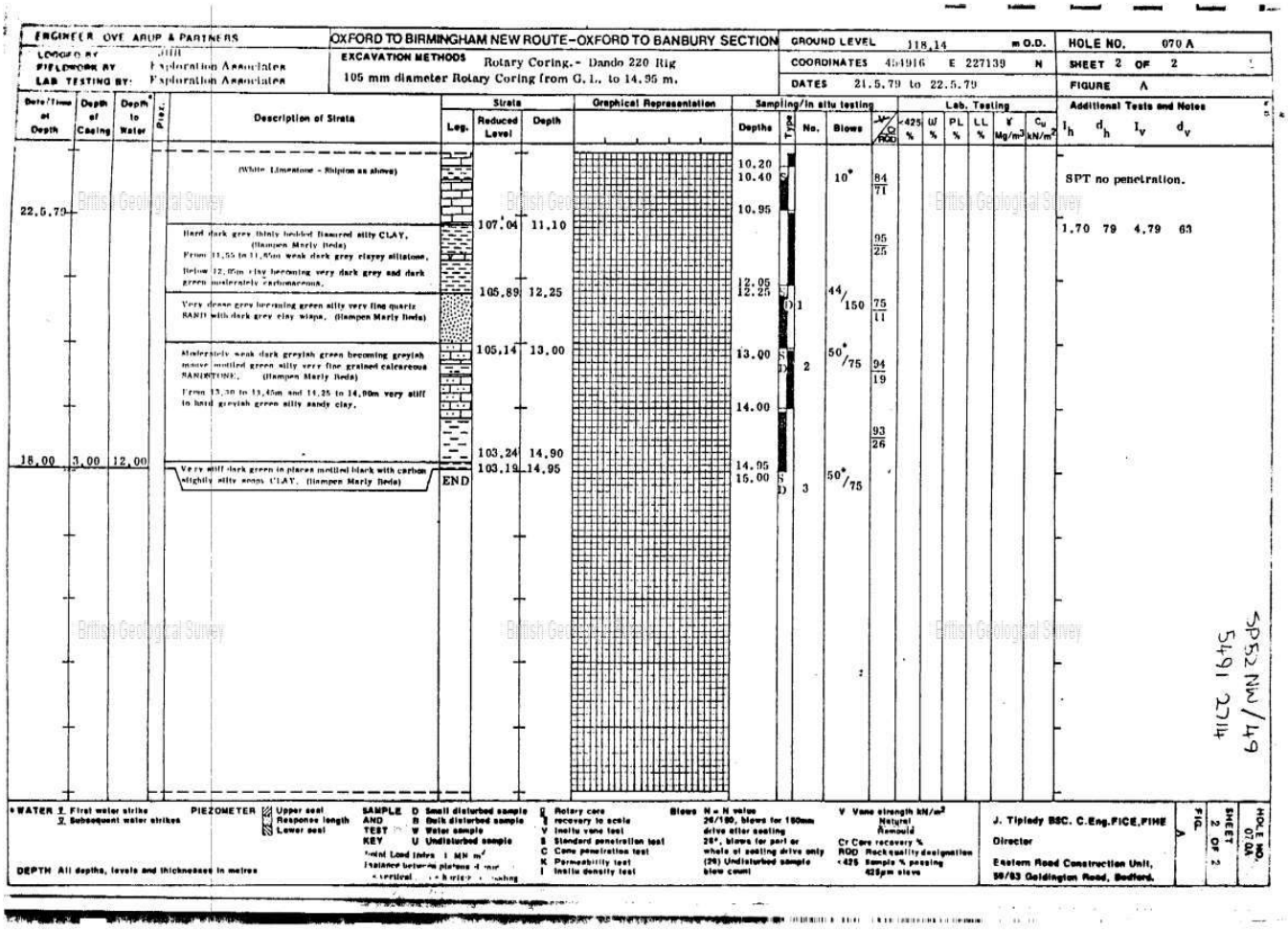
Date/Time at Depth	Depth of Casing	Depth* to Water	PIEZ.	DESCRIPTION OF STRATA	Leg.	Reduced Level	Depth
				(As above) Fresh grey slightly sandy clayey LIMESTONE, containing bands of very stiff dark grey laminated clay from 9.08m. to 9.38m. and 10.35m. to 10.75m. Fossils present in laminations.			(3.20)
				Very stiff dark grey/green fissured laminated CLAY, containing bands of dark green clay (laminated).		107.04	11.80
26/11/82 13.30	Nil	8.90*				106.04	(1.00) 12.80

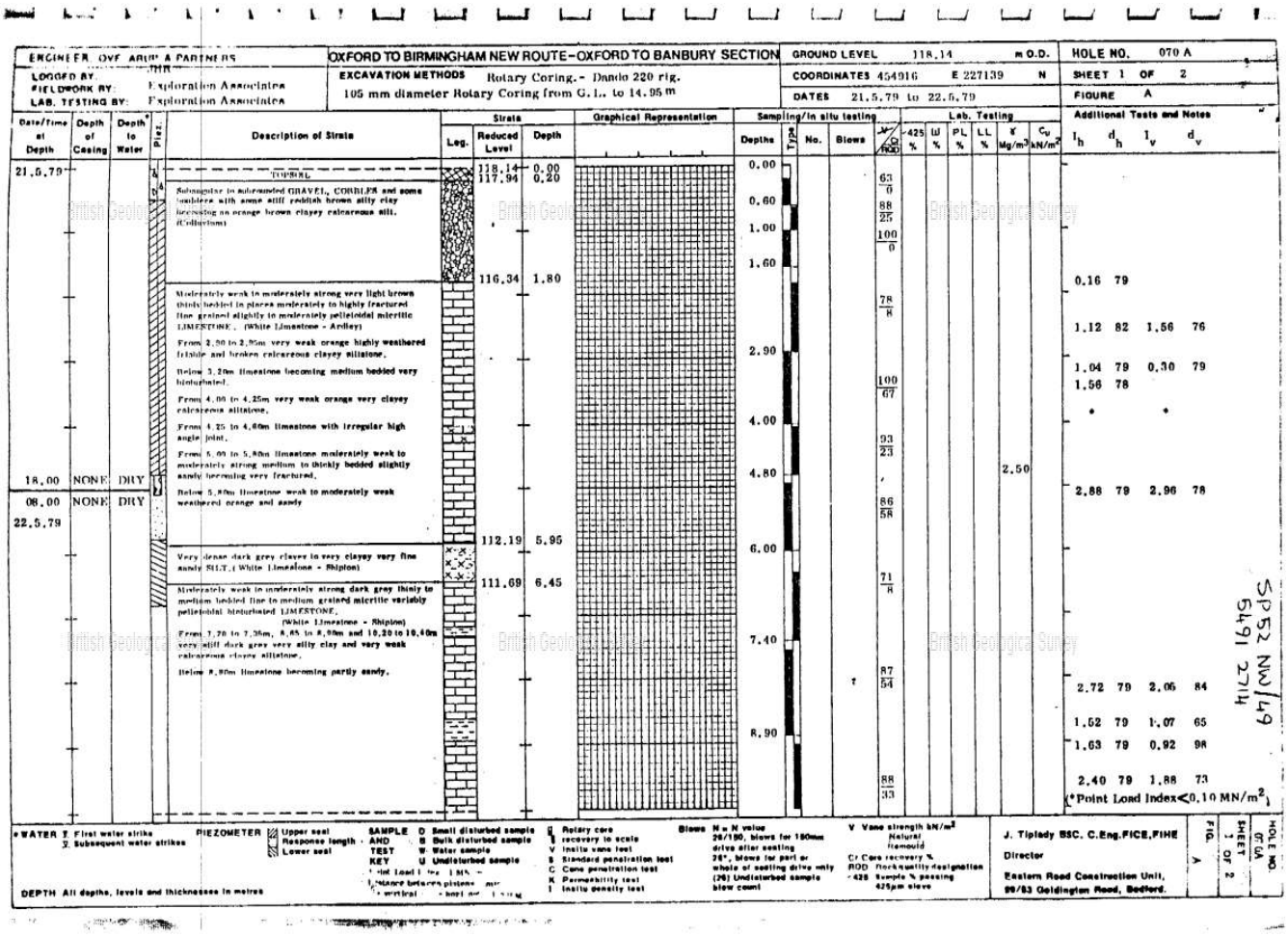
GRAPHICAL REPRESENTATION

Depths	TYPE	No.	Blows	V / RQD	+425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²
10.00	% SCR	% RQD	min DT	Circ %						
	100	96	84	56	Nil					
11.00	100	100	100	21	Nil					
12.00	100	80	-	69	Nil					

ADDITIONAL TESTS AND NOTES
Borehole backfilled with lean concrete from 12.80 to 2.00m. depth. Backfilled with soil from 2.00m. to ground level.
Notes on Circulation Return
SP52NW/111
*Water level falling.

*WATER ▼ First water strike ▽ Subsequent water strikes
PIEZOMETER Upper seal, Response length, Lower seal
SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample
Rotary core recovery to scale; V Insitu vane test; S standard penetration test; C Cone penetration test; K Permeability test; I In situ density test
Blows: N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count
V Vane strength kN/m² Natural Remould
Cr Core recovery % RQD Rockquality designation 425 Sample % passing 425 µm sieve
TCR = Total Core Recovery; SCR = Solid Core Recovery; DT = Drill Time
SHEET 2 OF 2 070AS


ENGINEER OVE ARUP & PARTNERS
OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
GROUND LEVEL 118.14 m O.D.
HOLE NO. 070 A
FIELDWORK BY Exploration Associates
LAB TESTING BY Exploration Associates
EXCAVATION METHODS Rotary Coring.- Dando 220 Rig
105 mm diameter Rotary Coring from G.L. to 14.95 m.
COORDINATES 454916 E 227139 N
DATES 21.5.79 to 22.5.79
SHEET 2 OF 2
FIGURE A
Strata
Graphical Representation
Sampling/in situ testing
Lab. Testing
Additional Tests and Notes
Description of Strata
Reduced Level
Depth
Depths
Type
No.
Blows
SPT no penetration.
1.70 79 4.79 63
22.5.79
18.00 3.00 12.00
107.04 11.10
105.89 12.25
105.14 13.00
103.24 14.90
103.19 14.95
END
10.20
10.40
10.95
12.05
12.25
13.00
14.00
14.95
15.00
10*
44/150
50*/75
50*/75
84/71
95/25
75/11
94/19
93/26
SP52 NW/49
5491 2714
WATER ▼ First water strike ▽ Subsequent water strikes
PIEZOMETER Upper seal Response length Lower seal
SAMPLE AND TEST KEY
DEPTH All depths, levels and thicknesses in metres
J. Tiplady BSC. C.Eng.FICE.FIHE
Director
Eastern Road Construction Unit,
59/63 Goldington Road, Bedford.
FIG. A
SHEET 2 OF 2
HOLE NO. 070A


ENGINEER OVE ARUP & PARTNERS
LOGGED BY THR
FIELDWORK BY Exploration Associates
LAB. TESTING BY Exploration Associates
OXFORD TO BIRMINGHAM NEW ROUTE - OXFORD TO BANBURY SECTION
EXCAVATION METHODS Rotary Coring.- Dando 220 rig.
105 mm diameter Rotary Coring from G.L. to 14.95 m
GROUND LEVEL 118.14 m O.D.
COORDINATES 454916 E 227139 N
DATES 21.5.79 to 22.5.79
HOLE NO. 070 A
SHEET 1 OF 2
FIGURE A
Date/Time at Depth
Depth of Casing
Depth to Water
Description of Strata
Strata
Leg.
Reduced Level
Depth
Graphical Representation
Sampling/in situ testing
Depths
Type
No.
Blows
Lab. Testing
Additional Tests and Notes
TOPSOIL
118.14 0.00
117.94 0.20
116.34 1.80
112.19 5.95
111.69 6.45
21.5.79
18.00 NONE DRY
08.00 NONE DRY
22.5.79
0.00
0.60
1.00
1.60
2.90
4.00
4.80
6.00
7.40
8.90
2.50
0.16 79
1.12 82 1.56 76
1.04 79 0.30 79
1.56 78
2.88 79 2.96 78
2.72 79 2.06 84
1.62 79 1.07 65
1.63 79 0.92 98
2.40 79 1.88 73
(*Point Load Index<0.10 MN/m²)
SP52 NW/49 2714
WATER
PIEZOMETER
SAMPLE AND TEST KEY
DEPTH All depths, levels and thicknesses in metres
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Director
Eastern Road Construction Unit,
20/83 Goldington Road, Bedford.

ENGINEER: OVE ARUP & PARTNERS

OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION

LOGGED BY: JJIR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates

EXCAVATION METHODS Percussion Boring - Pilcon Wayfarer
150 mm diameter hole
105 mm diameter Rotary Coring from 1.9 m to 20.0 m

GROUND LEVEL 109.83 m O.D.
COORDINATES 454975 E 226152 N
DATES 27.6.79 to 3.7.79

HOLE NO. 069
SHEET 2 OF 2
FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Description of Strata	Reduced Level	Depth
29.6.79			(White Limestone - Ardley as above) From 10.90 to 11.25m hard dark grey thinly bedded jointed silty clay with wispy laminae of weak pelletoidal limestone.	98.03	11.80
			Irregularly thinly interbedded hard dark grey very clayey calcareous SILT and very weak dark grey very muddy pelletoidal LIMESTONE very fossiliferous in places. (Hampen Marly Beds)	97.38	12.45
18.00	3.00	3.00	Very stiff green very silty CLAY with occasional vertical root impressions. (Hampen Marly Beds) From 12.75 to 13.00m clay becoming very thinly interbedded with light grey silt. From 13.00 to 13.40m clay becoming very dark greenish black increasingly carbonaceous with specks of coal and fragmented shells.	95.78	14.05
08.00	3.00	5.00			
2.7.79			Moderately weak to moderately strong greyish mauve thinly becoming medium bedded fine grained calcareous SANDSTONE with some wisps of very stiff green clay and green clay/silt filled branching root holes. (Hampen Marly Beds)	94.93	14.90
			Very stiff dark green becoming hard greenish grey very thinly bedded silty becoming very silty CLAY. (Hampen Marly Beds) Below 15.80m becoming very thinly interbedded with very weak dark grey muddy pelletoidal limestone.	93.53	16.30
			Moderately weak to moderately strong thinly to medium bedded fine to medium grained pelletoidal micritic LIMESTONE with depth becoming increasingly calcarenitic. (Taynton Stone) From 16.95 to 17.15m and 17.70 to 17.80m hard dark grey silty clay and very weak pelletoidal clayey siltstone.	89.83	20.00 END
18.00	3.00	7.00			

Sampling/in situ testing and Lab. Testing

Depths	Type	No.	Blows	Cr/RQD	<425 %	w %	PL %	LL %	γ Mg/m³	Cu kN/m²
				90/72						
					83	13	15	40		
12.00										
				99/84	81	20	20	51		
12.80										
13.00	S		N=101							
	D	9								
				97/83	100	17	16	46		
14.00	S		50*/75							
	D	10								
				74/44						
15.00										
15.20	S		N=72		92	19	14	50		
	D	11								
				89/53						
16.00	S		10*							
									2.50	
				94/48					2.47	
18.00										
				84/41					2.53	
20.00										

Additional Tests and Notes

I_h	d_h	I_v	d_v
1.30	76		
0.71	76	2.11	65
*			
*		*	
2.95	77	4.97	65
SPT no penetration.			
*		0.14	65
1.39	76	1.67	70
0.10	76	0.23	63
*			
0.53	75	1.42	75
1.09	73	2.58	71

(*Point Load Index <0.10MN/m²)

SP 52 NW/36
5497 2616

* WATER ▼ First water strike ▽ Subsequent water strikes
PIEZOMETER Upper seal / Response length / Lower seal
SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test
* Int Load Index I MN/m²; d distance between platens ...; v vertical, h horizontal
Blows: N = N value; 25/150, blows for 150mm drive after seating; 25*, blows for part or whole of seating drive only; (25) Undisturbed sample blow count
V Vane strength kN/m² Natural / Remould
Cr Core recovery %
RQD Rock quality designation
<425 Sample % passing 425µm sieve

DEPTH All depths, levels and thicknesses in metres

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Director
Eastern Road Construction Unit,
59/63 Goldington Road, Bedford.

FIG. A | SHEET 2 OF 2 | HOLE NO. 069

ENGINEER OVE ARUP & PARTNERS
LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates

OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
EXCAVATION METHODS Percussion Boring – Pilcon Wayfarer
150 mm diameter hole
105 mm diameter Rotary Coring from 1.9 m to 20.0 m

GROUND LEVEL 109.83 m O.D.
COORDINATES 454975 E 226152 N
DATES 27.6.79 to 3.7.79

HOLE NO. 069
SHEET 1 OF 2
FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water
27.6.79		
18.00	3.00	DRY
08.00	3.00	DRY
28.6.79		
18.00	3.00	3.00
08.00	3.00	3.00
29.6.79		

Description of Strata	Reduced Level	Depth
TOPSOIL	109.83	0.00
Stiff initially dark orange brown very silty CLAY becoming light grey very clayey calcareous SILT with some light brown limestone gravel. (Colluvium/Weathered Limestone) Below 1.30m clay and silt with an increasing quantity of limestone gravel and cobbles.	109.63	0.20
Moderately weak to moderately strong light brown initially highly fractured becoming thinly to medium bedded fine to medium grained micritic variably pelletoidal bioturbated LIMESTONE. (White Limestone – Ardley) From 4.10 to 4.20, 4.60 to 4.80m and 5.30 to 5.45m limestone moderately weak moderately weathered orange. From 5.00 to 5.25m limestone moderately strong grey more sparry with thick walled bivalves. Below 6.05m limestone with irregular vertical solution weathered and iron stained joints. Below 5.50m limestone very compact slightly sandy. At 7.10m zone of solution leached shells.	107.93	1.90
Initially very dense orange brown clayey calcareous SILT becoming a very stiff very dark grey silty CLAY. (White Limestone – Shipton)	102.68	7.15
Moderately weak to moderately strong grey thinly to medium bedded fine to medium grained micritic variably pelletoidal LIMESTONE, (White Limestone – Shipton) From 8.05 to 8.20m hard dark grey very silty clay. From 9.70 to 10.30m moderately weak to moderately strong fine grained silty calcareous sandstone.	102.23	7.60

Sampling/In situ testing and Lab. Testing

Depths	Type	No.	Blows	Cr/RQD	-425 %	W %	PL %	LL %	γ Mg/m³	Cu kN/m²
0.00	U	1	(37)							
					66	12	16	25		
0.50	D	2								
	U	3	(80)							
1.00	D	4								
	U	5	(85)		47	11	13	21		
1.50	D	6								
	U	7	(120)			9				
1.90	D	8		100/0						
2.00				65/0						
2.80				44/0						
3.35				80/0						
3.70									2.50	
				83/54						
5.90				90/25						
7.25				93/76						
8.00				99/68						
8.90										

Additional Tests and Notes

I_h	d_h	I_v	d_v
1.20	72		
0.32	75	0.79	71
2.63	75	1.64	74
2.04	75	0.70	100
2.03	75	2.10	58
*			
0.17	76	0.36	91
0.17	76	*	

(*Point Load Index <0.10 MN/m²)

SP52NW/36
~~5497 2616~~
5498 2615

* WATER ▽ First water strike ▼ Subsequent water strikes
PIEZOMETER Upper seal / Response length / Lower seal
DEPTH All depths, levels and thicknesses in metres

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
W Water sample
U Undisturbed sample
Point Load Index I MN/m²; distance between platens; v = vertical, h = horizontal

Rotary core recovery to scale
V Insitu vane test
S Standard penetration test
C Cone penetration test
K Permeability test
I Insitu density test

Blows N = N value
26/150, blows for 150mm drive after seating
26*, blows for part or whole of seating drive only
(26) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould
Cr Core recovery %
RQD Rock quality designation
-425 Sample % passing 425μm sieve

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Eastern Road Construction Unit,
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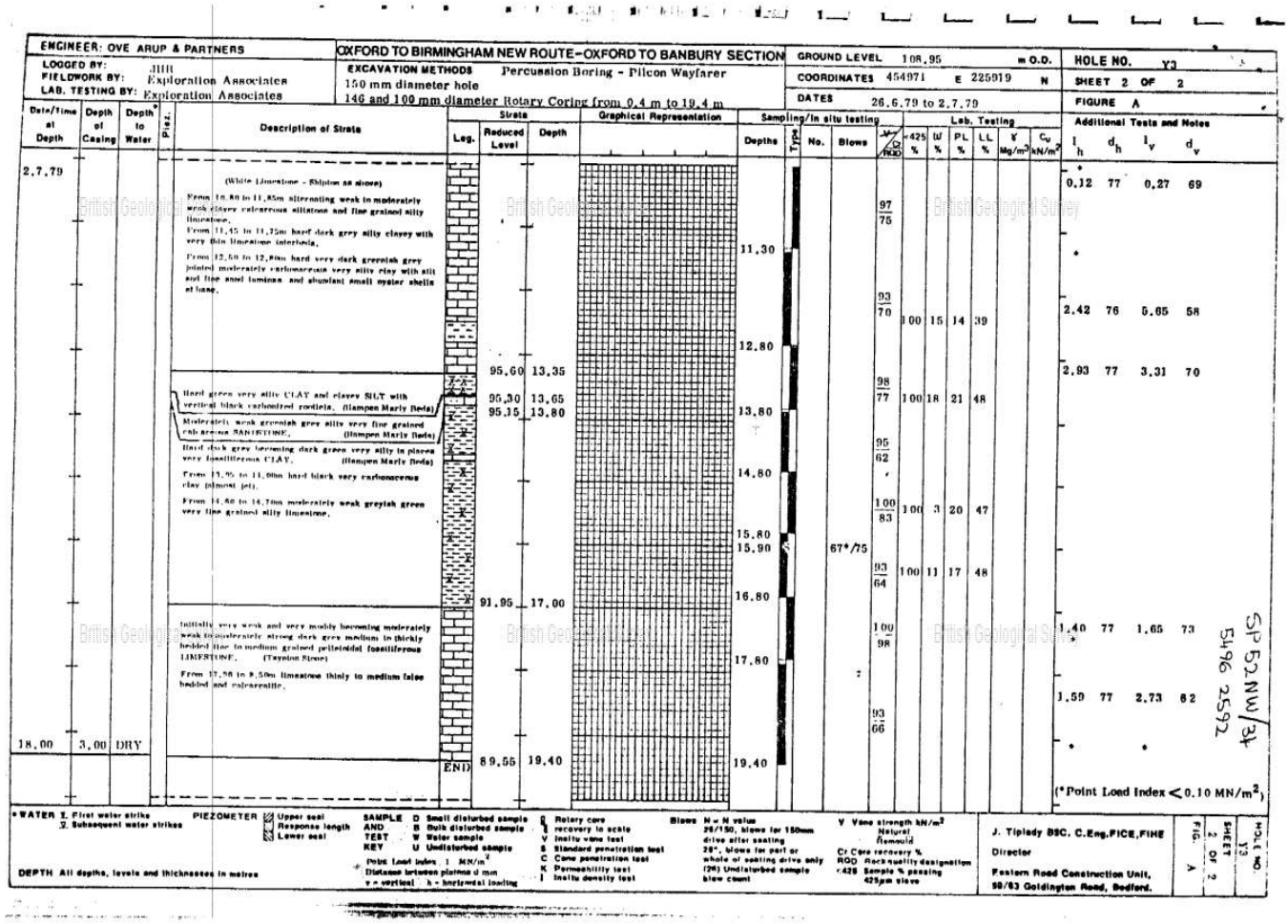
FIG. A | SHEET 1 OF 2 | HOLE NO. 069


ENGINEER: OVE ARUP & PARTNERS
OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
LOGGED BY: JHH
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates
EXCAVATION METHODS Percussion Boring - Pilcon Wayfarer
150 mm diameter hole
146 and 100 mm diameter Rotary Coring from 0.4 m to 19.4 m
GROUND LEVEL 108.95 m O.D.
COORDINATES 454971 E 225919 N
DATES 26.6.79 to 2.7.79
HOLE NO. Y3
SHEET 2 OF 2
FIGURE A
Date/Time at Depth
Depth of Casing
Depth to Water
Description of Strata
Strata
Leg.
Reduced Level
Depth
Graphical Representation
Sampling/In situ testing
Depths
Type
No.
Blows
Lab. Testing
<425 %
W %
PL %
LL %
γ Mg/m³
Cv kN/m²
Additional Tests and Notes
2.7.79
(White Limestone - Shipton on Stowe)
From 10.80 to 11.85m alternating weak to moderately weak clayey calcareous siltstone and fine grained silty limestone.
From 11.45 to 11.75m hard dark grey silty clayey with very thin limestone interbeds.
From 12.50 to 12.80m hard very dark greenish grey jointed moderately carbonaceous very silty clay with silt and fine sand laminae and abundant small oyster shells at base.
95.60 13.35
95.30 13.65
95.15 13.80
Hard green very silty CLAY and clayey SILT with vertical black carbonized rootlets. (Hampen Marly Beds)
Moderately weak greenish grey silty very fine grained calcareous SANDSTONE. (Hampen Marly Beds)
Hard dark grey becoming dark green very silty in places very fossiliferous CLAY. (Hampen Marly Beds)
From 13.95 to 14.00m hard black very carbonaceous clay (almost jet).
From 14.60 to 14.70m moderately weak greyish green very fine grained silty limestone.
91.95 17.00
Initially very weak and very muddy becoming moderately weak to moderately strong dark grey medium to thickly bedded fine to medium grained pelletoidal fossiliferous LIMESTONE. (Taynton Stone)
From 17.90 to 18.50m limestone thinly to medium laise bedded and calcarenitic.
18.00 3.00 DRY
89.55 19.40
END
11.30
12.80
13.80
14.80
15.80
15.90
16.80
17.80
19.40
67*/75
97/75
93/70
100 15 14 39
98/77
100 18 21 48
95/62
100/83
100 3 20 47
93/64
100 11 17 48
100/98
93/66
0.12 77 0.27 69
2.42 76 0.65 58
2.93 77 3.31 70
1.40 77 1.65 73
1.59 77 2.73 82
SP 52 NW/34
5496 2592
(*Point Load Index < 0.10 MN/m²)
WATER 1. First water strike 2. Subsequent water strikes
PIEZOMETER Upper seal Response length Lower seal
SAMPLE AND TEST KEY D Small disturbed sample B Bulk disturbed sample W Water sample U Undisturbed sample
Point Load Index I MN/m² Distance between platens d mm v = vertical h = horizontal loading
R Rotary core recovery in scale
V Insitu vane test
S Standard penetration test
C Cone penetration test
K Permeability test
I Insitu density test
Blows N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count
V Vane strength kN/m² Natural Remould
Cr Core recovery % RQD Rock quality designation <425 Sample % passing 425μm sieve
DEPTH All depths, levels and thicknesses in metres
J. Tipledy BSC. C.Eng.FICE,FIHE
Director
Eastern Road Construction Unit, 98/63 Goldington Road, Bedford.
FIG. A
SHEET 2 OF 2
HOLE NO. Y3

ENGINEER: OVE ARUP & PARTNERS

OXFORD TO BIRMINGHAM NEW ROUTE – OXFORD TO BANBURY SECTION

LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates

EXCAVATION METHODS: Percussion Boring – Pilcon Wayfarer
150 mm diameter hole
146 and 100 mm diameter Rotary Coring from 0.4 to 19.4 m

GROUND LEVEL: 108.95 m O.D.
COORDINATES: 454971 E 225919 N
DATES: 26.6.79 to 2.7.79

HOLE NO. Y3
SHEET 1 OF 2
FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*
27.6.79		
18.00	NIL	DRY
08.00	NIL	DRY
27.6.79		
18.00	1.50	0.00
08.00	1.50	DRY
28.6.79		
18.00	3.00	DRY
08.00	3.00	6.70
29.6.79		
18.00	3.00	0.00
08.00	3.00	6.70
2.7.79		

Description of Strata	Reduced Level	Depth
	108.95	0.00
TOPSOIL	108.75	0.20
Subangular to subrounded COBBLES and BOULDERS of white micritic limestone with some firm dark reddish brown silty clay. (Colluvium)	107.75	1.20
Moderately strong white highly fractured becoming slightly fractured thinly bedded fine grained lined oolitic and calcarenitic sparry LIMESTONE. (White Limestone – Bladon) From 2.75 to 2.85m weak light orange brown conglomeratic calcareous siltstone. From 2.85 to 2.90m Hardground/erosion layer with rolled micritic pebbles and wispy iron staining.	106.05	2.90
Moderately weak to moderately strong thinly and medium bedded initially moderately fractured fine grained pelletoidal micritic bioturbated LIMESTONE. (White Limestone – Ardley) From 3.10 to 4.00m irregular vertical solution weathered joint. From 3.40 to 3.70m limestone very fine grained almost porcellanous with thin walled gastropods. From 3.90 to 6.50m limestone orange and orange brown fine to medium grained very pelletoidal with some sparry walled shells. Below 6.50m limestone becoming very compact medium to thickly bedded and increasingly siliceous. From 7.10 to 7.50m limestone moderately weak orange with solution casts of shells. Below 7.50m weak initially weathered orange becoming dark grey very silty calcareous sandstone.	101.05	7.90
Hard dark grey very silty CLAY and clayey SILT becoming black and carbonaceous. (White Limestone – Shipton)	100.65	8.30
Moderately weak to moderately strong grey medium to thickly bedded fine to medium grained pelletoidal micritic LIMESTONE. (White Limestone – Shipton) From 8.55 to 8.65m weak to moderately weak clayey pelletoidal calcareous siltstone.		

Sampling/In situ testing

Depths	Type	No.	Blows	Cr/RQD
0.40	S D	1		
0.60				75/0
				50/0
1.30				
1.60				83/0
				77/0
2.60				
				90/19
3.80				
				95/34
4.80				
				95/45
5.80				
				93/64
6.80				
				98/97
8.00				
				95/40
8.80				
				99/91
9.80				

Lab. Testing: <425 %, w %, PL %, LL %, γ Mg/m³, C_u kN/m²

Additional Tests and Notes

SPT no penetration.
Core diameter 114 mm.

Core diameter reduced below 1.60m

I_h	d_h	I_v	d_v
2.68	76		
3.46	77	3.34	77
0.85	75		
*		1.25	78
0.20	75		
2.63	75	1.97	74
2.70	72	2.28	75
*		*	
1.32	77	1.47	67

(*Point Load Index < 0.10 MN/m²)

SP 52NW/34
~~5496 2592~~
5497 2592

*WATER ▼ First water strike
▽ Subsequent water strikes

PIEZOMETER: Upper seal; Response length; Lower seal

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; Point load index I MN/m²; Distance between platens d mm; v = vertical, h = horizontal loading

Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test

Blows: N = N value; 20/190, blows for 190mm drive after seating; 25*, blows for part or whole of seating drive only; (20) Undisturbed sample blow count

V Vane strength kN/m² Natural, Remould; Cr Core recovery %; RQD Rock quality designation; <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 1 OF 2 | HOLE NO. Y3

ENGINEER. OVE ARUP & PARTNERS

LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates

OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION

EXCAVATION METHODS Rotary Coring –Dando 220 Rig.
105 mm diameter Rotary Coring from G.L. to 20.0 m.

GROUND LEVEL 103.07 m O.D.
COORDINATES 454947 E 225371 N
DATES 31.5.79 to 1.6.79

HOLE NO. Y 2
SHEET 2 OF 2
FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Description of Strata	Reduced Level	Depth
31.5.79			(White Limestone – Shipton as above) From 9.40 to 9.45m, 11.85 to 11.90m, 12.25 to 12.35m, 12.55 to 12.70m and 13.40 to 13.75m very stiff to hard dark grey very silty clay and clayey calcareous silt. From 11.90 to 13.40m limestone initially very fine grained porcelanious with increasing pellet content. From 13.40 to 13.75m hard very silty moderately carbonaceous clay with carbonized wood fragments. From 13.75 to 13.85m very weak dark grey pelletoidal fossiliferous clayey-calcareous siltstone. From 13.80 to 13.90m limestone moderately weak greenish grey porcelainous.	89.17	13.90
20.00	3.00	9.00			
08.00	3.00	3.60			
			Very stiff to hard dark grey and greyish green silty to very silty in places pelletoidal CLAY with some small oyster shells. (Hampen Marly Beds)	88.07	15.00
1.6.79			Moderately weak becoming moderately strong grey and greyish green fine grained calcareous SANDSTONE with vertical root impressions. (Hampen Marly Beds)	86.82	16.25
			Very weak dark green, clayey fine sandy SILTSTONE very fossiliferous and in places carbonaceous becoming a hard very dark grey carbonaceous silty CLAY. (Hampen Marly Beds)	85.97	17.10
			Weak to moderately weak dark grey thinly to medium bedded fine to medium grained very muddy becoming micritic pelletoidal LIMESTONE with some very thin interbeds of hard brown silty clay. (Taynton Stone) Below 17.80m limestone becoming light grey moderately weak to moderately strong thinly to medium bedded medium grained oolitic and calcarenitic. Below 19.00m limestone weak and broken.		
18.00	3.00	11.00	END	83.07	20.00

Sampling/In situ testing

Depths	Blows	Cr/RQD
11.90		
		100/80
14.90	10*	
		96/59
16.00		
		73/51
17.75		
		60/38
20.00		

Lab. Testing

<425 %	W %	PL %	LL %	γ Mg/m³	C_u kN/m²
100	12	14	42		
100	13	14	41		
100	18	14	52		
				2.65	
100	18	20	55		
				2.52	
				2.52	

Additional Tests and Notes

I_h	d_h	I_v	d_v
2.13	75	1.69	71
*			
3.11	75	2.58	71
SPT no penetration			
3.59	75	6.85	61
0.57	74	0.93	76
*		1.88	56
1.30	74	1.15	71

(* Point Load Index < 0.10 MN/m²)

SP52NW/31
5493 2539

* WATER ▽ First water strike
▽ Subsequent water strikes

PIEZOMETER Upper seal / Response length / Lower seal

DEPTH All depths, levels and thicknesses in metres

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
W Water sample
U Undisturbed sample
Point Load Index I MN/m²
Distance between platens d mm
v = vertical h = horizontal loading

Rotary core recovery to scale
V Insitu vane test
S Standard penetration test
C Cone penetration test
K Permeability test
I Insitu density test

Blows N = N value
26/190, blows for 150mm drive after seating
26*, blows for part or whole of seating drive only
(29) Undisturbed sample blow count

V Vane strength kN/m² Natural Remould
Cr Core recovery %
RQD Rock quality designation
·425 Sample % passing 425μm sieve

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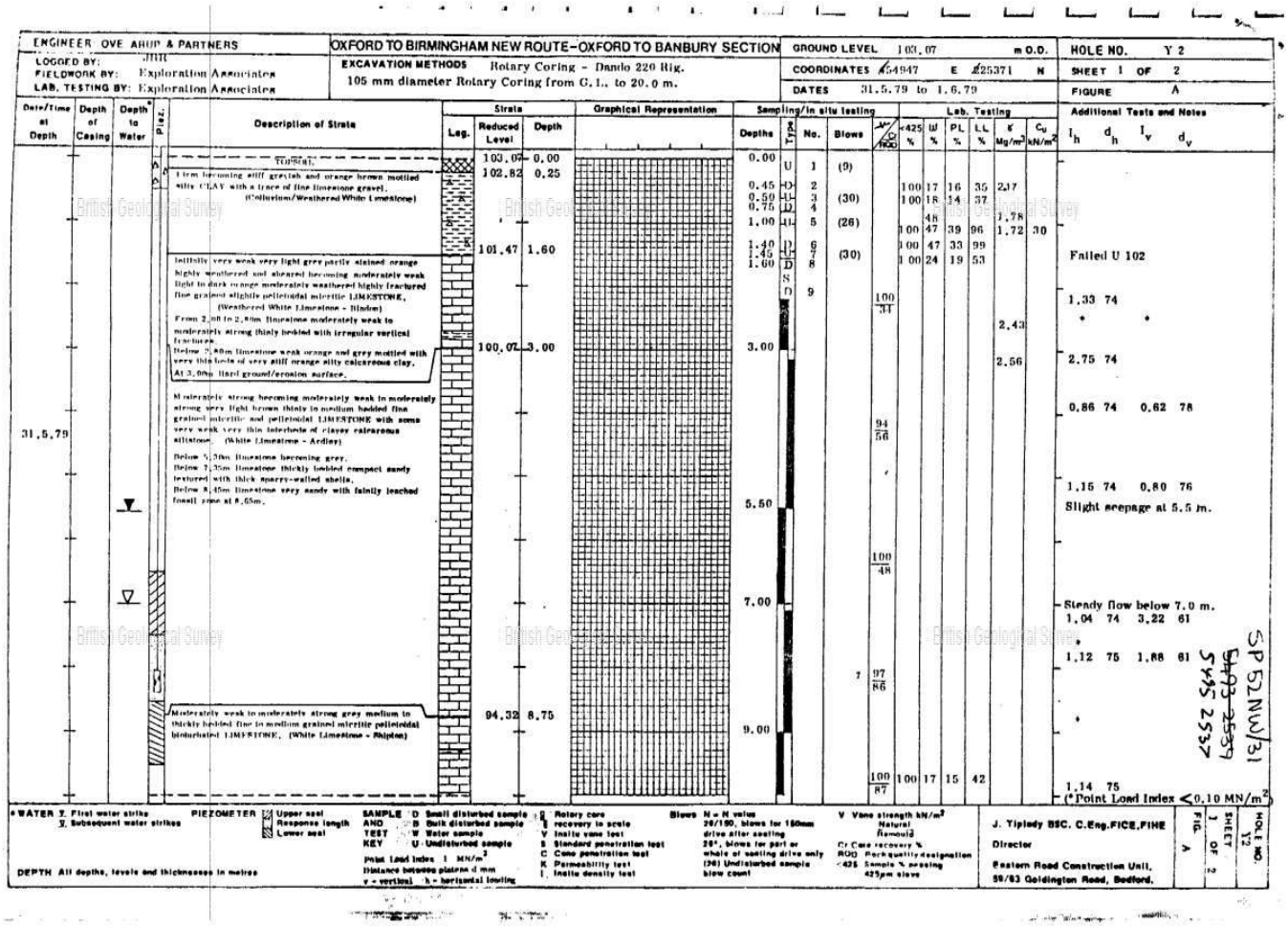
FIG. A | SHEET 2 OF 2 | HOLE NO. Y2


ENGINEER OVE ARUP & PARTNERS
OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
LOGGED BY:
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates
EXCAVATION METHODS Rotary Coring - Dando 220 Rig. 105 mm diameter Rotary Coring from G.L. to 20.0 m.
GROUND LEVEL 103.07 m O.D.
COORDINATES 454947 E 225371 N
DATES 31.5.79 to 1.6.79
HOLE NO. Y 2
SHEET 1 OF 2
FIGURE A
Strata
Graphical Representation
Sampling/In situ testing
Lab. Testing
Additional Tests and Notes
Description of Strata
Reduced Level
Depth
Failed U 102
Slight seepage at 5.5 m.
Steady flow below 7.0 m.
(*Point Load Index <0.10 MN/m²)
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SP52NW/31
SW5 2537

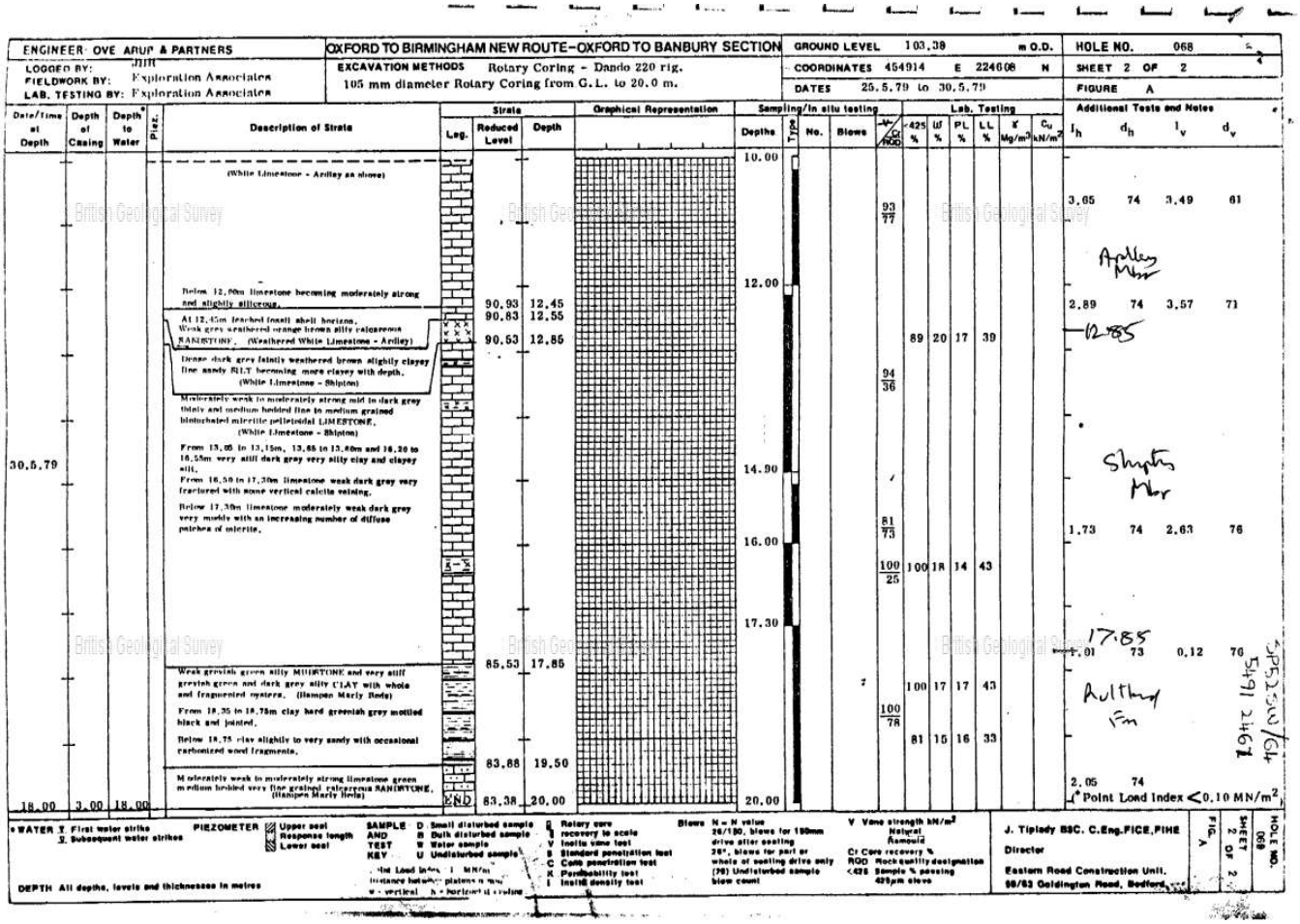
ENGINEER: OVE ARUP & PARTNERS
OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
LOGGED BY: Exploration Associates
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates
EXCAVATION METHODS Rotary Coring - Dando 220 rig. 105 mm diameter Rotary Coring from G.L. to 20.0 m.
GROUND LEVEL 103.38 m O.D.
COORDINATES 454914 E 224608 N
DATES 25.5.79 to 30.5.79
HOLE NO. 068
SHEET 2 OF 2
FIGURE A
Strata
Graphical Representation
Sampling/In situ testing
Lab. Testing
Additional Tests and Notes
Date/Time at Depth
Depth of Casing
Depth to Water
Description of Strata
Leg.
Reduced Level
Depth
Depths
Type
No.
Blows
RQD %
-425 %
wf %
PL %
LL %
γ Mg/m³
Cu kN/m²
Ih
dh
Iv
dv
(White Limestone - Ardley as above)
Below 12.80m limestone becoming moderately strong and slightly siliceous.
At 12.45m leached fossil shell horizon. Weak grey weathered orange brown silty calcareous SANDSTONE. (Weathered White Limestone - Ardley)
90.93 12.45
90.83 12.55
90.53 12.85
Dense dark grey faintly weathered brown slightly clayey fine sandy SILT becoming more clayey with depth. (White Limestone - Shipton)
Moderately weak to moderately strong mid to dark grey thinly and medium bedded fine to medium grained bioturbated micritic pelletoidal LIMESTONE. (White Limestone - Shipton)
From 13.05 to 13.15m, 13.65 to 13.80m and 16.20 to 16.55m very stiff dark grey very silty clay and clayey silt.
From 16.50 to 17.30m limestone weak dark grey very fractured with some vertical calcite veining.
Below 17.30m limestone moderately weak dark grey very muddy with an increasing number of diffuse patches of micrite.
30.5.79
Weak greyish green silty MUDSTONE and very stiff greyish green and dark grey silty CLAY with whole and fragmented oysters. (Hampen Marly Beds)
85.53 17.85
From 18.35 to 18.75m clay hard greenish grey mottled black and jointed.
Below 18.75 clay slightly to very sandy with occasional carbonized wood fragments.
Moderately weak to moderately strong limestone green mottled bedded very fine grained calcareous SANDSTONE. (Hampen Marly Beds)
83.88 19.50
END
83.38 20.00
18.00 3.00 18.00
10.00
12.00
14.90
16.00
17.30
20.00
93/77
94/36
81/73
100/25
100/78
89 20 17 39
100 18 14 43
100 17 17 43
81 15 16 33
3.65 74 3.49 81
2.89 74 3.57 71
1.73 74 2.63 76
1.91 73 0.12 76
2.05 74
Ardley Mbr
12.85
Shipton Mbr
17.85
Aulthorp Fm
SP52SW/64 5491 2461
Point Load Index <0.10 MN/m²
WATER ▽ First water strike ▽ Subsequent water strikes
PIEZOMETER Upper seal Response length Lower seal
SAMPLE AND TEST KEY D Small disturbed sample B Bulk disturbed sample W Water sample U Undisturbed sample
R Rotary core I Insitu vane test S Standard penetration test C Cone penetration test K Permeability test I Insitu density test
Blows N = N value 26/150, blows for 150mm drive after seating 26*, blows for part or whole of seating drive only (26) Undisturbed sample blow count
V Vane strength kN/m² Natural Remould
Cr Core recovery % RQD Rock quality designation <425 Sample % passing 425μm sieve
DEPTH All depths, levels and thicknesses in metres
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FIG. A
SHEET 2 OF 2
HOLE NO. 068

ENGINEER: OVE ARUP & PARTNERS

OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION

LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates

EXCAVATION METHODS Rotary Coring – Dando 220 rig.
105 mm diameter Rotary Coring from G.L. to 20.0 m.

GROUND LEVEL 103.38 m O.D.
COORDINATES 454914 E 224608 N
DATES 25.5.79 to 30.5.79

HOLE NO. 068
SHEET 1 OF 2
FIGURE A

Description of Strata

Description of Strata	Reduced Level	Depth
	103.38	0.00
TOPSOIL.	103.18	0.20
Firm to stiff orange brown becoming greyish brown initially sandy silty CLAY with an increasing quantity of fine limestone gravel with depth. (Colluvium/Forest Marble)	101.78	1.60
Moderately strong grey and blue hearted very thinly bedded medium to coarse grained very shelly LIMESTONE with small diffuse patches of light greenish grey micritic with very thin interbedded and laminae of stiff brown weathered orange silty clay. (Forest Marble)	101.23	2.15
Very weak light brownish grey fissured and jointed calcareous MUDSTONE faintly weathered orange brown on joints. (Forest Marble)	100.63	2.75
Very stiff becoming hard grey extensively mottled orange and orange brown thinly to very thinly interbedded very silty CLAY and clayey SILT. (Forest Marble) From 3.20 to 3.50m with occasional very thin interbeds of weak and moderately weak grey shelly limestone. Below 3.50m clay dark grey/black carbonaceous with some included very weak micritic limestone pebbles. At 3.95m erosion surface.	99.43	3.95
Weak to very weak light greenish grey silty calcareous MUDSTONE initially with some patches and wisps of green clay and carbonized wood fragments. (White Limestone – Bladon) Below 4.10m mudstone with included gravel-size fragments of underlying limestone.	98.78	4.60
Moderately weak light grey mottled mid grey very fine grained micritic LIMESTONE with orange stained anastomosing fractures. (White Limestone – Bladon) Below 4.85m limestone becoming pelletoidal. From 5.15 to 5.30m erosion horizon – surface inclined at 45°. Below 5.30m limestone moderately strong light grey/white thickly bedded fine grained pelletoidal oolitic with well developed vertical stylolites.	96.38	7.00
Moderately weak rapidly becoming moderately weak to moderately strong light grey medium bedded fine to medium grained bioturbated oolitic and pelletoidal LIMESTONE with occasional very thin beds of brown silty calcareous clay. (White Limestone – Ardley) From 7.30 to 7.50m limestone moderately fractured.		

Water / Casing

Date/Time at Depth	Depth of Casing	Depth to Water
25.5.79		
15.00	3.00	NIL
11.00	3.00	1.20
30.5.79		

Sampling / In situ testing and Lab. Testing

Depths	Type	No.	Blows	Cr/RQD	<425 %	w %	PL %	LL %	γ Mg/m³	Cu kN/m²
0.00	B	1	(20)							
0.15	D	2								
0.50	U	3	(45)		66	21 23	23	40	2.01 2.06	90
					78	23	21	53		
0.95	B	4								
1.00	U	5	(100)		58	22 18	22	49	2.10 2.05	105
1.50	D	6	30*/38							
	S D	7		96/0						
2.00				95/39	100	16	16	34		
3.50					100	18	16	40		
				84/78						
4.00				89/36	98	16	36	62		
5.40				96/71						
7.00				64/47						
8.00				95/59						
10.00										

Additional Tests and Notes

I_h	d_h	I_v	d_v
2.63	75		
2.10	74	0.43	68
1.52	74	0.69	75
0.18	74		

Forest Marble Fm
— 4.60
Bladon Mbr
7.00
Ardley Mbr

SP52SW/64
5491 2467

(* Point Load Index <0.10 MN/m²)

* WATER First water strike; Subsequent water strikes
PIEZOMETER Upper seal; Response length; Lower seal
SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; S Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test
Point load index I MN/m², d distance between platens mm, v = vertical, h = horizontal
Blows N = N value; 26/150, blows for 150mm drive after seating; 28*, blows for part or whole of seating drive only; (26) Undisturbed sample blow count
V Vane strength kN/m² Natural / Remould
Cr Core recovery %; RQD Rock quality designation; <425 Sample % passing 425μm sieve
DEPTH All depths, levels and thicknesses in metres

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FIG. A | SHEET 1 OF 2 | HOLE NO. 068

ENGINEER: OVE ARUP & PARTNERS

LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates

OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION

EXCAVATION METHODS Percussion Boring – Pilcon Wayfarer
150 mm diameter hole
146 and 100 mm diameter Rotary Coring from 1.5 to 25.0 m

GROUND LEVEL 86.41 m O.D.
COORDINATES 454759 E 221969 N
DATES 4.7.79 to 11.7.79

HOLE NO. 062
SHEET 3 OF 3
FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water	Description of Strata	Reduced Level	Depth
			(White Limestone - Shipton as above)		
10.7.79			Below 21.35m limestone moderately weak muddy very silty.	64.91	21.50
			Hard becoming very stiff dark grey silty in places fine sandy CLAY with sparse shell fragments. (Hampen Marly Beds) From 21.95 to 22.00m clay black highly carbonaceous. From 22.00 to 22.60m clay hard dark greyish green mottled light grey silty to very silty with some very thin interbeds of dark brown very carbonaceous silt.	63.51	22.90
			Hard mid grey mottled green clayey fine sandy SILT. (Hampen Marly Beds)	63.31	23.10
			Weak becoming moderately weak mid grey thinly bedded silty fine grained calcareous SANDSTONE. (Hampen Marly Beds)	62.66	23.75
			Below 23.65 becoming a dense dark greyish brown slightly clayey silty very fine sand.	62.41	24.00
			Very stiff dark grey/black silty to very silty CLAY. (Hampen Marly Beds)		
18.00	12.00	0.00	Initially a weak to moderately weak greyish green silty very calcareous MUDSTONE becoming a weak to moderately weak mid grey silty micritic pelletoidal LIMESTONE. (Hampen Marly Beds)	61.41	25.00
			END		

Sampling/in situ testing

Depths	Cr/RQD
21.00	89/76
22.50	97/93
24.00	97/53
25.00	96/50

Additional Tests and Notes

Shipton Mbr

I_h	d_h	I_v	d_v
2.25	76	2.96	61
2.01	76	4.70	61
•		•	
•		•	
•		•	

21.50

Rutland Fm

(* Point Load Index < 0.10 MN/m²)

SP52SW/29
5476 2197

*WATER ⊻ First water strike ⊻ Subsequent water strikes
PIEZOMETER Upper seal / Response length / Lower seal
DEPTH All depths, levels and thicknesses in metres

SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; R Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test
Point Load Index I MN/m²; Distance [illegible] platens d m; v = vertical, h = horizontal loading

Blows N = N value 25/150, blows for 150mm drive after seating; 25*, blows for part or whole of seating drive only; (25) Undisturbed sample blow count

V Vane strength kN/m² Natural / Remould
Cr Core recovery %
RQD Rock quality designation
<425 Sample % passing 425μm sieve

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FIG. A | SHEET 3 OF 3 | HOLE NO. 062

ENGINEER: OVE ARUP & PARTNERS	OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION	GROUND LEVEL 91.23 m O.D.	HOLE NO. 066
LOGGED BY: JHR FIELDWORK BY: Exploration Associates LAB. TESTING BY: Exploration Associates	EXCAVATION METHODS Percussion Boring - Pilcon Wayfarer 150 mm diameter hole 146 mm diameter Rotary Coring from 0.5 m to 19.4 m	COORDINATES 454762 E 223319 N DATES 11.7.79 to 17.7.79	SHEET 2 OF 2 FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*	Description of Strata	Reduced Level	Depth
16.7.79			(White Limestone - Ardley as above) From 10.00 to 11.05m limestone moderately weak to moderately strong light orange mottled grey medium to thickly bedded fine grained sparry pelletoidal with sandy texture. Below 11.50m limestone predominantly grey with increasingly fine sandy silty texture and occasional lignite fragments.	79.03	12.20
18.00 08.00	NIL NIL	12.00 6.50	Very dense very weakly cemented dark brownish grey clayey fine sandy SILT becoming a weak calcareous SILTSTONE. (White Limestone - Shipton)	78.53	12.70
17.7.79			Moderately weak to moderately strong grey medium to thickly bedded fine to medium grained bioturbated micritic pelletoidal LIMESTONE. (White Limestone - Shipton) From 14.00 to 14.10m, 14.90 to 15.00m, 15.20 to 15.25m, 16.00 to 16.35m and 17.30 to 17.45m weak dark grey clayey calcareous siltstone. From 17.45 to 17.70m limestone greyish green very fine grained micrite.	73.43	17.80
18.00	NIL	15.00	Very stiff dark greyish green and black thinly bedded slightly to very silty in places very carbonaceous CLAY. (Hampen Marly Beds)	71.83	19.40
			END		

Sampling Depths	Cr/RQD	<425 %	W %	PL %	LL %	Additional Tests and Notes
	91/79					
11.00	87/46					Ardley Mbr
12.50		100	33	19	52	12.70
	97/90					
14.00	85/36					Shipton Mbr
15.50	100/77	80	19	14	43	
16.60	100/45	100	21	15	46	
17.40	93/93					
17.70		100	11	13	28	17.80
	40/18					Rutland Fm
19.40						

SP52 SW/47
5476 2333

*WATER ▽ First water strike ▽ Subsequent water strikes
PIEZOMETER Upper seal, Response length, Lower seal
SAMPLE AND TEST KEY: D Small disturbed sample; B Bulk disturbed sample; W Water sample; U Undisturbed sample; P Piston sample; Rotary core recovery to scale; V Insitu vane test; S Standard penetration test; C Cone penetration test; K Permeability test; I Insitu density test
Blows N = N value; 25/150, blows for 150mm drive after seating; 25*, blows for part or whole of seating drive only; (25) Undisturbed sample blow count
V Vane strength kN/m² Natural/Remould; Cr Core recovery %; RQD Rock quality designation; <425 Sample % passing 425μm sieve
DEPTH All depths, levels and thicknesses in metres

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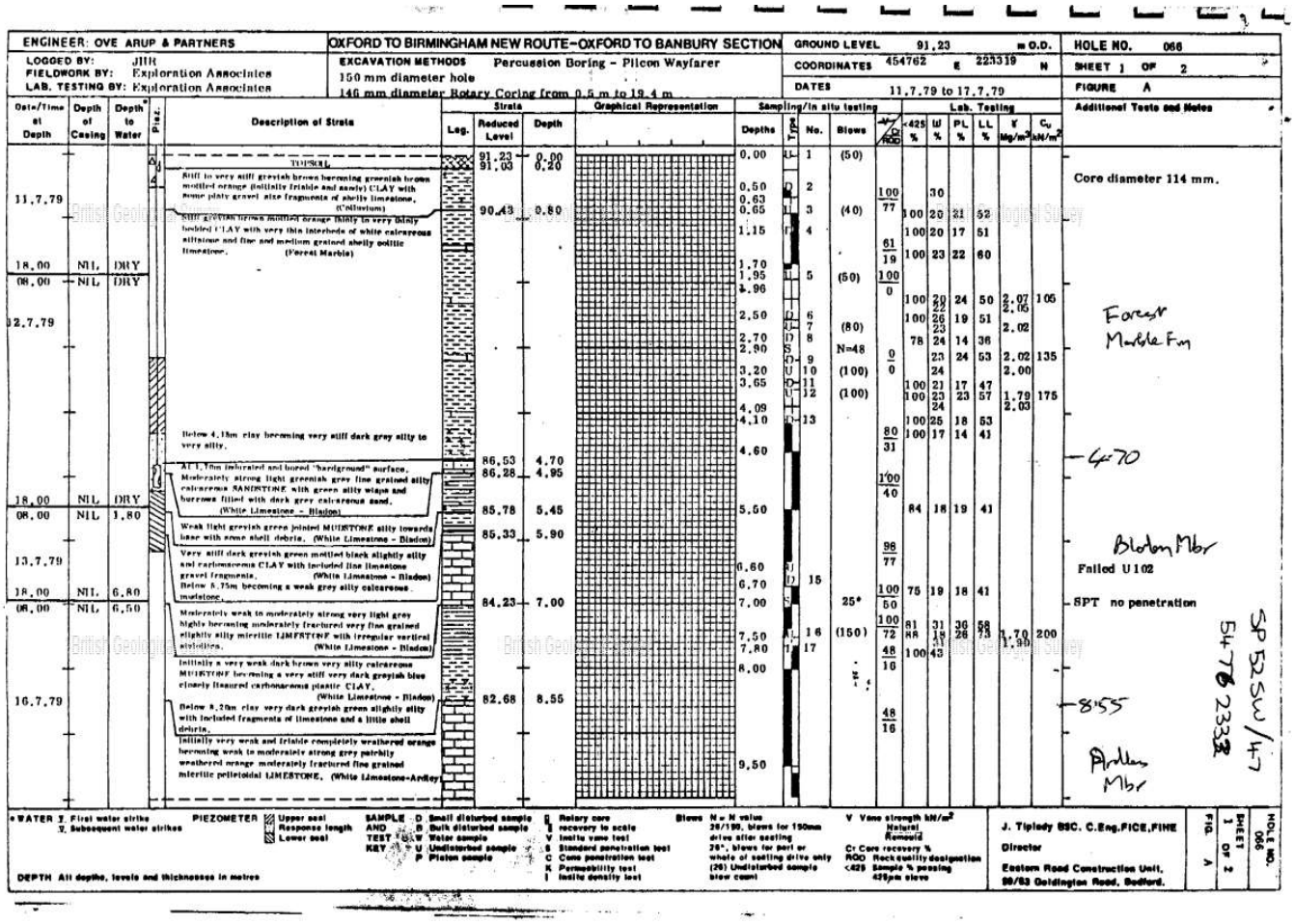
FIG. A SHEET 2 OF 2 HOLE NO. 066


ENGINEER: OVE ARUP & PARTNERS
OXFORD TO BIRMINGHAM NEW ROUTE-OXFORD TO BANBURY SECTION
GROUND LEVEL 91.23 m O.D.
HOLE NO. 066
LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates
EXCAVATION METHODS Percussion Boring - Pilcon Wayfarer
150 mm diameter hole
146 mm diameter Rotary Coring from 0.5 m to 19.4 m
COORDINATES 454762 E 223319 N
DATES 11.7.79 to 17.7.79
SHEET 1 OF 2
FIGURE A
Core diameter 114 mm.
Forest Marble Fm
Bladon Mbr
Failed U102
SPT no penetration
Ardley Mbr
SP 52 SW/47
54 76 233
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Director
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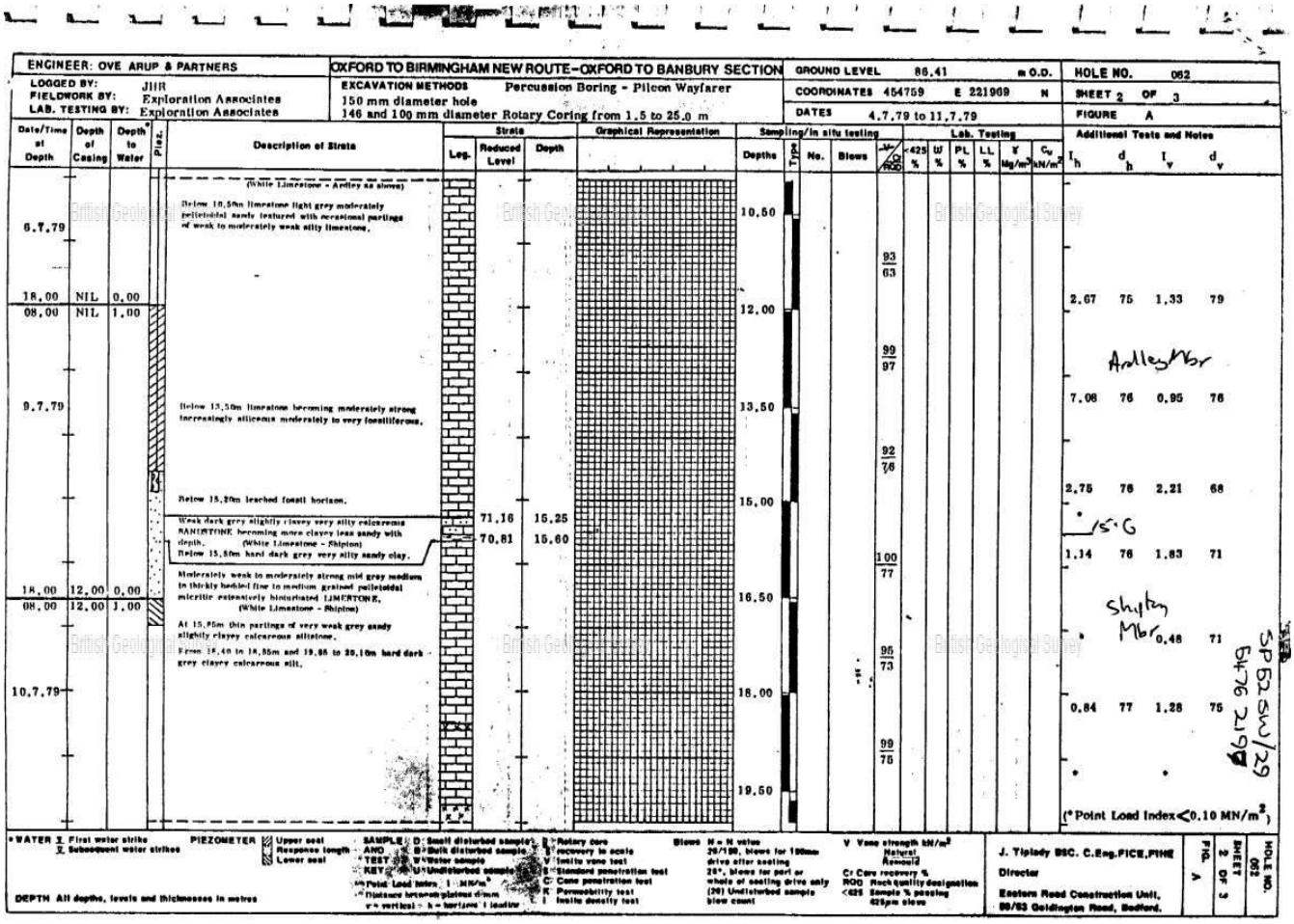
ENGINEER: OVE ARUP & PARTNERS
OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
LOGGED BY: JHR
FIELDWORK BY: Exploration Associates
LAB. TESTING BY: Exploration Associates
EXCAVATION METHODS Percussion Boring - Pilcon Wayfarer
150 mm diameter hole
146 and 100 mm diameter Rotary Coring from 1.5 to 25.0 m
GROUND LEVEL 86.41 m O.D.
COORDINATES 454759 E 221969 N
DATES 4.7.79 to 11.7.79
HOLE NO. 062
SHEET 2 OF 3
FIGURE A
Description of Strata
Strata
Graphical Representation
Sampling/in situ testing
Lab. Testing
Additional Tests and Notes
Ardley Mbr
Shipton Mbr
SP52SW/29
5476 2196
(* Point Load Index < 0.10 MN/m²)
DEPTH All depths, levels and thicknesses in metres
J. Tiplady BSC. C.Eng.FICE,FIHE
Director
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ENGINEER: OVE ARUP & PARTNERS	OXFORD TO BIRMINGHAM NEW ROUTE–OXFORD TO BANBURY SECTION
LOGGED BY: JHR FIELDWORK BY: Exploration Associates LAB. TESTING BY: Exploration Associates	EXCAVATION METHODS Percussion Boring - Pilcon Wayfarer 150 mm diameter hole 146 and 100 mm diameter Rotary Coring from 1.5 to 25.0 m

GROUND LEVEL 86.41 m O.D. — COORDINATES 454759 E 221969 N — DATES 4.7.79 to 11.7.79

HOLE NO. 062 — SHEET 1 OF 3 — FIGURE A

Date/Time at Depth	Depth of Casing	Depth to Water*
4.7.79		
18.00	NIL	DRY
08.00	NIL	DRY
5.7.79		
18.00	NIL	0.00
08.00	NIL	1.00
6.7.79		

Description of Strata	Reduced Level	Depth
	86.41	0.00
TOPSOIL.	86.21	0.20
Firm becoming stiff yellowish brown mottled grey and orange silty CLAY initially with some fine to coarse platy limestone gravel and streaks of white and cream silty fine calcareous SAND. (Colluvium/Weathered Forest Marble)	84.91	1.50
Moderately weak to moderately strong brown initially highly fractured becoming thinly bedded medium grained oolitic shell debris LIMESTONE. (Forest Marble)	84.21	2.20
Stiff grey streaked brown and orange very thinly bedded silty CLAY with very thin interbeds and laminae of silty clayey oolitic sand and calcareous silt. (Forest Marble)	83.51	2.90
At 2.90m indurated and bored erosion surface. Moderately weak to moderately strong light and dark grey colour banded medium bedded medium grained oolitic and shell debris LIMESTONE. (Forest Marble) From 3.70m to 3.80m very dense dark grey weakly cemented clayey fine sandy calcareous silt. Below 3.80m limestone light grey micritic.	81.91	4.50
At 4.50m irregular erosion surface. Initially hard dark grey slightly clayey fine sandy calcareous SILT with included lumps of limestone becoming moderately weak greenish grey very broken micritic MUDSTONE. (White Limestone - Bladon) Below 5.50m mudstone becoming interbedded with very stiff dark grey fissured carbonaceous silty clay with included gravel size lumps of micritic limestone. At 6.15m thin band of coal.	79.71	6.70
Very stiff becoming hard greyish green and dark green fissured slightly silty moderately carbonaceous CLAY in places highly moisture absorbent. (White Limestone - Bladon) Below 7.10m clay with individual lumps of limestone broken slabs and vertical root impressions.	78.61	7.80
Moderately weak to moderately strong light grey medium bedded very fine grained slightly silty micritic LIMESTONE. (White Limestone - Bladon)	77.91	8.50
At 8.50m convoluted bored surface. Moderately weak to moderately strong mid grey medium grained micritic pelletoidal becoming fine sandy textured LIMESTONE. (White Limestone - Ardley)		

Depths	Type	No.	Blows	Cr/RQD	<425 %	W %	PL %	LL %	γ Mg/m³	Cu kN/m²
0.45	S		N=29							
0.70	D	1			74	15	7	29		
	U	2	(80)		100	21	17	45	2.03	
1.20	D	3			79	7	14	59		
1.40	S		76/150							
1.50	D	4								
				56/20	100	20	15	42		
2.50	U	5	(100)							
2.90	D	6			100	25	21	49	2.02	
	S				100	19	8	47		
									2.60	
				71/41						
4.20										
				85/47	100	20	17	36		
5.70	U/S									
				98/60						
6.70 / 6.80	S/D	7	70/225		100	22	21	35		
				97/84	90	23	26	56		
8.10										
				100/54						
9.00										
				98/79						

Additional Tests and Notes (I_h d_h I_v d_v):

Core diameter 114 mm.

Forest Marble Fm

2.90

SPT no penetration.

Bladon Mbr

Failed U102
SPT no penetration.

8.50

Core diameter reduced below 9.0m.

3.04 75 3.89 81

Ardley Mbr

SP52SW/29

5476 2196

WATER ▽ First water strike ▼ Subsequent water strikes — PIEZOMETER Upper seal, Response length, Lower seal — SAMPLE AND TEST KEY: D Small disturbed sample, B Bulk disturbed sample, W Water sample, U Undisturbed sample; Point Load Index I MN/m² (distance between platens mm), v - vertical h - horizontal [illegible] loading; Rotary core recovery to scale, V Insitu vane test, S Standard penetration test, C Cone penetration test, K Permeability test, I Insitu density test — Blows N - N value, 25/150, blows for 150mm drive after seating, 25, blows for part or whole of seating drive only, (25) Undisturbed sample blow count — V Vane strength kN/m² Natural/Remould, Cr Core recovery %, RQD Rock quality designation, <425 Sample % passing 425μm sieve

DEPTH All depths, levels and thicknesses in metres

J. Tiplady BSC. C.Eng.FICE,FIHE, Director, Eastern Road Construction Unit, 80/83 Goldington Road, Bedford.

FIG. A — SHEET 1 OF 3 — HOLE NO. 062

Waterman records (2012)

ALLIED EXPLORATION & GEOTECHNICS LTD

DRILLHOLE LOG

Status:- **FINAL**
Date:- **04/06/97**

Project: **Site Investigation at RAF Upper Heyford**			DRILLHOLE No **BH-04**
Client: **Defence Estate Organisation**	Location: **Oxfordshire E453354.10 N227054.10**		
Method & Equipment: **Openhole using a UMM C10TW**	Ground Level(m(AOD)): **121.88**	Date: **29-04-97**	Sheet: **1 of 3**

RUN DETAILS			STRATA						
Depth	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth Thick-ness)	DESCRIPTION: Discontinuities	DESCRIPTION: Detail	DESCRIPTION: Main	Geology / Instrument / Backfill
			121.68		(0.20) 0.20	0.00-19.80m ... Openhole drilling.		Firm to stiff brown sandy CLAY.	
			121.28		(0.40) 0.60			Yellow brown highly weathered LIMESTONE weak to very weak. (Boulders)	
			121.18		(0.10) 0.70				
			120.82		(0.36) 1.06			Firm brown sandy CLAY.	
								Yellow brown highly weathered LIMESTONE weak to very weak.	
					(1.47)			Yellow brown slightly to moderately weathered LIMESTONE moderately weak to moderately strong.	
			119.35		2.53				
			118.96		(0.39) 2.92			Yellow brown moderately weathered LIMESTONE weak.	
					(1.17)			Yellow brown moderately to slightly weathered LIMESTONE moderately weak.	
			117.79		4.09				
			117.51		(0.28) 4.37			Grey moderately weathered MUDSTONE weak.	
					(1.18)			Grey moderately to slightly weathered MUDSTONE moderately weak.	
			116.33		5.55				
					(0.88)			Grey moderately weathered MUDSTONE weak.	
			115.45		6.43			Grey moderately to slightly weathered MUDSTONE weak.	

Drilling Progress and Water Observations

Date		Depth	Casing	Core Dia mm	Water (mBGL) Strike	Water (mBGL) RWL	Flush Type	Flush Returns
29/04/97		0.00	0.00					
29/04/97		19.80	0.00		16.82		air	100%

GENERAL REMARKS

1) Inspection pit excavated prior to drilling (1.0 x 1.0 x 0.20m). 2) Jar samples taken every 1.00m. 3) 50mm diameter standpipe installed to 19.80m.

All dimensions in metres Scale 1:50	For Explanation of Symbols and Abbreviations see Key Sheets	Checked By:	Logged By: J. Fernley	Contract No. 1742

Date Printed:- 04/06/97

Form AEG22

ALLIED EXPLORATION & GEOTECHNICS LTD

DRILLHOLE LOG

Status:- **FINAL**
Date:- **04/06/97**

Project: Site Investigation at RAF Upper Heyford			DRILLHOLE No BH-04
Client: Defence Estate Organisation	Location: Oxfordshire E453354.10 N227054.10		
Method & Equipment: Openhole using a UMM C10TW	Ground Level(m(AOD)): 121.88	Date: 29-04-97	Sheet: 2 of 3

RUN DETAILS			STRATA							
Depth	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth Thick-ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instru-ment/ Backfill
					(4.53)			(As sheet 1 of 3) Grey moderately to slightly weathered MUDSTONE weak. between c.8.00-10.00m BGL ... greenish grey.		
			110.92		10.96					
					(0.37)			Grey moderately to slightly weathered sandy MUDSTONE moderately weak to weak.		
			110.55		11.33					
					(0.24)			Grey fine grained moderately to slightly weathered SANDSTONE moderately weak to weak.		
			110.31		11.57					
					(1.25)			Grey moderately to slightly weathered sandy MUDSTONE weak to moderately weak.		
			109.06		12.82					
					(0.20)			Grey fine grained moderately to slightly weathered SANDSTONE moderately weak.		
			108.86		13.02					
					(0.58)			Grey moderately to slightly weathered sandy MUDSTONE weak to moderately weak.		
			108.28		13.60					
					(0.48)			Grey fine grained moderately to slightly weathered SANDSTONE weak to moderately weak.		
			107.80		14.08					
					(1.85)			Grey slightly weathered MUDSTONE weak to moderately weak.		
			105.95		15.93					

Drilling Progress and Water Observations

Date		Depth	Casing	Core Dia mm	Water (mBGL) Strike	RWL	Flush Type	Returns
29/04/97		0.00	0.00					
29/04/97		19.80	0.00		16.82		air	100%

GENERAL REMARKS

1) Inspection pit excavated prior to drilling (1.0 x 1.0 x 0.20m). 2) Jar samples taken every 1.00m. 3) 50mm diameter standpipe installed to 19.80m.

All dimensions in metres Scale 1:50	For Explanation of Symbols and Abbreviations see Key Sheets	Checked By:	Logged By: J. Fernley	Contract No. 1742

Date Printed:- 04/06/97

Form AEG22

ALLIED EXPLORATION & GEOTECHNICS LTD

DRILLHOLE LOG

Status:- **FINAL**
Date:- 04/06/97

Project: Site Investigation at RAF Upper Heyford				DRILLHOLE No BH-04
Client: Defence Estate Organisation	Location: Oxfordshire E453354.10 N227054.10			
Method & Equipment: Openhole using a UMM C10TW	Ground Level(m(AOD)): 121.88	Date: 29-04-97		Sheet: 3 of 3

RUN DETAILS: Depth	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thickness)	Discontinuities	Detail	Main	Geology	Instrument/Backfill
			105.06		(0.89) 16.82			Dark grey brown moderately weathered MUDSTONE weak.		
			103.82		(1.24) 18.06			Dark grey moderately weathered MUDSTONE weak.		
			102.08		(1.74) 19.80			Grey moderately weathered sandy MUDSTONE weak to moderately weak.		
								Drillhole complete at 19.80m BGL.		

Drilling Progress and Water Observations

Date		Depth	Casing	Core Dia mm	Water (mBGL) Strike	RWL	Flush Type	Returns
29/04/97		0.00	0.00					
29/04/97		19.80	0.00		16.82		air	100%

GENERAL REMARKS

1) Inspection pit excavated prior to drilling (1.0 x 1.0 x 0.20m). 2) Jar samples taken every 1.00m. 3) 50mm diameter standpipe installed to 19.80m.

All dimensions in metres Scale 1:50	For Explanation of Symbols and Abbreviations see Key Sheets	Checked By: [signature]	Logged By: J. Fernley	Contract No. 1742

Date Printed:- 04/06/97

Form AEG22

Geocore Site Investigations Ltd

Location **Heyford Park, Oxfordshire**				BOREHOLE No **BH214**
Job No **RT/11/52204**	Date **10-05-11**	Ground Level (m) 125.71	Co-ordinates () E 452,961.0 N 227,253.0	
Client Waterman Energy, Environment and Design Ltd				Sheet 1 of 2

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+125.71	0.00		
													(0.30)	MADE GROUND dark brown very clayey medium sand (topsoil).	
												+125.41	0.30		
														Firm brown slightly gravelly CLAY. Gravel is of angular fine to coarse limestone.	
													(1.20)		
												+124.21	1.50		
													(0.50)	Yellow brown weathered LIMESTONE. (Rotary open hole)	
												+123.71	2.00		
				2.00-3.00	70	29	0	2.00	NI					Weak light brown/yellow brown partially crystalline calcaceous LIMESTONE. Frequent recrystallised shell material. Generally completely weathered with the exception of some isolated core stones. Stength reduced to extremely weak and recovered as light brown very clayey gravel where most intensely weathered.	
								2.30	40					2.30-2.70m - Fractures sub horizontal, extremely closely spaced undulating, rough and open with orange brown discolouration on fracture surface.	
								2.35	NI						
								2.39	25						
								2.47	NI						
								2.63	29						
								2.70	No Rec						
				3.00-6.00	42	20	7	3.00	NI				(2.01)	3.60-3.66m - Fractures extremely closely spaced sub horizontal, undulating, rough and tight with some orange brown discolouration on fracture surface.	
								3.60	33.3						
								3.66	NI						
								3.72	11.1						
								3.90	NI						
								4.01	7.7			+121.70	4.01		
													(0.26)	Weak thinly laminated, grey slightly calcaceous fine grained argillaceous SILTSTONE. Highly weathered throughout entire horizon. Retains original structure but recovered as very stiff clay.	
								4.27	No Rec			+121.44	4.27	Fractures very closely spaced, sub horizontal, planar rough and tight with slight dark grey discolouration on fracture surface. No recovery. Drill loss no evidence of voiding.	

REMARKS

Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.0m
Rotary Coring 2.0-9.0m.
Flushing medium-Air/Mist
Standing water was observed at 8.2m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location **Heyford Park, Oxfordshire**				BOREHOLE No **BH214**
Job No **RT/11/52204**	Date **10-05-11**	Ground Level (m) 125.71	Co-ordinates () E 452,961.0 N 227,253.0	
Client Waterman Energy, Environment and Design Ltd				Sheet 2 of 2

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	STRATA: Description	Instrument/ Backfill
												+120.70	5.01		
													(1.73)	No recovery. Drill loss no evidence of voiding. *(continued)*	
												+119.71	6.00		
				6.00-7.50	75	58	30	6.00	13.3					Strong light grey crystalline fine to medium grained calcaceous LIMESTONE. Generally fresh with slight greenish grey penetrative discolouration.	
								6.15	NI					6.00-6.15m - Fractures sub horizontal, stepped, rough and open with slight orange brown and greenish grey discolouration on fracture surface.	
								6.26	7.4				(0.68)	6.26-6.68m - Fractures sub horizontal, stepped, rough and open with slight orange brown and greenish grey discolouration on fracture surface.	
								6.68	NI			+119.03	6.68		
								6.78	0					Very weak becoming medium strong at 8.13m thinly laminated greenish grey slightly calcaceous fine grained argillaceous MUDSTONE. Completely weathered becoming slightly weathered at 8.13m. Strength reduced to very weak with extensive blue grey clay weathering products where most intensely weathered.	
								7.15	No Rec					Fractures medium spaced, sub horizontal, stepped rough and tight with slight orange brown discolouration on fracture surface.	
				7.50-9.00	97	94	78	7.50	2.9				(1.94)		
								8.08	NI						
								8.13	4.1						
								8.62	0			+117.09	8.62		
													(0.38)	Strong dark grey slightly argillaceous medium to fine grained calcaceous LIMESTONE. Frequent fossilised shell fragments and oolites. Fresh. Unfractured insitu.	
00:00 10.05.11	1.5m	8.2m										+116.71	9.00		

REMARKS

Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.0m
Rotary Coring 2.0-9.0m.
Flushing medium-Air/Mist
Standing water was observed at 8.2m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 09-05-11	Ground Level (m) 122.87	Co-ordinates () E 453,318.9 N 227,202.0	BH215
Client Waterman Energy, Environment and Design Ltd				Sheet 1 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+122.87	0.00	Firm brown slightly gravelly CLAY. Gravel is of angular fine to coarse limestone.	
													(1.20)		
												+121.67	1.20	Light brown LIMESTONE. (Rotary open hole)	
													(0.70)		
												+120.97	1.90	Strong light brown/yellow brown, partially crystalline fine grained calcaceous LIMESTONE. Frequent recrystallised shell material. Generally fresh to slightly weathered but becoming highly weathered at 3.0m. Strength is reduced to weak with extensive light brown clayey weathering products where most intensely weathered.	
				1.90-3.00	85	68	36	1.90	4					Fractures extremely closely spaced, sub horizontal, undulating rough and open with orange brown and slight dark grey discolouration on fracture surface.	
								2.15	NI						
								2.20	14.3						
								2.62	NI				(1.45)		
								2.77	0						
								2.84	No Rec						
				3.00-6.00	57	46	11	3.00	5.7						
												+119.52	3.35	Strong grey crystalline fine grained calcaceous LIMESTONE. Frequent calcite veining and fossilised shell fragements. Generally slightly weathered but highly weathered neighbouring fractures where strength is reduced to weak with grey sandy clay weathering products.	
								3.35	18.9						
								3.46	7.7					3.35-3.46m - Fractures very closely spaced, undulating, rough and tight with orange brown discolouration on fracture surface.	
								3.59	8.2				(0.85)	3.46-3.59m - 1 no sub vertical fracture (136mm). Undulating rough and wide with orange brown discolouration on fracture surface.	
												+118.67	4.20	3.59-4.20m - Fractures very closely spaced, sub horizontal, stepped rough and tight with orange brown discolouration on fracture surface.	
								4.20	4.4					Very weak, thinly laminated light grey calcaceous fine grained SILTSTONE. Slightly fossiliferous. Highly weathered/poorly litified throughout.	
													(0.45)	Fractures very closely spaced, stepped, rough and tight. Clean.	
								4.65	NI			+118.22	4.65		
								4.70	No Rec						

REMARKS

Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-1.9m
Rotary Coring 1.9-30m.
Flushing medium-Air/Mist
Standing water was observed at12.7m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No **RT/11/52204**	Date **09-05-11**	Ground Level (m) 122.87	Co-ordinates () E 453,318.9 N 227,202.0	**BH215**
Client Waterman Energy, Environment and Design Ltd				Sheet 2 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	STRATA: Description	Instrument/ Backfill
												+117.86	5.01	Medium strong light grey crystalline fine grained calcaceous LIMESTONE. Frequent fossilised shell fragments. Generally highly weathered with the exception of isolated very strong fresh core stones. Strength reduced to weak with green grey discolouration where most intensely weathered. Fractures sub horizontal, stepped, smooth and tight. No infill. *(continued)*	
				6.00-9.00	97	93	58	6.00	1.7				(2.05)		
								6.60	NI			+116.17	6.70		
								6.70	1.0					Weak, becoming medium strong with depth, thinly laminated greenish grey slightly calcaceous fine grained argillaceous MUDSTONE. Fissile. Highly weathered 6.7-7.6m with extensive green grey clayey weathering products. Slightly weathered thereafter. Fractures medium spaced, sub horizontal, stepped rough and wide with up to 10mm grey sandy clay infill.	
													(2.10)		
								8.80	0			+114.07	8.80		
								8.90	No Rec					Very strong light grey crystalline fine grained calcaceous LIMESTONE. Frequent calcite veining and recrystallised shell material. Localised argillaceous rich horizons. Fresh. Fractures closely spaced, sub horizontal, stepped rough and tight with dark grey discolouration on fracture surface.	
				9.00-12.00	93	93	79	9.00	2.7						

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-1.9m
Rotary Coring 1.9-30m.
Flushing medium-Air/Mist
Standing water was observed at12.7m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 09-05-11	Ground Level (m) 122.87	Co-ordinates () E 453,318.9 N 227,202.0	BH215
Client Waterman Energy, Environment and Design Ltd				Sheet 3 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+112.85	10.02	Very strong light grey crystalline fine grained calcaceous LIMESTONE. Frequent calcite veining and recrystallised shell material. Localised argillaceous rich horizons. Fresh. Fractures closely spaced, sub horizontal, stepped rough and tight with dark grey discolouration on fracture surface. *(continued)*	
								10.50	3.8				(3.50)		
								11.80	No Rec						
				12.00-15.00	77	72	52	12.00	0						
								12.30	NI			+110.57	12.30		
								12.36	6.7					Very strong dark grey crystalline medium grained calcaceous LIMESTONE. Extensive micritic cementation and frequent fossilised shell fragments. Highly weathered 12.3-12.6 becoming slightly weathered thereafter. Strength is reduced to medium strong with dark grey sandy clay weathering products where most intensely weathered. 12.36-12.66m - Fractures very closely spaced, sub horizontal, stepped, rough and open. Clean. 12.66-13.70m - 1 No sub vertical fractures (1040mm). Undulating, rough and wide with dark orange brown discolouration penetrating up to 40mm fromfracture surface.	
								12.66	1.0						
								13.70	5				(2.00)	13.70-14.30m - 1 no sub vertical fractures (700mm). Undulating, rough and wide with dark orange brown discolouration penetrating up to 40mm fromfracture surface.	
								14.30	No Rec			+108.57	14.30	No recovery. Drill loss. No evidence of voiding.	

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-1.9m
Rotary Coring 1.9-30m.
Flushing medium-Air/Mist
Standing water was observed at12.7m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 09-05-11	Ground Level (m) 122.87	Co-ordinates () E 453,318.9 N 227,202.0	BH215
Client Waterman Energy, Environment and Design Ltd				Sheet 4 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	STRATA: Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
				15.00-18.00	0	0	0	15.00	No Rec			+107.84	15.03	No recovery. Drill loss. No evidence of voiding. *(continued)*	
													(3.70)		
												+104.87	18.00	WATER STRIKE AT18.0m.	
				18.00-21.00	83	79	9	18.00	18					Extremely weak, thinly cross laminated dark grey fine grained arenaceous SANDSTONE. Frequent interlaminated lignite and fossilised wood. Fresh.	
													(0.55)	Fractures extremely closely spaced, planar, rough and tight with slight light grey discolouration on fracture surface.	
								18.50 18.55	NI 1.3			+104.32	18.55		
														Medium strong, thinly laminated fine grained arenaceous SANDSTONE. Fissile. Fresh. Fractures medium spaced, sub horizontal, undulating rough and tight with reddish brown discolouration penetrating up to 10mm from fracture surface.	
													(2.75)		

REMARKS

Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-1.9m
Rotary Coring 1.9-30m.
Flushing medium-Air/Mist
Standing water was observed at12.7m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 09-05-11	Ground Level (m) 122.87	Co-ordinates () E 453,318.9 N 227,202.0	BH215
Client Waterman Energy, Environment and Design Ltd				Sheet 5 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
								20.15	NI			+102.83	20.04	Medium strong, thinly laminated fine grained arenaceous SANDSTONE. Fissile. Fresh.	
								20.20	3.6					Fractures medium spaced, sub horizontal, undulating rough and tight with reddish brown discolouration penetrating up to 10mm from fracture surface. *(continued)*	
								20.48	No Rec						
				21.00-24.00	100	54	52	21.00	3.3						
								21.30	0			+101.57	21.30	Very strong light grey crystalline fine grained calcaceous LIMESTONE. Frequent interbedded argillaceous laminae up to 2mm thick. Fresh.	
													(0.80)	Fractures sub horizontal, stepped, rough and tight with dark grey discolouration on fracture surface.	
								21.80	NI						
								21.90	5			+100.77	22.10		
								22.10	NI					Weak thinly interlaminated dark grey and brown fine grained argillaceous SILTSTONE and fine grained arenaceous sandstone. Frequent interbedded coal laminae. Slightly weathered throughout.	
								22.20	3.3				(0.70)	Fractures closely spaced, sub horizontal, undulating, rough and open with up to 2.5m dark grey sandy clay infill.	
												+100.07	22.80		
								22.80	5					Medium strong, thickly interlaminated grey crystalline fine grained calcaceous LIMESTONE and dark grey fine grained argillaceous siltstone. Fresh in limestone horizons but highly weathered in siltstone where strength is reduced to weak with dark grey sandy clay weathering products.	
								23.00	NI						
								23.20	5.4					Fractures very closely spaced, sub horizontal, undulating, rough and open with up to 1mm dark grey sandy clay infill and slight orange brown discolouration on fracture surface.	
													(1.85)		
				24.00-27.00	32	20	4								
								24.50	NI			+98.22	24.65		
								24.65	NI					Strong thinly laminated grey fine grained argillaceous MUDSTONE. Fissile. Frequent interbedded tabular limestone nodules up to 5mm thick. Fresh.	
								24.95	No Rec					Fractures medium spaced, sub horizontal, planar smooth and tight. No infill.	

REMARKS

Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-1.9m
Rotary Coring 1.9-30m.
Flushing medium-Air/Mist
Standing water was observed at12.7m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 09-05-11	Ground Level (m) 122.87	Co-ordinates () E 453,318.9 N 227,202.0	BH215
Client Waterman Energy, Environment and Design Ltd				Sheet 6 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+97.82	25.05	Strong thinly laminated grey fine grained argillaceous MUDSTONE. Fissile. Frequent interbedded tabular limestone nodules up to 5mm thick. Fresh. Fractures medium spaced, sub horizontal, planar smooth and tight. No infill. *(continued)*	
				27.00-28.50	0	0	0						(5.35)		
				28.50-30.00	48	36	0	28.50 29.22	2.8 No Rec						
00:00 09.05.11	1.5m	12.7m										+92.87	30.00		

REMARKS

Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-1.9m
Rotary Coring 1.9-30m.
Flushing medium-Air/Mist
Standing water was observed at12.7m on completion.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No **RT/11/52204**	Date **05-05-11**	Ground Level (m) 124.03	Co-ordinates () E 453,143.8 N 226,911.5	**BH216**
Client Waterman Energy, Environment and Design Ltd				Sheet 1 of 2

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+124.03	0.00		
													(1.00)	Firm brown slightly gravelly CLAY. Gravel is of angular fine to coarse limestone.	
				1.00-2.90	21	5	0	1.00	NI			+123.03	1.00	Strong light brown/yellow brown partially crystalline calcaceous LIMESTONE. Frequent recrystallised shell material. Gnerally fresh but completely weathered in non intact areas where recovered as weak gravel sized fragments or firm orange brown slightly sandy clay.	
								1.31	0					3.00-3.22m - 1 No sub vertical fracture (220mm) undulating rough and wide with orange brown sand gravel infill and discolouration on fracture surface.	
								1.40	No Rec					3.22-4.00m - Fractures sub horizontal, very closely spaced, undulating, rough and open with orange brown penetrative discolouration on fracture surface and up to 2.5m orange brown sandy clay infill.	
														4.00-4.27m - 1 no sub vertical fracture (270mm), undulating rough and wide with orange brown discolouration on fracture surface.	
														4.27-4.48m - 1 no sub vertical fracture (270mm), undulating rough and wide with orange brown discolouration on fracture surface.	
														4.60-4.95m - 1 no sub vertical fracture (270mm), undulating rough and wide with orange brown discolouration on fracture surface.	
														5.00-5.13m - 1 no sub vertical fracture (270mm), undulating rough and wide with orange brown discolouration on fracture surface.	
				2.90-5.90	90	79	39	2.90	NI				(4.13)		
								3.00	4.5						
								3.22	11.5						
								4.00	3.7						
								4.27	4.8						
								4.48	NI						
								4.60	2.9						
								4.95	NI						

REMARKS
Hand excavated 0.0-1.0m
Rotary Coring 1.0-10m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 05-05-11	Ground Level (m) 124.03	Co-ordinates () E 453,143.8 N 226,911.5	BH216
Client Waterman Energy, Environment and Design Ltd				Sheet 2 of 2

CORE RECOVERY & TESTS

Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests
				5.00	7.7	
				5.13	5	
				5.33	11.1	
				5.60	No Rec	
5.90-8.90	90	81	62	5.90	10	
				6.00	NI	
				6.12	5.2	
				6.70	2.5	
				7.90	10	
				8.20	0	
				8.60	No Rec	
8.90-10.00	32	32	23	8.90	0	
				9.25	No Rec	

STRATA

Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
	+119.02	5.01		
	+118.90	5.13		
			Weak thinly laminated fine grained slightly calcaceous argillaceous MUDSTONE. Slightly weathered.	
	+118.70	5.33		
			Fractures sub horizontal, planar, smooth and tight. Clean.	
		(0.67)	Very weak, becoming strong at 5.5m, grey crystalline medium grained calcaceous LIMESTONE. Abundant recrystallised oolites. Frequent calcite veining. Completely weathered 5.33-5.5m becoming fresh thereafter. Considerable reduction in strength and recovered as grey sandy clay where most intensely weathered.	
			Fractures, sub horizontal, very closely spaced, undulating rough and open with slight orange brown discolouration on fracture surface.	
	+118.03	6.00		
			Medium strong thickly interlaminated fine grained argillaceous MUDSTONE and medium grained calcaceous limestone. Frequent fossilised shells and shell fragments centred along bedding surfaces. Highly weathered throughout with greenish grey penentrative discolouration. Fractures sub horizontal, undulating, rough and open with slight orange brown discolouration on fracture surface and dark grey sandy clay infill.	
		(0.70)		
	+117.33	6.70		
			Medium strong thinly laminated fine grained argillaceous MUDSTONE. Frequent interlaminated calcaceous material. Slightly weathered but poorly lithified throughout. Highly weathered in non intact areas where strength is reduced to very weak.	
			Fractures sub horizontal, closely spaced stepped, smooth and tight with slight light grey clayey sand coatings.	
		(1.20)		
	+116.13	7.90		
			Medium strong becoming weak with depth, thinly laminated greenish grey calcaceous fine grained argillaceous MUDSTONE. Fresh/slightly weathered becoming highly weathered at 8.6m. Recovered as stiff green/grey slightly sandy clay where most intensely weathered.	
			7.90-8.20m - Fractures extremely closely spaced, sub horizontal undulating, rough and wide with up to 10mm green grey gravelly coarse sand infill.	
			8.20-9.25m - Unfractured insitu.	
		(2.10)		
	+114.03	10.00		

REMARKS
Hand excavated 0.0-1.0m
Rotary Coring 1.0-10m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location **Heyford Park, Oxfordshire**				BOREHOLE No **BH217**
Job No **RT/11/52204**	Date **04-05-11**	Ground Level (m) 120.99	Co-ordinates () E 452,578.5 N 226,447.1	
Client Waterman Energy, Environment and Design Ltd				Sheet 1 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	STRATA: Description	Instrument/ Backfill
												+120.99	0.00	MADE GROUND. Dark brown slightly clayey slightly gravelly fine sand. Gravel is of angular fine to coarse limestone.	
												+120.49	(0.50) 0.50	Stiff orange brown very gravelly CLAY with many cobbles. Gravel is of angular fine to coarse limestone. Cobbles are angular limestone.	
												+120.09	(0.40) 0.90	Yellow brown LIMESTONE (rotary open hole)	
												+118.89	(1.20) 2.10	Strong light brown/yellow brown partially crystalline fine grained calcaceous LIMESTONE. Frequent recrystallised shell material. Generally slightly weathered but completely weathered in non intact areas where recovered as orange brown very sandy clay. Fractures extremely closely spaced, sub horizontal, undulating rough and open with orange brown discolouration on fracture surface.	
				2.10-2.90	94	75	13	2.10	8.3						
								2.70	NI						
								2.85	No Rec						
				2.90-5.90	79	63	40	2.90	NI			+117.99	(0.90) 3.00	Extremely weak, becoming very strong at 3.25m, crystalline fine to medium grained calcaceous LIMESTONE. Frequent recrystallised shell material. Generally fresh but completely weathered 3.0-3.25m where recovered as stiff blue grey silty gravely clay. 3.00-3.16m - Unfractured insitu. 3.25-3.70m - Fractures very closely spaced, sub horizontal, undulating rough and wide with orange brown penetrative discolouration on fracture surface.	
								3.00	0						
								3.16	NI						
								3.25	8.9						
								3.70	NI			+117.29	(0.70) 3.70	Weak thinly laminated dark grey slightly calcaceous fine grained argillaceous SILTSTONE. Completely weathered recovered as firm grey sandy clay.	
								4.00	5			+116.99	(0.30) 4.00	Very strong light grey crystalline fine grained calcaceous LIMESTONE. Frequent recrystallised shell material. Fresh. Fractures very closely spaced, sub horizontal, undulating rough and wide with orange brown penetrative discolouration on fracture surface.	
								4.40	3.4			+116.59	(0.40) 4.40	Weak to medium strong, thinly laminated slightly greenish grey calcaceous fine grained argillaceous MUDSTONE. Frequent interlaminated siltstone horizons. Generally moderately weathered but locally highly weathered where strength is reduced to weak with greenish grey clayey weathering products. Fractures closely spaced, sub horizontal, stepped, rough and tight with slight light grey discolouraton on fracture surface.	
													(0.86)		

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.1m
Rotary Coring 2.1-30m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 04-05-11	Ground Level (m) 120.99	Co-ordinates () E 452,578.5 N 226,447.1	BH217
Client Waterman Energy, Environment and Design Ltd				Sheet 2 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	STRATA: Description	Instrument/ Backfill
												+115.98	5.01		
												+115.73	5.26		
								5.28	No Rec					Strong light grey crystalline fine grained calcaceous LIMESTONE. Generally fresh but locally completely weathered where recovered as extremely weak geenish grey very sandy clay. Fractures medium spaced, stepped rough and tight. No infill.	
				5.90-8.90	85	70	43	5.90	2.2				(1.54)		
												+114.19	6.80		
								6.80	0					Stiff dark brown/grey very sandy CLAY.	
												+113.99	7.00		
								7.00	5					Medium strong thinly interlaminated grey fine grained calcaceous MUDSTONE and fine grained argillaceous siltstone. Locally slightly weathered but generally highly to completely weathered. Recovered as weak blue grey fine to coarse gravel sized fragments where most intensely weathered.	
								7.40	0				(1.05)	7.0-7.4m - 2 No extremely closely spaced, sub vertical fractures, stepped, smooth and tight with greenish grey penetrative discolouration.	
								7.60	NI					7.90-8.05m - Fractures sub horizontal, stepped, rough and tight. No infill.	
								7.70	0						
								7.80	NI						
								7.90	6.7						
												+112.94	8.05		
								8.05	5.1					Very strong grey partially crystalline medium grained oolitic LIMESTONE. Frequent fossilised shell material localised in argillaceous laminae. Fresh.	
								8.44	No Rec					8.05-8.44m - Fractures very closely spaced, undulating, rough and wide with slight orange brown discolouration on fracture surface.	
				8.90-11.90	95	88	56	8.90	0					WATER STRIKE AT 9.0m.	
													(3.45)		

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.1m
Rotary Coring 2.1-30m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 04-05-11	Ground Level (m) 120.99	Co-ordinates () E 452,578.5 N 226,447.1	BH217
Client Waterman Energy, Environment and Design Ltd				Sheet 3 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+110.97	10.02	Very strong grey partially crystalline medium grained oolitic LIMESTONE. Frequent fossilised shell material localised in argillaceous laminae. Fresh. *(continued)*	
								10.40	2					10.4-10.9m - 1 no sub vertical fractures (500mm). Undulating rough and open with dark grey discolouration on fracture surface.	
								10.90	0					11.2-11.3m - 1 no sub vertical fracture (100mm). Undulating, rough and wide with light brown discolouration on fracture surface.	
								11.10	NI					11.3-11.5m - Fractures very closely spaced, sub horizontal, stepped, rough and open with up to 2.5mm grey slightly sandy clay infill.	
								11.20	10						
								11.30	10						
												+109.49	11.50	Medium strong thinly laminated, grey slightly calcaceous fine grained argillaceous SILTSTONE. Fresh.	
								11.50	4					Fractures medium spaced, sub horizontal, planar smooth and tight with slight light grey discolouration on fracture surface.	
								11.75	No Rec						
				11.90-14.90	90	90	57	11.90	1.1				(2.20)		
												+107.29	13.70	Weak blue grey thinly laminated calcaceous fine grained argillaceous MUDSTONE. Highly fossiliferous. Abundant partially fossilised shell fragments centred along bedding surfaces. Localised coarse grained sand laminae up to 5mm thick. Poorly lithified throughout but generally fresh. Highly weathered neighbouring sandy areas where strength is reduced with blue grey sandy clay weathering products.	
								13.70	2.2					Fractures medium spaced, sub horizontal, stepped, rough and tight with slight dark greenish grey discolouration on fracture surface.	
								14.60	No Rec						
				14.90-17.90	55	47	35	14.90	2.6				(2.50)		

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.1m
Rotary Coring 2.1-30m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 04-05-11	Ground Level (m) 120.99	Co-ordinates () E 452,578.5 N 226,447.1	BH217
Client Waterman Energy, Environment and Design Ltd				Sheet 4 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+105.96	15.03	Weak blue grey thinly laminated calcaceous fine grained argillaceous MUDSTONE. Highly fossiliferous. Abundant partially fossilised shell fragments centred along bedding surfaces. Localised coarse grained sand laminae up to 5mm thick. Poorly lithified throughout but generally fresh. Highly weathered neighbouring sandy areas where strength is reduced with blue grey sandy clay weathering products. Fractures medium spaced, sub horizontal, stepped, rough and tight with slight dark greenish grey discolouration on fracture surface. *(continued)*	
								16.05	NI						
								16.20	0			+104.79	16.20	Weak grey fine grained very calcaceous SILTSTONE. Slightly weathered.	
													(0.35)	Unfractured insitu.	
								16.55	No Rec			+104.44	16.55	No recovery. Drill loss. No evidence of voiding.	
													(1.35)		
												+103.09	17.90		
				17.90-20.90	31	5	5	17.90	NI					Weak dark grey fine grained arenaceous SANDSTONE. Generally completely weathered with the exception of some isolated core stones. Recovered as extremely weak fine grained sand fragments where most intensely weathered.	
													(0.94)	Fractures medium spaced, sub horizontal, stepped smooth and tight with slight light brown silty sand coatings.	
								18.60	4.2						
								18.84	No Rec			+102.15	18.84	No recovery. Drill loss. No evidence of voiding.	
													(2.06)		

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.1m
Rotary Coring 2.1-30m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 04-05-11	Ground Level (m) 120.99	Co-ordinates () E 452,578.5 N 226,447.1	BH217
Client Waterman Energy, Environment and Design Ltd				Sheet 5 of 6

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	STRATA: Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+100.95	20.04	No recovery. Drill loss. No evidence of voiding. *(continued)*	
												+100.09	20.90		
				20.90-23.90	100	48	26	20.90	NI					Light grey silty medium SAND.	
													(1.10)		
												+98.99	22.00	Very weak thinly cross laminated, dark grey/brown fine grained arenaceous SANDSTONE. Poorly lithified throughout but generally fresh. Highly weathered in non intact areas and neighbouring fractures where recovered as extremely weak coarse grained sand fragments.	
								22.20	0					Fractures medium spaced, sub horizontal, planar rough and tight. No infill.	
								22.45	NI						
								22.50	20						
								22.55	NI						
								22.60	5						
								22.80	NI						
								22.85	1.8						
													(1.90)		
								23.42	NI						
								23.50	0						
												+97.09	23.90		
				23.90-26.90	62	58	36	23.90	3.0					Weak thinly interlaminated dark grey and grey fine grained argillaceous MUDSTONE and fine grained argillaceous siltstone. Abundant fossilised shell remains. Highly weathered/poorly lithified throughout. Recovered as very stiff sandy slightly gravelly clay. 23.90-25.56m - Fractures closely spaced, sub horizontal, undulating rough and tight with slight orange brown discolouration on fracture surface. 25.65-25.75m - Fractures medium spaced, sub horizontal, planar rough and tight. No infill.	
													(1.85)		

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.1m
Rotary Coring 2.1-30m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 04-05-11	Ground Level (m) 120.99	Co-ordinates () E 452,578.5 N 226,447.1	BH217
Client Waterman Energy, Environment and Design Ltd				Sheet 6 of 6

CORE RECOVERY & TESTS | STRATA

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
								25.56	NI			+95.94	25.05		
								25.65	10						
								25.75	No Rec			+95.24	25.75	No recovery. Drill loss. No evidence of voiding.	
													(1.15)		
								26.80	1			+94.09	26.90		
				26.90-30.00	79	82	74							Strong thinly laminated dark grey fine grained argillaceous MUDSTONE. Fissile. Occasional interlaminated tabular limestone nodules up to 10mm thick. Fresh. Fractures widely spaced, sub horizontal, planar smooth and tight with stiff light grey discolouration on fracture surface.	
													(3.10)		
								29.36	No Rec			+90.99	30.00		

REMARKS
Hand excavated 0.0-1.2m
Rotary Open Hole 1.2-2.1m
Rotary Coring 2.1-30m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 05-05-11	Ground Level (m) 124.22	Co-ordinates () E 452,320.4 N 226,406.4	BH218
Client Waterman Energy, Environment and Design Ltd				Sheet 1 of 2

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
												+124.22	0.00		
												+124.02	0.20	MADE GROUND dark brown very clayey medium sand (topsoil).	
													(0.70)	Firm orange brown slightly gravelly CLAY with some cobbles. Gravel is of angular fine to coarse limestone. Cobbles are angular limestone.	
												+123.32	0.90		
				0.90-3.00	40	27	0	0.90	16.7					Strong light brown/yellow brown partially crystalline calcaceous LIMESTONE. Frequent recrystallised shell material. Generally fresh/slightly weathered but highly weathered neighbouring sub vertical fractures, where strength is reduced to weak with yellow brown sandy clay weathering products. Fractures sub horizontal, very closely spaced, undulating, rough and open with slight orange brown discolouration on fracture surface	
								1.20	10					1.20-1.30m - 1 No. sub vertical fracture (100mm) undulating rough and wide with some red brown discolouration on fracture surface.	
								1.30	8						
								1.55	11.1					1.55-1.73m - 2 No. extremely closely spaced sub vertical fractures (200mm) .Undulating rough and tight with orange brown discolouration and light brown sandy clay infill.	
								1.73	No Rec				(2.50)		
				3.00-6.00	86	78	43	3.00	7.5						
												+120.82	3.40		
								3.40	40					Medium strong light grey fine grained calcaceous LIMESTONE. Generally slightly weathered. Highly weathered neighbouring fractures where strength is reduced to weak with dark grey clay weathering products.	
								3.45	NI						
								3.70	10					3.40-3.9m - Fractures extremely closely spaced, sub horizontal undulating, rough and open with up to 2.5mm orange brown clayey sand infill.	
								3.90	0					3.70-3.90m - Fractures extremely closely spaced, sub horizontal undulating, rough and open with up to 2.5mm orange brown clayey sand infill.	
								4.90	3						

CORE RECOVERY & TESTS

STRATA

REMARKS

Hand excavated 0.0-0.9m
Rotary Coring 0.9-10m.
Flushing medium-Air/Mist
Standing water was observed at 8.0m on competion and remained at 8.0m after 20 minutes.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No **RT/11/52204**	Date **05-05-11**	Ground Level (m) 124.22	Co-ordinates () E 452,320.4 N 226,406.4	**BH218**
Client Waterman Energy, Environment and Design Ltd				Sheet 2 of 2

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	CORE RECOVERY & TESTS: Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests	Legend	Reduced Level	Depth (Thickness) (m)	STRATA: Description	Instrument/ Backfill
												+119.21	5.01		
													(3.83)	Medium strong light grey fine grained calcaceous LIMESTONE. Generally slightly weathered. Highly weathered neighbouring fractures where strength is reduced to weak with dark grey clay weathering products. *(continued)*	
								5.57	No Rec					4.90-5.57m - Fractures, medium spaced, sub horizontal, undulating, rough and open with up to 2.5mm grey sandy clay infill.	
				6.00-9.00	97	96	68	6.00	3.3					6.00-7.23m - Fractures very closely spaced, sub horizontal, undulating rough and wide with slight grey clayey sand coatings (possibly drill induced).	
												+116.99	7.23		
								7.23	5.7				(0.37)	Weak thinly laminated dark grey slightly calcaceous fine grained argillaceous MUDSTONE. Frequent interbedded silty sand laminae up to 0.5mm thick. Fractures very closely spaced, sub horizontal, planar, rough and tight with slight orange brown clayey sand coatings.	
								7.60	0			+116.62	7.60	Strong grey crystalline medium grained calcaceous LIMESTONE. Frequent calcite veining and fossilised shell fragments. Fresh.	
								8.03	30				(0.53)	Fractures extremely closely spaced, sub horizontal, stepped, rough and open with slight orange brown and dark grey discolouration on fracture surface.	
								8.13	3.4			+116.09	8.13	Weak thinly laminated, strong blue grey slightly calcaceous fine grained argillaceous MUDSTONE. Highly weathered throughout.	
													(0.58)	8.13-8.71m - Fractures medium spaced, planar, rough and tight. No infill.	
								8.71	NI			+115.51	8.71	Very strong crystalline grey medium grained calcaceous LIMESTONE. Generally fresh with slight greenish grey discolouration.	
								8.80	0						
								8.91	No Rec					9.00-9.15m - Fractures medium spaced, sub horizontal, planar, rough and tight. No infill.	
				9.00-10.00	83	83	38	9.00	6.7						
								9.15	4.4				(1.29)	9.15-9.83m - Fractures closely spaced, sub horizontal, planar, rough and tight with slight greenish grey discolouration on fracture surface.	
00:00 05.05.11	1.5m	8m						9.83	No Rec			+114.22	10.00		

REMARKS
Hand excavated 0.0-0.9m
Rotary Coring 0.9-10m.
Flushing medium-Air/Mist
Standing water was observed at 8.0m on competion and remained at 8.0m after 20 minutes.

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 05-05-11	Ground Level (m) 121.32	Co-ordinates () E 452,242.8 N 226,132.9	BH219
Client Waterman Energy, Environment and Design Ltd				Sheet 1 of 2

CORE RECOVERY & TESTS

Drilling Progress	Casing depth/size	Water level/ time/ date	Flush Return %	Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests
				2.00-5.00	83	53	14	2.00	NI	
								2.40	18.9	
								2.62	NI	
								2.80	20	
								2.85	NI	
								3.00	13.3	
								3.30	8.3	
								3.54	NI	
								3.60	3.4	
								4.48	No rec	

STRATA

Legend	Reduced Level	Depth (Thickness) (m)	Description	Instrument/ Backfill
	+121.32	0.00		
	+121.22	0.10	MADE GROUND dark brown very clayey medium sand (topsoil).	
		(0.30)	Firm orange gravelly CLAY with some cobbles. Gravel is of angular fine to coarse limestone. Cobbles are angular limestone.	
	+120.92	0.40	Light brown LIMESTONE. (Rotary open hole)	
		(1.60)		
	+119.32	2.00		
		(1.30)	Medium strong light brown/yellow brown partially crystalline fine grained calcaceous LIMESTONE. Frequent recrystallised shell material. Generally moderately weathered but completely weathered in non intact areas where recovered as stiff light brown gravelly clay. Strength reduced to extremely weak where most intensely weathered. Fractures extremely closely spaced sub horizontal, undulating rough and open with slight orange brown discolouration on fracture surface.	
	+118.02	3.30		
		(2.15)	Strong grey partially crystalline medium grained oolitic calcaceous LIMESTONE. Generally fresh/slightly weathered but highly weathered neighbouring fractures and in non intact areas. Strength reduced to weak with grey clayey sand weathering products where most intensely weathered. Fractures very closely spaced, stepped, rough and open with up to 1mm orange brown sandy clay infill and orange brown discolouration on fracture surface.	

REMARKS

Hand excavated 0.0-0.5m
Rotary open Hole 0.5m-2.0m
Rotary Coring 2.0m-10m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Geocore Site Investigations Ltd

Location	Heyford Park, Oxfordshire			BOREHOLE No
Job No RT/11/52204	Date 05-05-11	Ground Level (m) 121.32	Co-ordinates () E 452,242.8 N 226,132.9	BH219
Client Waterman Energy, Environment and Design Ltd				Sheet 2 of 2

CORE RECOVERY & TESTS

Depth (m) AL/ from to	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Depth	Fracture Index	Tests
5.00-8.00	73	66	44	5.00	0	
				5.20	NI	
				5.45	2.6	
				6.60	0	
				7.00	0	
				7.20	No rec	
8.00-10.00	100	88	88	8.00	0	
				8.40	NI	
				8.51	2.8	
				9.23	23.5	
				9.40	0	
				9.70	3.3	

STRATA

Legend	Reduced Level	Depth (Thickness) (m)	Description
	+116.31	5.01	
	+115.87	5.45	
		(1.15)	Very strong light grey crystalline fine grained calcaceous LIMESTONE. Frequent recrystallised shell fragments. Fresh. Fractures closely spaced, sub horizontal, undulating rough, and open with up to 1.5mm grey silty clay infill.
	+114.72	6.60	
		(0.40)	Weak thinly laminated dark grey fine grained argillaceous SILTSTONE. Highly weathered throughout with light grey silty sand weathering products. Unfractured insitu.
	+114.32	7.00	
		(1.40)	Very strong light grey crystalline fine grained calcaceous LIMESTONE. Fresh. Unfractured insitu.
	+112.92	8.40	
		(1.00)	Weak, thinly laminated, slightly greenish grey slightly calcaceous fine grained argillaceous MUDSTONE. Fissile. Generally highly weathered but locally completely weathered where recovered as stiff grey slightly sandy clay. 8.51-9.23m - Fractures medium spaced, sub horizontal, planar smooth and tight. Clean. 9.23-9.40m - Fractures extremely closely spaced, stepped rough and tight with light grey clayey sand coatings.
	+111.92	9.40	
		(0.30)	Medium strong blue grey very calcaceous fine grained argillaceous SILTSTONE. Fresh. Unfractured insitu.
	+111.62	9.70	
		(0.30)	Strong grey crystalline fine grained calcaceous LIMESTONE. Generally fresh with slight greenish grey penetrative discolouration. Fractures sub horizontal, stepped, rough and tight. Clean.
	+111.32	10.00	

Drilling Progress | Casing depth/size | Water level/ time/ date | Flush Return %

Instrument/ Backfill

REMARKS

Hand excavated 0.0-0.5m
Rotary open Hole 0.5m-2.0m
Rotary Coring 2.0m-10m.
Flushing medium-Air/Mist

All dimensions in metres Scale 1:32.3	Client Freddie Alcock	Equipment Comacchio 450-P	Logged By Edward Lodge

GEOCORE ROTARY 204 WATERMAN - ROCK CORE LOGS.GPJ AGS3_ALL.GDT 4/7/11

Hydrock records (2014) Extract of unreferenced SLR report

Appendix A
Borehole Logs

BOREHOLE LOG

BOREHOLE No **BH101**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		113.60mATBM	E 453,868 N 225,832

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					113.40		0.20	TOPSOIL	
								Yellow buff LIMESTONE	
							(5.80)		
					107.60		6.00		
								Soft, dark grey sandy CLAY	
							(0.90)		
					106.70		6.90		
								Interbedded LIMESTONES and MUDSTONES	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres	Contractor : Site Investigation Services	Method:	Logged By:	Approved By:
Scale 1:50	Plant: Massenza m4			

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH101**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		113.60mATBM	E 453,868 N 225,832

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(3.60)	Interbedded LIMESTONES and MUDSTONES *(continued)*	
					103.10		10.50	Dark grey MUDSTONE	
					101.80		(1.30) 11.80	Stiff Sandy CLAY	
					100.70		(1.10) 12.90	Hard dark LIMESTONE	
					100.40		13.20	Dark grey sandy CLAY	
					99.80		(0.60) 13.80	Dark grey MUDSTONE interbedded with hard dark grey LIMESTONE	

9 10 11 12 13 14 15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant: Massenza M4	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH101**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0035.00174		113.60mATBM	E 453,868 N 225,832

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 3 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Dark grey MUDSTONE interbedded with hard dark grey LIMESTONE *(continued)*	
17									
							(8.20)		
18									
19									
20									
21									
					91.60		22.00		
22								Borehole complete at 22.00m	
23									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres	Contractor : Site Investigation Services	Method:	Logged By:	Approved By:
Scale 1:50	Plant: Massenza mt4			

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH102**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		114.88mATBM	E 453,845 N 225,754

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					114.58		0.30	Soft, Orange/Brown, Slightly Clayey SAND (TOPSOIL)	
							(1.20)	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					113.38		1.50		
							(0.90)	Moderately weak, very pale brown/yellow oolitic LIMESTONE.	
					112.48		2.40		
							(1.60)	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					110.88		4.00		
							(3.00)	Strong, very pale brown/yellow oolitic LIMESTONE.	
					107.88		7.00		
					107.48		(0.40) 7.40	Soft, dark grey, sandy CLAY.	
					106.98		(0.50) 7.90	Soft, dark grey MUDSTONE	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH102**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		114.88mATBM	E 453,845 N 225,754

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
								Weak, dark grey MUDSTONE, with occasional limestone bands. *(continued)*	
9							(2.60)		
10					104.38		10.50		
							(0.80)	Strong, dark grey LIMESTONE.	
11					103.58		11.30		
							(1.20)	Stiff, dark grey, sandy CLAY	
12					102.38		12.50		
							(0.50)	Strong, grey LIMESTONE.	
13					101.88		13.00		
							(2.00)	Weak, dark grey MUDSTONE, with occasional clayey sand bands.	
14									
15					99.88		15.00		
								Borehole complete at 15.00m	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH103**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		114.37mATBM	E 453,835 N 225,703

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					114.07		0.30	Soft, orange/brown sandy CLAY (TOPSOIL).	
							(2.20)	Strong, very pale brown/yellow oolitic LIMESTONE.	
					111.87		2.50		
							(0.90)	Moderately strong, pale brown/yellow oolitic LIMESTONE.	
					110.97		3.40		
							(2.90)	Strong, very pale brown/yellow oolitic LIMESTONE.	
					108.07		6.30		
					107.87		6.50	Very strong, fresh grey LIMESTONE.	
							(0.50)	Soft, brown sandy CLAY.	
					107.37		7.00		
							(0.50)	Weak, dark grey silty MUDSTONE.	
					106.87		7.50		
							(0.40)	Strong, grey LIMESTONE.	
					106.47		7.90		

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH103**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		114.37mATBM	E 453,835 N 225,703

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
							(1.10)	Moderately strong, grey MUDSTONE, with occasional limestone bands. *(continued)*	
9					105.37		9.00	Borehole complete at 9.00m	
10									
11									
12									
13									
14									
15									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH104**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		113.98mATBM	E 453,825 N 225,655

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					113.48		(0.50) 0.50	Soft, orange/brown sandy CLAY.	
					111.98		(1.50) 2.00	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					109.98		(2.00) 4.00	Strong, very pale brown and yellow oolitic LIMESTONE.	
					108.98		(1.00) 5.00	Very weathered, weak, light brown sandy LIMESTONE.	
					108.68		5.30	Strong, very pale brown and yellow oolitic LIMESTONE.	
					108.38		5.60	Weathered, weak, light brown sandy LIMESTONE.	
					107.18		(1.20) 6.80	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					106.98		7.00	Weathered, weak, light brown sandy LIMESTONE.	
					106.48		(0.50) 7.50	Stiff, grey silty/sandy CLAY.	
								Moderately strong, grey MUDSTONE, with occasional limestone bands.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH104**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		113.98mATBM	E 453,825 N 225,655

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
9							(4.00)	Moderately strong, grey MUDSTONE, with occasional limestone bands. *(continued)*	
10									
11					102.48		11.50		
12								Borehole complete at 11.50m	
13									
14									
15									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

SLR CONSULTING LTD, SLR HOUSE, MEADOWBANK WAY, EASTWOOD, NOTTINGHAMSHIRE. NG16 3TT, Tel: 01773 766020, Fax: 01772 7

BOREHOLE LOG

BOREHOLE No **BH105**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		113.46mATBM	E 453,815 N 225,606

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(0.70)	Weak, weathered, light brown sandy LIMESTONE.	
					112.76		0.70	Strong, very pale brown and yellow oolitic LIMESTONE.	
							(1.80)		
					110.96		2.50	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
							(1.00)		
					109.96		3.50	Strong, very pale brown and yellow oolitic LIMESTONE.	
					109.65		3.80	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					109.46		4.00	Strong, very pale brown and yellow oolitic LIMESTONE.	
							(1.00)		
					108.46		5.00	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
							(0.70)		
					107.76		5.70	Strong, very pale brown and yellow oolitic LIMESTONE.	
							(0.80)		
					106.96		6.50	Strong, fresh light grey LIMESTONE.	
					106.66		6.80	Firm, brown sandy CLAY.	
					106.56		6.90	Stiff, dark grey silty CLAY.	
					106.26		7.20	Moderately strong, gey silty MUDSTONE, with occasional limestone bands.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH105**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		113.46mATBM	E 453,815 N 225,606

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					103.66		(2.60) 9.80	Moderately strong, gey silty MUDSTONE, with occasional limestone bands. *(continued)*	
					102.96		(0.70) 10.50	Weak, dark grey silty MUDSTONE.	
					102.66		10.80	Strong, grey LIMESTONE.	
					101.96		(0.70) 11.50	Moderately strong, grey silty MUDSTONE.	
					101.46		(0.50) 12.00	Strong, grey LIMESTONE.	
					99.96		(1.50) 13.50	Weak, grey silty MUDSTONE.	
								Borehole complete at 13.50m	

9 10 11 12 13 14 15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH106**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		112.95mATBM	E 453,805 N 225,557

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					112.75		0.20	Orange/brown, sandy, silty CLAY (TOPSOIL).	
							(0.80)	Firm, light brown sandy CLAY.	
					111.95		1.00		
1							(1.30)	Pale orange and brown oolitic LIMESTONE.	
2					110.65		2.30		
							(2.00)	Strong, fresh light grey LIMESTONE.	
3									
4					108.65		4.30		
							(2.20)	Strong, light grey and green LIMESTONE.	
5									
6					106.45		6.50		
							(0.40)	Orange/brown sandy CLAY.	
					106.05		6.90		
7					105.95		7.00	Weak, dark grey to black SHALE.	
							(0.50)	Weak, dark grey, very silty MUDSTONE.	
					105.45		7.50		
								Weak, grey silty MUDSTONE with occasional limestone bands.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH106**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		112.95mATBM	E 453,805 N 225,557

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
								Weak, grey silty MUDSTONE with occasional limestone bands. *(continued)*	
9							(4.00)		
10									
11					101.45		11.50		
12								Borehole complete at 11.50m	
13									
14									
15									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH107**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		112.33mATBM	E 453,801 N 225,507

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					112.03		0.30	Soft to firm, brown sandy CLAY (TOPSOIL).	
					111.83		0.50	Firm, brown to orange sandy CLAY.	
							(1.00)	Strong, very pale brown and yellow oolitic LMESTONE.	
					110.83		1.50		
							(1.50)	Very strong, pale brown and yellow oolitic LIMESTONE.	
					109.33		3.00		
							(1.60)	Strong, very pale brown and yellow oolitic LMESTONE.	
					107.73		4.60		
							(1.90)	Soft, light brown sandy CLAY.	
					105.83		6.50		
					105.53		6.80	Stiff, dark grey, silty, sandy CLAY.	
							(1.20)	Moderately weak, grey MUDSTONE, with occasional limestone bands.	
					104.33		8.00		

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH107**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		112.33mATBM	E 453,801 N 225,507

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					103.93		(0.40) 8.40	Strong, fresh light grey MUDSTONE.	
9							(2.10)	Moderately strong, fresh light grey LIMESTONE.	
10					101.83		10.50		
					101.53		10.80	Soft to firm, grey silty CLAY.	
11					100.83		(0.70) 11.50	Moderately fresh, light grey LIMESTONE, with occasional weak mudstone bands.	
					100.63		11.70	Soft to firm, grey silty CLAY.	
12					99.83		(0.80) 12.50	Moderately strong, grey silty MUDSTONE, with occasional limestone bands.	
13					98.93		(0.90) 13.40	Firm to stiff, dark grey silty CLAY.	
14					97.83		(1.10) 14.50	Moderately strong, grey MUDSTONE.	
					97.33		(0.50) 15.00	Very soft, black clayey SILT.	
15					96.33		(1.00) 16.00	Firm, dark grey, slightly silty grey CLAY.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH107**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		112.33mATBM	E 453,801 N 225,507

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 3 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
								Moderately weak, dark grey MUDSTONE, with very thin bands of silty clay and limestone bands with occasional fossil fragments.	
17									
18									
19							(6.00)		
20									
21									
					90.33		22.00		
22								Borehole complete at 22.00m	
23									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH108**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		111.83mATBM	E 453,790 N 225,458

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(0.50)	Firm, orange/brown sandy CLAY	
					111.33		0.50		
							(1.50)	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					109.83		2.00		
							(2.00)	Strong, very pale brown and yellow oolitic LIMESTONE.	
					107.83		4.00		
					107.53		4.30	Weak, weathered, very sandy LIMESTONE.	
							(0.70)	Strong, very pale brown and yellow oolitic LIMESTONE.	
					106.83		5.00		
							(0.60)	Weak, weathered, very sandy LIMESTONE.	
					106.23		5.60		
					106.13		5.70	Dark orange, slightly clayey SAND.	
							(0.70)	Firm, dark grey silty CLAY.	
					105.43		6.40		
					105.33		6.50	Moderately weak, dark grey MUDSTONE.	
							(0.80)	Moderately fresh, light grey LIMESTONE.	
					104.53		7.30		
								Moderately fresh, grey LIMESTONE, with occasional mudstone bands.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH108**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		111.83mATBM	E 453,790 N 225,458

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
							(2.70)	Moderately fresh, grey LIMESTONE, with occasional mudstone bands. *(continued)*	
					101.83		10.00	Borehole complete at 10.00m	

9 10 11 12 13 14 15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH109**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		111.26mATBM	E 453,779 N 225,408

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					110.76		(0.50) 0.50	Firm, orange/brown sandy CLAY.	
							(1.80)	Moderately strong, pale brown/yellow oolitic LIMESTONE.	
					108.96		2.30		
							(3.20)	Strong, very pale brown and yellow oolitic LIMESTONE.	
					105.76		5.50		
					105.56		5.70	Soft, brown sandy CLAY.	
					105.26		6.00	Soft, grey, silty, sandy CLAY.	
							(3.00)	Moderately strong, grey silty MUDSTONE, with occasional limestone bands.	

1 2 3 4 5 6 7

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH109**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		111.26mATBM	E 453,779 N 225,408

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
								Moderately strong, grey silty MUDSTONE, with occasional limestone bands. *(continued)*	
					102.26		9.00		
9								Borehole complete at 9.00m	
10									
11									
12									
13									
14									
15									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH110**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		110.86mATBM	E 453,769 N 225,360

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
					109.96		(0.90) 0.90	Firm, brown sandy CLAY.	
1					109.66		1.20	Fairly weathered, very pale brown/yellow oolitic LIMESTONE.	
					109.26		(0.40) 1.60	Moderately strong, very pale brown/yellow oolitic LIMESTONE.	
					109.06		1.80	Strong, very pale brown and yellow oolitic LIMESTONE.	
2					108.26		(0.80) 2.60	Moderately strong, pale brown/yellow oolitic LIMESTONE.	
3					106.86		(1.40) 4.00	Strong, pale brown and yellow oolitic LIMESTONE.	
4					106.36		(0.50) 4.50	Moderately strong, pale brown oolitic LIMESTONE.	
					105.86		(0.50) 5.00	Strong, pale brown and yellow oolitic LIMESTONE.	
5					104.86		(1.00) 6.00	Moderately strong, grey LIMESTONE.	
6					104.56		6.30	Soft, brown sandy CLAY.	
					104.36		6.50	Stiff, dark grey, silty, sandy CLAY.	
7							(2.50)	Moderately strong, grey MUDSTONE, with occasional limestone bands.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH110**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		110.86mATBM	E 453,769 N 225,360

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					101.86		9.00	Moderately strong, grey MUDSTONE, with occasional limestone bands. *(continued)*	
9								Borehole complete at 9.00m	
10									
11									
12									
13									
14									
15									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH111**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		110.24mATBM	E 453,758 N 225,305

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					109.94		0.30	Soft to firm, orange/brown sandy CLAY.	
					109.24		(0.70) 1.00	Moderately strong, brown/yellow oolitic LIMESTONE.	
					107.74		(1.50) 2.50	Moderately strong, pale brown and yellow oolitic LIMESTONE.	
					107.24		(0.50) 3.00	Strong, pale brown and yellow oolitic LIMESTONE, with occasional sand bands.	
					106.74		(0.50) 3.50	Moderately strong, pale brown and yellow oolitic LIMESTONE.	
					104.44		(2.30) 5.80	Moderately strong, pale brown and yellow oolitic LIMESTONE.	
					104.24		6.00	Soft, orange/brown sandy CLAY.	
					103.84		(0.40) 6.40	Stiff, dark grey, silty, sandy CLAY.	
					103.64		6.60	Moderately weak, grey MUDSTONE.	
					103.24		(0.40) 7.00	Strong, fresh light grey LIMESTONE.	
								Moderately weak, dark grey silty MUDSTONE, with occasional limestone bands.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH111**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		110.24mATBM	E 453,758 N 225,305

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(3.40)	Moderately weak, dark grey silty MUDSTONE, with occasional limestone bands. *(continued)*	
					99.84		10.40		
					99.54		10.70	Moderately strong, light grey LIMESTONE.	
					99.04		(0.50) 11.20	Stiff, dark grey silty CLAY.	
					98.74		11.50	Moderately strong, grey MUDSTONE.	
							(2.00)	Stiff, dark grey silty CLAY.	
					96.74		13.50		
					96.24		(0.50) 14.00	Strong, fresh grey LIMESTONE, with occasional mudstone bands.	
								Borehole complete at 14.00m	

9 10 11 12 13 14 15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR ACS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH112**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.63mATBM	E 453,748 N 225,256

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
					~~109.53~~		0.10	Grass over brown SAND (TOPSOIL).	
					109.13		(0.40) 0.50	Firm, brown sandy CLAY.	
							(1.50)	Moderately strong, cream LIMESTONE.	
					107.63		2.00		
					106.83		(0.80) 2.80	Very strong, cream LIMESTONE.	
					106.63		3.00	Weak, brown sandy LIMESTONE.	
					105.33		(1.30) 4.30	Strong, brown/cream LIMESTONE.	
					105.13		4.50	Moderately strong, brown sandy LIMESTONE.	
					104.93		4.70	Strong, cream LIMESTONE.	
					~~104.83~~		4.80	Weak, brown sand LIMESTONE.	
					104.53		5.10	Strong, light grey LIMESTONE.	
					104.23		5.40	Moderately weak, brown sandy LIMESTONE.	
					104.03		5.60	Moderately strong, light grey LIMESTONE.	
					~~103.93~~		5.70	Very strong, light grey LIMESTONE.	
					~~103.83~~		5.80	Firm, light brown silty SAND.	
					~~103.63~~		6.00	soft to firm, dark grey/black CLAY.	
					102.93		(0.70) 6.70	Moderately strong, grey slightly sandy MUDSTONE.	
					102.63		7.00	Strong, grey LIMESTONE.	
					102.23		(0.40) 7.40	Moderately strong, grey slightly sandy MUDSTONE.	
					101.83		(0.40) 7.80	Strong, grey LIMESTONE.	
					101.63		8.00	Moderately strong, grey slightly sandy MUDSTONE.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH112**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.63mATBM	E 453,748 N 225,256

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Borehole complete at 8.00m	

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10
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Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR ACS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH113**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.40mATBM	E 453,737 N 225,223

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					109.30		0.10	TOP SOIL Strong, buff LIMESTONE.	
							(7.10)		
					102.20		7.20	Moderately strong, grey MUDSTONE.	
							(1.30)		

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

SLR CONSULTING LTD, SLR HOUSE, MEADOWBANK WAY, EASTWOOD, NOTTINGHAMSHIRE. NG16 3TT, Tel: 01773 766020, Fax: 01772 7

BOREHOLE LOG

BOREHOLE No **BH113**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.40mATBM	E 453,737 N 225,223

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					100.90		8.50	Moderately strong, grey MUDSTONE. *(continued)*	
9					99.90		(1.00) 9.50	Dark grey MUDSTONE.	
					99.40		(0.50) 10.00	Strong, grey LIMESTONE.	
10					99.00		(0.40) 10.40	Dark grey CLAY.	
					98.40		(0.60) 11.00	Strong, grey LIMESTONE.	
11					98.00		(0.40) 11.40	Stiff, dark grey silty CLAY	
					97.90		11.50	Strong, grey LIMESTONE.	
12					95.90		(2.00) 13.50	Grey silty CLAY interbedded with strong, grey LIMESTONE.	
13					95.20		(0.70) 14.20	Strong, grey LIMESTONE.	
14					93.40		(1.80) 16.00	Very stiff, dark grey silty CLAY.	
15									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH113**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.40mATBM	E 453,737 N 225,223

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 3 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Moderately strong, grey MUDSTONE interbedded with LIMESTONES	
17									
18							(4.00)		
19									
					89.40		20.00		
20								Borehole complete at 20.00m	
21									
22									
23									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

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BOREHOLE LOG

BOREHOLE No **BH114**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.66mATBM	E 453,765 N 225,222

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
					109.16		(0.50) 0.50	Grass over gravelly, sandy TOPSOIL. Sand is fine.	
					108.16		(1.00) 1.50	Weak, cream LIMESTONE.	
					107.66		(0.50) 2.00	Moderately strong, cream LIMESTONE.	
					107.36		2.30	Moderately strong/strong, cream LIMESTONE.	
					106.96		(0.40) 2.70	Moderately strong, cream LIMESTONE.	
					105.66		(1.30) 4.00	Strong, cream LIMESTONE.	
					103.36		(2.30) 6.30	Very strong, cream LIMESTONE.	
					103.16		6.50	Light brown, silty, fine sand.	
					102.66		(0.50) 7.00	Firm, dark grey sandy CLAY.	
					101.66		(1.00) 8.00	Strong, grey LIMESTONE.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH114**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.66mATBM	E 453,765 N 225,222

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Borehole complete at 8.00m	

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Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH115**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.70mATBM	E 453,815 N 225,219

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
					109.40		0.30	Grass overlying TOPSOIL.	
							(1.70)	Blocky, saprolitic rock. LIMESTONE	
					107.70		2.00		
							(2.20)	Iron stained, weathered LIMESTONE.	
					105.50		4.20		
							(2.30)	Yellowish grey to buff white weathered LIMESTONE, plus zones of intensely weathered silt.	
					103.20		6.50		
					102.70		(0.50) 7.00	Brownish yellow to orange, water bearing, calcareous siltstone underlain by dark grey clay, MUDSTONE.	
							(1.00)	Fresh looking, medium grey LIMESTONE, with occasional shaly or micaceous mudstone bands.	
					101.70		8.00		

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH115**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.70mATBM	E 453,815 N 225,219

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Borehole complete at 8.00m	

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Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR ACS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH116**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.46mATBM	E 453,865 N 225,216

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					109.21		0.25	Brownish grey, silty soil with fragments of limestone (TOPSOIL).	
								Saprolite. Blocky, weathered yellowish LIMESTONE with soil horizons.	
							(1.85)		
					107.36		2.10		
								Yellowish-buff grey LIMESTONE. Generally massive but Mg coarse grained texture common.	
							(3.90)		
					103.46		6.00		
								Hard, iron stained LIMESTONE.	
							(1.10)		
					102.36		7.10		
					102.26		7.20	Soil/ CLAY	
								Dark grey, fresh LIMESTONE.	
							(0.80)		
					101.46		8.00		

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR ACS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH116**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.46mATBM	E 453,865 N 225,216

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Borehole complete at 8.00m	

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Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH117**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.00mATBM	E 453,914 N 225,211

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
					108.50		(0.50) 0.50	TOPSOIL.	
							(5.90)	Weathered, yellowish brown and grey LIMESTONE, with isolated bands of decomposed silt.	
					102.60		6.40		
					102.40		6.60	Upper marl, SILTSTONE/dark clay, with interbeds of shale and dark grey shale.	
							(2.50)	Dark grey LIMESTONE, varicoloured locally.	

1 2 3 4 5 6 7

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH117**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		109.00mATBM	E 453,914 N 225,211

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Dark grey LIMESTONE, varicoloured locally. *(continued)*	
					99.90		9.10		
					99.50		(0.40) 9.50	SILTSTONE with clay	
							(2.00)	Dark grey to light grey LIMESTONE, with shale and siltstone interbeds.	
					97.50		11.50		
					97.10		(0.40) 11.90	SILTSTONE and dark grey shale (clay). (Middle Marl?)	
							(1.10)	Light grey LIMESTONE.	
					96.00		13.00		
								Borehole complete at 13.00m	

9 10 11 12 13 14 15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH118**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		108.42mATBM	E 453,964 N 225,207

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 1

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					108.07		0.35	TOPSOIL.	
							(4.65)	Weathered, iron stained, yellowish grey LIMESTONE with rare laminae of highly decomposed silt	
					103.42		5.00		
					102.92		(0.50) 5.50	Weak zone, yellowish brown SILT.	
							(1.20)	Iron stained, yellowish grey LIMESTONE.	
					101.72		6.70		
					101.42		7.00	SILTSTONE. Dark grey limestone at base of upper marl.	
								Borehole complete at 7.00m	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

SLR CONSULTING LTD, SLR HOUSE, MEADOWBANK WAY, EASTWOOD, NOTTINGHAMSHIRE. NG16 3TT, Tel: 01773 766020, Fax: 01772 7

BOREHOLE LOG

BOREHOLE No **BH119**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		107.76mATBM	E 454,013 N 225,199

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					107.46		0.30	TOPSOIL.	
							(5.70)	Weathered, yellowish grey LIMESTONE, plus bands of highly decomposed, medium yellow sandy silt. Becoming hard to drill at base.	
					101.76		6.00		
					101.36		(0.40) 6.40	Light grey SILTSTONE, with clay at base.	
								Medium grey, fresh LIMESTONE.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH119**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		107.76mATBM	E 454,013 N 225,199

SLR

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(3.90)	Medium grey, fresh LIMESTONE. *(continued)*	
					97.46		10.30		
					97.06		(0.40) 10.70	SILTSTONE/clay.	
							(2.30)	Blocky ground (jointed or fractured) LIMESTONE and clay.	
					94.76		13.00		
					93.96		(0.80) 13.80	Mainly SILTSTONE.	
							(1.30)	Grey LIMESTONE.	
					92.66		15.10		
					92.26		(0.40) 15.50	Light grey SILTSTONE interbedded with dark grey clay. Plus water.	
								Medium grey Mg LIMESTONE, with occasional bands of silty shales.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH119**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		107.76mATBM	E 454,013 N 225,199

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 3 of 3

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Medium grey Mg LIMESTONE, with occcasional bands of silty shales. *(continued)*	
17							(3.50)		
18									
19					88.76		19.00		
								Borehole complete at 19.00m	
20									
21									
22									
23									

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH120**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		107.09mATBM	E 454,062 N 225,192

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 1

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					106.74		0.35	TOPSOIL.	
							(1.20)	Weathered, yellowish grey LIMESTONE.	
					105.54		1.55	Iron stained, yellowish (buff) grey LIMESTONE. Quite hard locally, though in places thin bands of highly weathered sandy silt occur.	
							(4.95)		
					100.59		6.50		
					100.24		6.85	Interbedded weak siltstone and dark grey shale (CLAY).	
					100.09		7.00	Dark grey, fresh LIMESTONE, shaly locally.	
								Borehole complete at 7.00m	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor: Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK.BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH121**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		106.29mATBM	E 454,112 N 225,181

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 1

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					105.89		(0.40) 0.40	Medium brownish grey soil with fragments of limestone. TOPSOIL.	
							(3.40)	Iron stained and weathered, yellowish buff white LIMESTONE with occasional bands highly decomposed sandy silt. Very hard to drill at base.	
					102.49		3.80		
					102.29		4.00	Brownish yellow and grey sandy SILT.	
							(3.00)	Light yellowish grey and white. Massive LIMESTONE. Very competent.	
					99.29		7.00		
								Borehole complete at 7.00m	

1 2 3 4 5 6 7

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH122**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		105.75mATBM	E 454,161 N 225,172

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					105.45		0.30	TOPSOIL.	
							(2.10)	Saprock: Weathered yellowish/buff grey iron stained LIMESTONE. Locally Mg rich.	
					103.35		2.40		
					103.25		2.50	Highly decomposed SANDY SILT zone.	
							(1.50)	Moderately hard, buff white LIMESTONE plus trace haematite.	
					101.75		4.00		
					101.65		4.10	SANDY SILT band.	
							(2.40)	Grey LIMESTONE.	
					99.25		6.50		
							(0.50)	Weak, brownish grey SILTSTONE with dark grey clay (shale) plus damp.	
					98.75		7.00		
							(1.00)	Dark grey LIMESTONE interbedded with shales and siltstones.	
					97.75		8.00		

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH122**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		105.75mATBM	E 454,161 N 225,172

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Borehole complete at 8.00m	

9
10
11
12
13
14
15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH123**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		104.84mATBM	E 454,209 N 225,163

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					104.54		0.30	light brown sandy TOPSOIL with fragments of limestone.	
							(1.70)	Saprolitic rock- Weathered LIMESTONE with occasional bands of completely decomposed zones. Iron staining widespread.	
					102.84		2.00		
							(1.20)	Moderately hard, yellowish to buff white LIMESTONE.	
					101.64		3.20		
					101.54		3.30	Decomposed brownish SANDY SILT.	
							(2.50)	Yellowish grey, massive LIMESTONE. occasionally Mg rich.	
					99.04		5.80		
					98.54		(0.50) 6.30	Weak zone of decomposed SILTSTONE/ clay. Slightly damp.	
								Fresh looking, medium grained dark LIMESTONE. Thin laminae of shale or silty shale may be common.	

1 2 3 4 5 6 7

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH123**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		104.84mATBM	E 454,209 N 225,163

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(3.70)	Fresh looking, medium grained dark LIMESTONE. Thin laminae of shale or silty shale may be common. *(continued)*	
					94.84		10.00		
								Borehole complete at 10.00m	

9 10 11 12 13 14 15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

SLR CONSULTING LTD, SLR HOUSE, MEADOWBANK WAY, EASTWOOD, NOTTINGHAMSHIRE. NG16 3TT, Tel: 01773 766020, Fax: 01772 7

BOREHOLE LOG

BOREHOLE No **BH124**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		103.84mATBM	E 454,256 N 225,146

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 1 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
					103.54		0.30	TOPSOIL.	
							(4.50)	Iron stained, yellowish to buff grey, medium grained LIMESTONE. Interbedded with highly decomposed zones usually 0.2m thick. Locally hard drilling conditions.	
					99.04		4.80		
					98.74		5.10	Decomposed sandy SILTSTONE laminae.	
					98.04		(0.70) 5.80	Strong, grey LIMESTONE.	
					97.74		6.10	Brownish grey SILTSTONE, interbedded with dark grey clay (shale).	
					96.44		(1.30) 7.40	Medium grey LIMESTONE.	
					95.84		(0.60) 8.00	Light grey interbeds of shales and siltstones.	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES GPJ 30-11-06

BOREHOLE LOG

BOREHOLE No **BH124**

Client: **Viridor Waste Management**

Project No:	Date:	Ground Level:	Co-ordinates:
403.0036.00174		103.84mATBM	E 454,256 N 225,146

Project: **Ardley Landfill Site Monitoring Borehole Installations**

Sheet: 2 of 2

SAMPLES & TESTS				Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
								Borehole complete at 8.00m	

9
10
11
12
13
14
15

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Contractor : Site Investigation Services Plant:	Method:	Logged By:	Approved By:

Form SLR AGS3 UK BH File ARDLEY BOREHOLES.GPJ 30-11-06

SLR CONSULTING LTD, SLR HOUSE, MEADOWBANK WAY, EASTWOOD, NOTTINGHAMSHIRE. NG16 3TT, Tel: 01773 766020, Fax: 01772 7

BRD records (2015)

TRIAL PIT RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: J McDermott
Date Completed: 15/06/2015
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP01

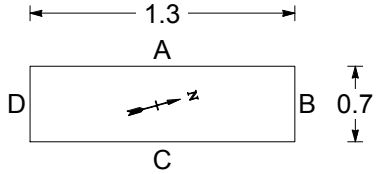
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	PID J1	0.0 ppm	MADE GROUND: Dark brown/black, sandy, gravelly clay. Gravel of fine to coarse, angular to rounded flint, brick and concrete.	0.20 ()	MG	
0.40	PID D1	0.0 ppm	Orange brown, sandy, gravelly CLAY. Gravel of fine to coarse, angular to subangular limestone with tabular limestone cobbles.	0.50 ()	WHITE LIMESTONE FORMATION	
0.60	J2 B1		Light grey and cream brown, sandy, clayey GRAVEL of fine to coarse angular to subangular, limestone with cobbles of tabular limestone.	1		
1.20	PID J2	0.0 ppm		1.60 ()		
				2		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.60m bgl on suspected Limestone rock.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: J McDermott
Date Completed: 15/06/2015
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP02

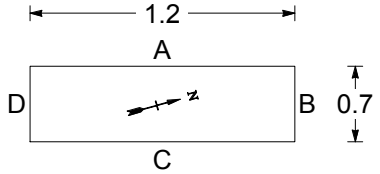
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Scrub over: Dark brown, sandy, gravelly clay. Gravel of fine to coarse, angular to rounded flint, limestone, brick and concrete.	0.10 ()	M	
0.30	PID J1	0.0 ppm	Orange brown and yellow brown, very sandy, very gravelly CLAY. Gravel of fine to coarse, angular to subangular, limestone, with tabular limestone cobbles.		WLF	
0.50	D1					
0.60	PID J2	0.0 ppm				
				0.70 ()		
0.80	B1		Orange brown and cream brown, sandy, clayey GRAVEL of fine to coarse, angular to subangular limestone with tabular limestone cobbles.	0.85 ()		
				1		
				2		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 0.85m bgl on suspected Limestone rock.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: J McDermott
Date Completed: 15/06/2015
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP03

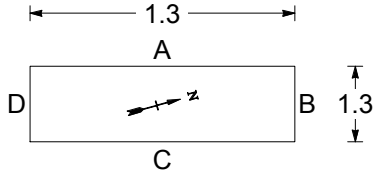
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Brown and orange brown, sandy, gravelly clay. Gravel of fine to coarse, angular to rounded flint, half to whole bricks, concrete and occasional ceramic tiles with some cobbles of tabular limestone.		MADE GROUND	
0.30	PID J1	0.0 ppm				
0.50	D1					
0.60	PID J2	0.1 ppm				
			0.70 m: Becoming very sandy and slightly moist with a faint hydrocarbon odour.	1		
1.35	PID D2 J3	150 ppm	1.35 m: Grey/black staining with a hydrocarbon odour.	1.40 ()		
				2		
				3		
				4		

Pit Stability: Unstable in Made Ground
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.40m bgl on suspected Limestone rock.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: J McDermott
Date Completed: 15/06/2015
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP04

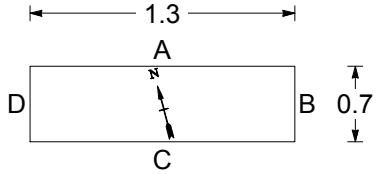
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Tarmac/Roadstone.	0.10 ()	M	
0.25	PID J1	0.1 ppm	Medium dense to dense, grey brown/yellow brown, sandy, clayey GRAVEL of fine to coarse, angular to subangular limestone with cobbles of limestone.		WLF	
0.40	D1			0.50 ()		
0.60	D2		Yellow brown, sandy, gravelly CLAY. Gravel of fine to coarse, angular to tabular limestone			
0.70	PID	0.0 ppm		0.75 ()		
0.80	J2 B1		Yellow brown, weak LIMESTONE, recovered as sandy gravel of fine to coarse, angular limestone and tabular cobbles of limestone.	0.82 ()		
				1		
				2		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 0.82m bgl on suspected Limestone rock.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client:	Mr J and Mrs R Pickford
Project Title:	Ashgrove Farm, Ardley
Project No:	BRD2409
Logged By:	J McDermott
Date Completed:	15/06/2015
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP05

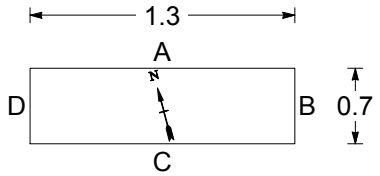
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Concrete	0.10 ()	WLF	
0.20	PID J1	0.0 ppm	Medium dense to dense, grey brown/yellow brown, sandy, clayey GRAVEL of fine to coarse, angular to subangular limestone with cobbles of tabular limestone.			
0.40	D1					
			0.50 m: 30mm diameter iron pipe crossing centre of pit FACE A - C	0.55 ()		
				1		
				2		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 0.55m bgl due to service pipe encountered.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client:	Mr J and Mrs R Pickford
Project Title:	Ashgrove Farm, Ardley
Project No:	BRD2409
Logged By:	J McDermott
Date Completed:	15/06/2015
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP06

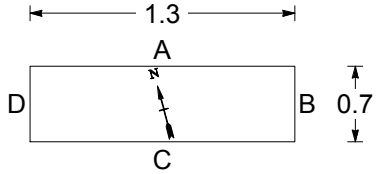
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	B1		MADE GROUND: Dense, cream brown, sandy, clayey gravel of fine to medium, angular to rounded limestone. - Possible historic concrete/cement mix.	0.10 ()	M	
			m: Unable to excavate further.			

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit abandoned at 0.1m bgl as unable to excavate further.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: J McDermott
Date Completed: 15/06/2015
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP07

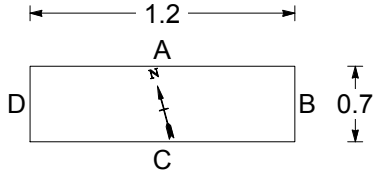
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Medium dense to dense, cream brown, sandy, slightly clayey gravel of fine to coarse angular to rounded limestone with cobbles of tabular limestone.		MADE GROUND	
0.30	PID J1	0.0 ppm				
0.50	D1					
			0.60 m: Face B - D: 50mm diameter cast iron pipe - expected to be an old drainage pipe.	0.70 ()		
0.80	D2		Orange to yellow, sandy, slightly clayey GRAVEL of fine to coarse angular to subangular limestone with cobbles of tabular limestone.		WLF	
0.90	PID	0.0 ppm				
0.95	J2 B1			1.00 ()		
				1		
				2		
				3		
				4		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.0m bgl on suspected Limestone rock.

All dimensions in metres
Log Scale 1:25

BRD
Telephone: 01295 272244
Email: info@brduk.com

Trial Pit Photographs

TP01

Project Title: Ashgrove Farm, Ardley
Client: Mr J and Mrs R Pickford
BRD Reference: BRD2409-OP4-A
Date Issued: July 2015

01295 272244
info@brduk.com

Trial Pit Photographs

TP02

Project Title:	Ashgrove Farm, Ardley
Client:	Mr J and Mrs R Pickford
BRD Reference:	BRD2409-OP4-A
Date Issued:	July 2015

BRD
01295 272244
info@brduk.com

Trial Pit Photographs

TP03

Project Title: Ashgrove Farm, Ardley
Client: Mr J and Mrs R Pickford
BRD Reference: BRD2409-OP4-A
Date Issued: July 2015

BRD
01295 272244
info@brduk.com

Trial Pit Photographs

TP04

Project Title:	Ashgrove Farm, Ardley
Client:	Mr J and Mrs R Pickford
BRD Reference:	BRD2409-OP4-A
Date Issued:	July 2015

01295 272244
info@brduk.com

Trial Pit Photographs

TP05

Project Title:	Ashgrove Farm, Ardley
Client:	Mr J and Mrs R Pickford
BRD Reference:	BRD2409-OP4-A
Date Issued:	July 2015

01295 272244
info@brduk.com

Trial Pit Photographs

TP06

Project Title:	Ashgrove Farm, Ardley
Client:	Mr J and Mrs R Pickford
BRD Reference:	BRD2409-OP4-A
Date Issued:	July 2015

BRD
01295 272244
info@brduk.com

Trial Pit Photographs

TP07

Project Title:	Ashgrove Farm, Ardley
Client:	Mr J and Mrs R Pickford
BRD Reference:	BRD2409-OP4-A
Date Issued:	July 2015

BRD
01295 272244
info@brduk.com

BOREHOLE RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: I Hibberd
Date Commenced: 11/09/2015
Date Completed: 11/09/2015
Method Used: Dynamic Sampling with follow on Rotary Coring (Water Flush)

Borehole No.

BH01

Sheet 1 of 1

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.60	PID	0.0 ppm		MADE GROUND: Light brown/beige, very clayey, slightly sandy, clay bound gravel of medium to coarse, subangular to angular limestone and rare concrete.	1		MADE GROUND	
1.35	PID	96.7 ppm		Weathered LIMESTONE: Recovered as white/light grey, slightly clayey gravel of subangular limestone with hydrocarbon odour.	1.30 ()		WHITE LIMESTONE	
1.50	J1 PID	55.1 ppm		Recovered as very stiff, light grey with orange mottling, very gravelly CLAY. Gravel of coarse, tabular limestone with hydrocarbon odour.	1.40 () 1.60 () 2			
2.55	PID	22.1 ppm	1	LIMESTONE: Recovered as coarse gravel of subangular limestone.	2.50 ()			
2.80	J2 PID	28.7 ppm		1.60 - 2.50 m: Poor recovery. Only 25%. Medium strong to strong, thinly bedded, crystalline, light grey / white with some orange LIMESTONE.	3			
3.40	PID J3	3.5 ppm	1	2.50 - 2.60 m: Vertical fractures with hydrocarbon staining at surfaces. 3.00 - 4.00 m: 1m core length with 70% recovery.	3.20 ()			
4.20	PID J4	5.3 ppm		Strong, light grey / white with occasional orange specks, thinly to medium bedded crystalline LIMESTONE with occasional shells.	4 3.95 ()		R. FM.	
4.70	PID	0.0 ppm		Firm grey silty CLAY. 4.00 m: Very stiff, dark grey/blue, silty CLAY with occasional shells/fossils.	4.50 ()			
				Extremely weak, dark grey with light grey lenses, thinly laminated, silty SANDSTONE.	4.80 () 5 5.00 ()			
				Extremely weak, thinly laminated, green/grey, silty MUDSTONE.	6 7 8			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins
11-09-15	1.60	-	-	-	-
11-09-15	3.00	1.60	92.5	-	-
11-09-15	3.40	1.60	92.5	3.40	2.23
11-09-15	4.00	1.60	92.5	-	-
11-09-15	5.00	3.00	92.5	-	-

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 5.00m bgl.
Borehole fitted with gas and groundwater monitoring installation and flush metal cover.
Dynamic sample to 1.60m and then coring to base.

Surface Elevation Level:

All dimensions in metres
Log Scale 1:50

BRD
Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Mr J and Mrs R Pickford
Project Title: Ashgrove Farm, Ardley
Project No: BRD2409
Logged By: I Hibberd
Date Commenced: 11/09/2015
Date Completed: 11/09/2015
Method Used: Dynamic Sampling with follow on Rotary Coring (Water Flush)

Borehole No.

BH02

Sheet 1 of 1

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
				MADE GROUND: Loose, brown and white, silty, sandy gravel of fine to coarse, subangular to tabular limestone with cobbles of limestone.	0.20 ()		MG	
0.30	PID	0.0 ppm						
0.50	PID	0.0 ppm		Medium dense, yellow brown with some orange, sandy, very clayey GRAVEL of subangular limestone.	0.70 ()			
0.80	PID	0.0 ppm		Recovered as yellow, slightly clayey SAND with limestone fragments. No hydrocarbon odour or staining. (Open hole drilling to install casing).	1			
				LIMESTONE: Recovered as medium strong, light grey / white with orange, clayey, coarse, subangular gravel.	1.30 ()		WHITE LIMESTONE	
2.00	PID	0.0 ppm			2			
				Extremely weak, thickly laminated, light grey with orange lenses LIMESTONE with clayey infill.	2.20 ()			
			1		2.50 ()			
2.70	PID J1	0.0 ppm		Very stiff, light grey with orange CLAY with some tabular limestone gravel.	3			
				LIMESTONE: Recovered as medium strong, light grey / white with orange, clayey, coarse, subangular gravel.	3.00 ()			
3.50	PID	0.0 ppm	1					
					4			
				Very stiff, slightly fissured, dark grey, silty CLAY.	4.00 ()		RF	
4.20	PID	0.0 ppm						
					4.80 ()			
					5			
					6			
					7			
					8			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins
11-09-15	0.60	-	-	-	-
11-09-15	2.80	1.30	92.5	-	-
11-09-15	3.70	1.30	92.5	3.70	2.60
11-09-15	4.30	1.30	92.5	-	-
11-09-15	4.80	1.30	92.5	-	-

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 4.80m bgl.
Borehole fitted with gas and groundwater monitoring installation and flush metal cover.
Hand dug pit to 0.60m, open hole 1.30m to allow casing to be installed, coring to 4.30m and dynamic sample to 4.80m.

Surface Elevation Level:

All dimensions in metres
Log Scale 1:50

BRD
Telephone: 01295 272244
Email: info@brduk.com

Specialist UXO Desk Top Study

EOD Contracts Ltd

International Unexploded Ordnance Risk Mitigation

Many People... One Aim

EXPLOSIVE ORDNANCE DESKTOP STUDY FOR:

PROJECT 21056

(LAND TO THE NE, E, SE OF) RAF HEYFORD OXFORDSHIRE

Hydrock

ISOQAR REGISTERED
UKAS MANAGEMENT SYSTEMS 0026

Institute of Explosives Engineers
VOICE OF THE EXPLOSIVES INDUSTRIES

www.eodcontractsltd.com Tel 01386 578 405

EXPLOSIVE ORDNANCE DESKTOP STUDY

Of

LAND TO THE NE, E, SE OF – RAF HEYFORD OXFORDSHIRE

Conducted by EOD Contracts Limited

On behalf of

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CONTENTS

TERMS AND DEFINITIONS

Anti-Aircraft Shells (AA)

Small High Explosive Shells (HE) shells ranging up to 100mm in diameter.

Battlefield Area Clearance (BAC)

The systematic clearance of munitions from military property or old battle sites e.g., ranges, airfields etc.

Borehole Search

The placing of boreholes in a set pattern, then using a magnetometer to take readings at specific depths along each borehole. When used with a geophysical survey system this will give a magnetic signature of the area. The depth of the borehole and the pattern will depend upon the type of Unexploded Bombs (UXB) and the geology of the ground.

Doodle Bug (See Pilotless Aircraft)

Explosive Ordnance (EO)

All munitions containing explosives, nuclear fission/fusion materials and or biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and Small Arms Ammunition (SAA); all mines, torpedoes and depth charges; pyrotechnics; clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices (IED); and all similar or related items or components explosive in nature.

Explosive Ordnance Clearance (EOC)

See BAC.

Explosive Ordnance Disposal (EOD)

The detection, identification, field evaluation, render safe, recovery and disposal of **UXO**.

Geophysical Survey

The survey of an area using a Magnetometer and geophysical gathering device, after interpretation, this will produce a geophysical map and an object list for any metallic anomalies.

High Explosive (HE)

High explosives burn/detonate at rates of up to 9,000 m/per second.

Incendiary Bomb (IB)

Incendiary bombs ranged from 1kg in size to 500kg the larger sizes were sometimes called Oil Bombs. Fills range from thermite mixtures, phosphorus to kerosene.

Intrusive Survey

The use of a cone penetrometer (MagCone) or drilled boreholes (MagDrill) to take magnetometer test in a set pattern (see borehole search), or to prove pile positions.

Land Service Ammunition (LSA)

LSA is defined as “All items containing explosives or pyrotechnic compounds which are placed, thrown or projected so as to cause damage to men and equipment during land warfare.

Long Range Rocket (LRR)

The long-range rocket sometimes codenamed Big Ben is the V2 rocket designed to deliver an approximate payload of 1000 kg.

Oil Bomb (OB)

A bomb containing a flammable liquid, normally the KC 250 Flam or the C 500 flam.

Pilotless Aircraft (PAC)

A flying bomb (Fly) or doodlebug is the V1 rocket or predecessors designed to deliver an explosive payload of approximately 500kg - 800kg.

Parachute Mine (PM)

Air dropped mine may have been used as a blast effect bomb maximum explosive content 1600lb always fitted with anti-handling and anti-stripping equipment.

Unexploded Bomb (UXB)

Any air dropped bomb that has failed to operate.

Unexploded Ordnance (UXO)

Explosive ordnance that has been primed, fused, armed or otherwise prepared for use or used. It may have been fired, dropped, launched or projected yet remains unexploded either through malfunction or design or for any other cause.

Vengeance Weapons (V)

V1 see Pilotless Aircraft.
V2 see Long Range Rocket.

WWI

First World War 1 (1914 – 1918)

WWII

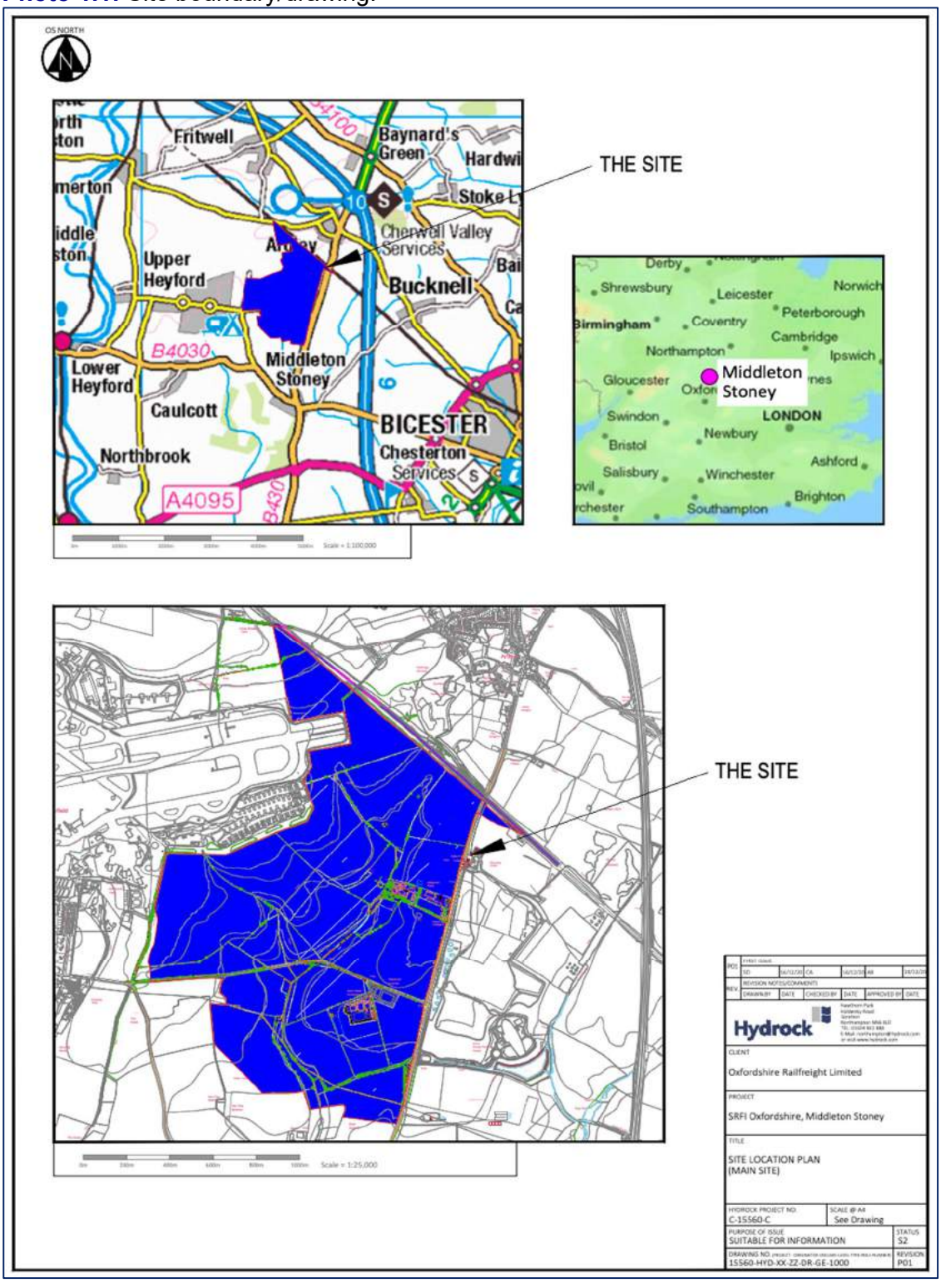
Second World War 2 (1939 – 1945)

EXECUTIVE SUMMARY

1 INSTRUCTION

EOD Contracts Ltd (ECL), have been commissioned by HYDROCK (hereafter, "the Client") to undertake a desktop study for potential historic Unexploded Ordnance (UXO) contamination for the future works being carried out within the Highlighted areas provided within the CLIENTS drawing below (**Photo 1.1**).

Photo 1.1: Site boundary/drawing.



2 SCOPE OF WORK

The scope of this EO Risk Assessment/Desk Study is to assess the likelihood of buried EO/UXO within the environs of "the site" (See **Photo 1.1**), in view of further development. A further aim was to evaluate the implication from UXO contamination during any future intrusive land use.

2.1 LOCATION

The Site area is located east of RAF Heyford. Due to the size of the area there are multiple access and egress to different parts of the Site.

TITLE	DESCRIPTION (CENTRE OF SITE)
Site Post Code	OX27 7PJ (Ashgrove Farm)
Grid Reference	SP 536262 / SP 5365626209
OS (X)	453656
OS (Y)	226209

3 SOURCES OF UXO CONTAMINATION

3.1 Through the use of thorough research (utilising both modern and historic data) EOD Contracts Ltd deem that the main source of UXO contamination pertaining to the site are as follows.

- Air delivered ordnance bombs and sub munitions/incendiaries.
- Military Usage (potentially)
- Close proximity to RAF Base

4 KEY FINDINGS

4.1 Based on the information researched by EOD Contracts Ltd for the proposed works being carried out on the land to the NE, E, SE of RAF Heyford, EOD Contracts Ltd can conclude the following.

4.2 There are no recorded incidents of the site being the subject of bombardment throughout WW1. However, the RAF station was operational throughout this period but only for training purposes.

4.3 Upper Heyford/RAF Heyford was targeted on at least four separate occasions throughout WW2. The exact location of where these bombs landed is not available (or likely exists).

4.4 The Site area itself would not have been considered a viable target to the Luftwaffe. However, its close proximity to RAF Heyford negates this fact. The Site area is situated at the eastern edge of the main runway, bombing accuracy throughout this period was very low meaning bombs dropped could easily overshoot their intended target.

4.5 There was no evidence to suggest that there was a HAA/LAA Gun Emplacement located within the Site area. However, again due to the Sites proximity to the RAF station this cannot be ruled out. This premise is also relevant when considering the placement of trenching/defensive positioning & military troop training.

4.6 The Site has remained relatively unchanged post WW2.

4.7 Therefore (to summarise) EOD Contracts Ltd deem that there is a **MEDIUM** Risk pertaining to items of UXO being located within the Site location.

5 RECOMMENDATIONS

5.1 It is recommended that the following risk mitigation strategy be executed during phases of the project indicated previously indicated as a **MEDIUM** risk.

5.2 Communicating the risks, all stakeholders should be made aware of the UXO situation on the site and the possible impact it may have on the project works and day to day running of the district. Clients have a legal duty under the Construction Design & Management Regulations (CDM) and Health & Safety at Work legislation to provide Designers and Contractors with project specific information needed to identify hazards and risks associated with the design and construction work. The possibility that UXO may be encountered on site falls within the category of a significant risk and as such it should be addressed as early as possible in the lifecycle of the project.

5.3 Further planning; the risks posed by UXO should be brought to the attention of the Project CDM Coordinators and other individuals with a responsibility for project safety and operations at the site. The matter of UXO should be considered critical to project safety and one requiring high priority action.

5.4 UXO safety awareness training should be given at all levels of site personnel and selected individuals on the project staff with relevant responsibilities. A competent person as part of the project safety induction course should provide the awareness training. It should be reinforced with specific safety briefings and toolbox talks to individuals involved in conducting intrusive earthworks.

5.5 Project overview and the responsibilities of those working on site with regard to duty of care and public safety.

5.6 UXO recognition and safety procedures to be followed on discovery of a suspicious object or the alarm being sounded.

5.7 Emergency procedures to be followed in the event of an explosion. Evacuation routes, muster stations and accounting for personnel.

5.8 Work permits, works methodology and specific UXO risk mitigation methods. Post-incident inspections and returning to normal works.

5.9 Prior to any intrusive piling or drilling commencing, UXO safety testing and appropriate clearance certification into the ground to sufficient depth to provide clearance from UXO. This can be done using a progressive drilling process or (where large numbers of piles are to be placed and ground permitting) using a vehicle borne hydraulic system to push a magnetometer into the ground to test for the presence of UXO prior to piling.

5.10 UXO safety monitoring of all “at risk” excavations, including geotechnical or archaeological trial pits to be conducted during the project. This should be provided by a UK Home Office Authorised EOD/UXO Contractor using qualified EOD Engineer with specialist locators and detectors to scan the ground ahead of the excavation wherever possible.

6 SPECIFICALLY

6.1 Geotechnical investigations, percussive drilling/trial pits/window/samples, require an EOD Engineer over watch.

6.2 The removal of all building foundations within the site footprint can be removed down to natural ground level (including basements).

6.5 New foundations with piling should be mitigated by the insertion of a magnetometer to encompass the pile position, this would be carried out using a CPT rig (magcone), the expected radius of the magcone is 1.5m therefore multiple piles could be checked.

6.6 Non-Intrusive Magnetometer surveys generally prove inconclusive on “Brownfield sites”, this is due to the high ferromagnetic background, therefore this methodology is not recommended for this site and shallow excavations should be overseen by a qualified EOD Engineer. This methodology could however be used on the grassed areas within the site confines.

7.0 **EOD Contracts Ltd can supply a turnkey solution to your UXO requirements. Therefore, the following mitigation strategies can be supplied for land or water-based operations**:

7.1 Intrusive survey using CPT *(Cone Pressure Testing)* or borehole equipment, *supplying risk mitigation to all Borehole and Pile locations, down to a maximum bomb penetration depth determined within this document.*

7.2 Non-Intrusive Survey using multiple array system with DGPS *(Digital Global targets be identified.*

7.3 Offshore, near-shore, estuarine and freshwater water environments magnetic, side scan and bathymetric supported by state-of-the-art DGPS.

7.4 The aforementioned surveys are supported with post processing of data and intrusive investigations if required.

7.5 EOD Engineer over watch using Suitably Qualified and Experienced Personnel, normally former British Army, Navy or RAF Bomb Disposal specialists.

7.6 Explosive Ordnance Safety Presentations.

7.7 EOD Contracts Ltd now offer Utility/Services Detection.

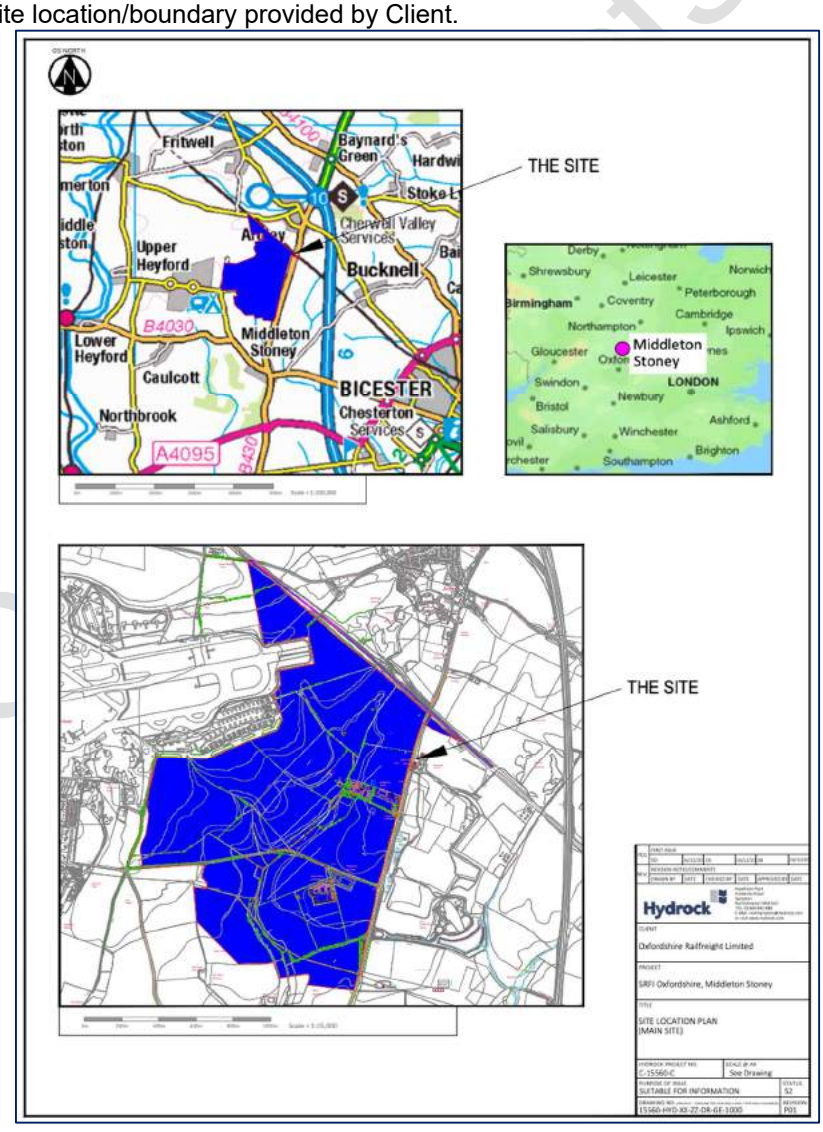
5.11

1.0 INTRODUCTION

1.1 Instruction

EOD Contracts Ltd (ECL), have been commissioned by the Client to undertake a desktop study for potential historic Unexploded Ordnance (UXO) contamination for the future works being carried out within the Highlighted areas provided within the CLIENTS drawing below (**Photo 1.1**).

Photo 1.1: Site location/boundary provided by Client.



1.2 Scope of Work

The scope of this EO Risk Assessment/Desk Study is to assess the likelihood of buried EO/UXO within the environs of “the sites”, in view of further development. A further aim was to evaluate the implication from UXO contamination during any future intrusive land use.

1.3 Restrictions

It must be emphasized that a desk study can only indicate the potential for UXO to be present on the site. A geophysical survey and intrusive investigation are fundamentally important to provide proof that the site is free of the UXO threat.

This study was written with the site conditions prevailing at the time of the study and no liability can be accepted for any change in the condition of the area.

Please note that our appraisal relies on the accuracy of the information contained in the documents consulted and that EOD Contacts Ltd will in no circumstances be held responsible for the accuracy of such information or data supplied.

1.4 Sensitive Documentation

Information may be classified, restricted or deemed to be confidential in nature to EOD Contracts Limited, where such material has been gained a summary of the documentation has been approved.

1.5 Objective

The objective of this document is to define the UXO contamination routes as defined in Unexploded ordnance (UXO) A guide for the construction industry (C681) dated July 2015 and offer remediation methodologies if required.

2.0 SOURCES OF INFORMATION

Research of the site's history, with regard to military usage, bombing raids and bomb impacts has been undertaken to establish the following:

- Frequency and intensity of enemy bombing raids for the site and immediate vicinity up to 500m.
- Bomb impacts and associated damage on the Site and in the immediate vicinity.
- The potential for UXO to remain on the Site and in the vicinity.
- Records of UXO removal activities for the Site and immediate vicinity.

The main sources of information consulted include:

- EOD Contracts Ltd company records
- Ministry of Defence records
- Central and Local Government Records
- Public Records Office (Kew)
- Historic Maps and Air Photography
- Open-Source information (Internet)
- Drawing Number – Clients RED Line.

2.1 Ministry of Defence (MOD) Records

33 Engineer Regiment (Explosive Ordnance Disposal) Royal Engineers is the unit responsible for maintaining the records concerning conventional Bomb incidents, reports, clearances and related UXO matters. These records are known to be incomplete and are no longer supplied. Based on in-house information released by the MOD previously, it is considered unlikely that any information released will have any significant impact on the findings of this study.

2.2 Attack Record Keeping

In general, the quality and accuracy of bombing and shelling records prior to 1939 varied greatly from one region to another. Records relating to the limited air attacks on the United Kingdom are considered to be sufficiently accurate in urban areas to provide a reasonable level of confidence in determining the likelihood that an area was or was not bombed during this period. Wartime records, maps etc held within the civil archives are considerably more comprehensive than those still in existence within the MOD, where it is acknowledged that large numbers of records have been disposed of since 1945. Records from some areas, particularly rural districts or near large bodies of water should still be regarded as an incomplete picture of the extent and effect of the bombing campaign.

2.3 Attack Record Accuracy.

While an Air Raid was in progress it was inevitable that mistakes would be made in the transcription of rushed verbal reports into the written records. Discrepancies did occur between the total of bombs dropped against detonations witnessed. In some cases, records were made several hours after the event and mistakes were inevitable. Some reports were drafted before the full extent of the raid had been determined which has led to significant omissions in the records. Reports of raids on rural areas were often witnessed and submitted by untrained individuals and passed through third parties before being recorded. Suspect UXB's occasionally went unreported by local farmers and

freeholders who saw the event as insignificant or were reluctant to report their findings for fear of valuable land or crops being destroyed by the authorities in their attempts to find the UXB.

2.4 Errors and Omissions

The accuracy of bombing records has been shown to vary greatly; this may have been a result of the individual record keeper's expertise. Additionally, in some cases, errors occurred as a result of poor or incomplete transcription and copying. Some "errors and omissions" were intentional, designed to serve as dis-information to confuse German intelligence. So long after the event, official verification of such incidents has often proven to be impossible to obtain. At present, UXBs are found on construction sites and other locations where there had been no documentary evidence to suggest their presence. These events, although infrequent, do serve as confirmation that records cannot be considered definitive.

2.5 Bibliography

The significant published documents referred to during this study are listed below:

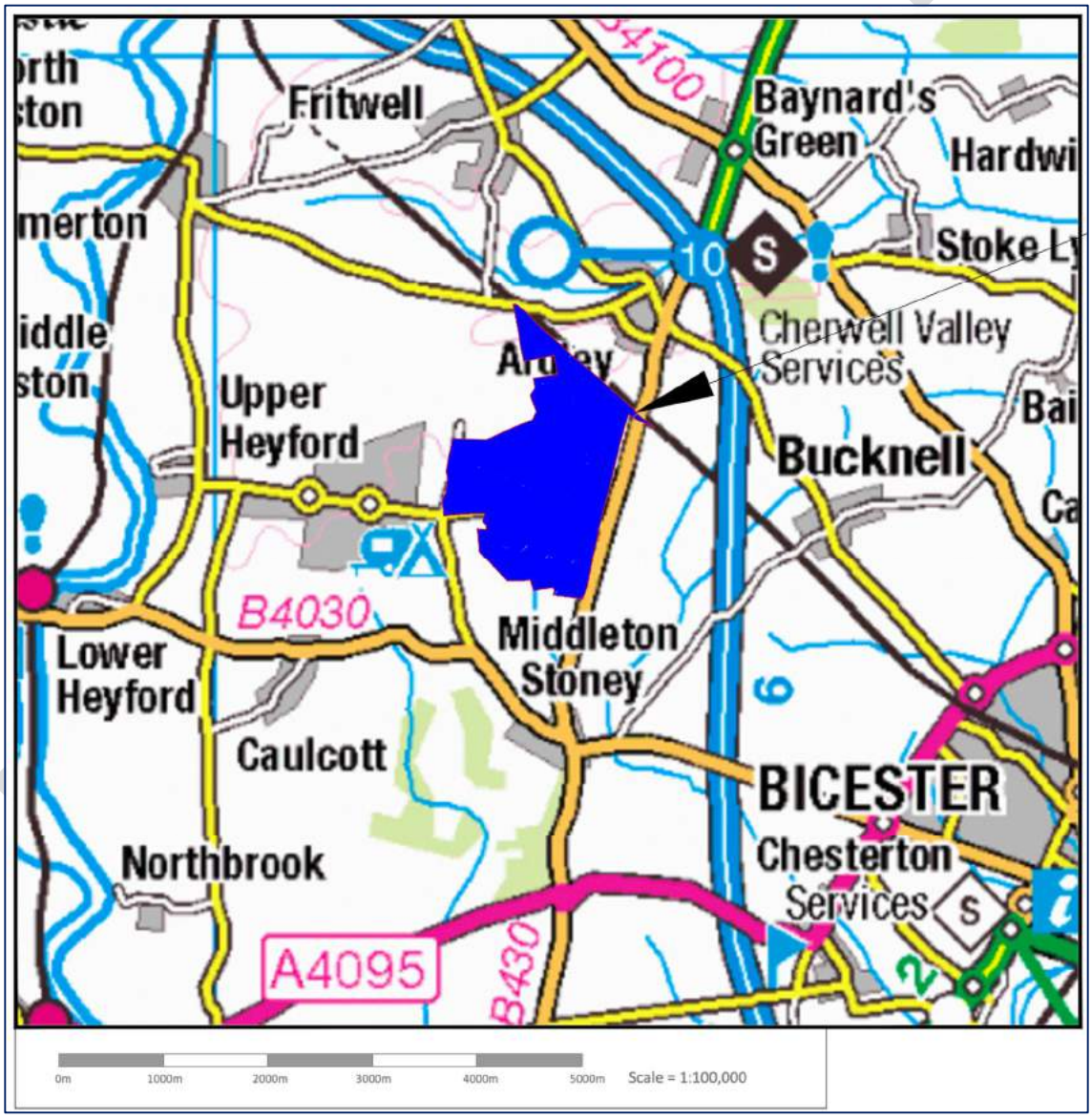
- HO 193 series from National Archives
- HO 198 series from National Archives
- HO 203/5 series (War-state and Society)
- The Blitz Then and Now Volumes 1 to 3
- AA Command Colin Dobinson
- German Air Raids on Britain 1914-1918
- Oxford City Council Records/Archives
- https://www.forces-war-records.co.uk/units/712/raf-upper-heyford
- https://en.wikipedia.org/wiki/RAF_Upper_Heyford
- https://www.oxfordmail.co.uk/news/17546873.unexploded-bomb-upper-heyford-cordon-lifted/
- https://archaeologydataservice.ac.uk/library/browse/issue.xhtml?recordId=1152087&recordType=GreyLitSeries
- https://www.heyfordparkresidents.org.uk/history/
- https://www.raf-upper-heyford.org/History.html
- https://military.wikia.org/wiki/RAF_Upper_Heyford
- http://www.hauntedhovel.com/rafupperheyford.html
- https://www.thetimechamber.co.uk/beta/sites/military/uk-sites/raf-upper-heyford
- https://www.28dayslater.co.uk/threads/raf-upper-heyford-oxfordshire-march-2020.124025/
- http://www.bbc.co.uk/oxford/content/articles/2009/02/16/raf_upper_heyford.shtml
- https://www.sofo.org.uk/ww2-bombings/

3.0 SITE DESCRIPTION AND DETAILS

3.1 Location

The Site area is located east of RAF Heyford. Due to the size of the area there are multiple access and egress to different parts of the Site.

TITLE	DESCRIPTION (CENTRE OF SITE)
Site Post Code	OX27 7PJ (Ashgrove Farm)
Grid Reference	SP 536262 / SP 5365626209
OS (X)	453656
OS (Y)	226209



3.2 Description

Photo 3.1: *The Site area at present predominantly undeveloped with only two obvious dwellings within the Site boundary (Farms). The remainder of the land appears to be agricultural in its usage.*

3.3 Geology

Lithological Description:	A pale grey to off-white or yellowish limestone, peloidal wackestone and packstone with subordinate ooidal and shell fragmental grainstone; with recrystallised limestone and/or hardgrounds at some levels with rare sandy limestone, muddy limestone, calcareous mudstone and silicate mudstone/clay. Coralliferous units (including Fairford Coral Bed) occur at or close to the top.
Definition of Lower Boundary:	The base of the described peloidal wackestone, packstone or grainstone, overlying calcareous mudstone or fine-grained ooidal grainstones of the Hampen Formation or calcareous mudstone of the Rutland Formation.
Definition of Upper Boundary:	Generally, a sharp, erosive boundary, with a cross-bedded shell-fragmental ooidal limestone of the Forest Marble Formation or mudstone of the Forest Marble Formation or Blisworth Clay Formation.
Thickness:	Up to 30 m, and typically 20 m thick in the type area.
Geographical Limits:	The Stroud to Cirencester area, where it passes south-westwards through passage into the high energy ooid limestone of the Athelstan Oolite Formation, and north-eastward through Oxon and Bucks to the south Northamptonshire area, where it passes through gradual facies change into limestone with greater terrigenous influence of the Blisworth Limestone Formation. In the subcrop, passes south-east in Berkshire into the Athelstan Oolite and Chalfield Oolite formations of the Weald (Wyatt, 2011).

Source: https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=WHL

3.4 Current Site Use

See **3.2 Description** & **Annex A**.

3.5 Future Works

At the time of writing this report it is understood that the site will be redeveloped. Therefore, it is assumed that the following intrusive construction works will be carried out:

NOTE: *The full scope of works has not been made available to ECL at the time of writing this report. However, it is believed that the carpark to the rear of the building is to be developed into 15 storey residential housing.*

- Geotechnical investigations, percussive drilling/trial pits/window/samples
- Removal of building foundations to natural ground level
- Foundations with large diameter rotary bored piling

4.0 HISTORICAL REVIEW

4.1 Historical Mapping & Aerial Photograph

Annex B contains all historic maps from which the below data has been analysed.

- Aerial Photo 1946 – The Site area at this time contains only one steading (farm). The remainder of the land appears to be utilised for agricultural purposes. No real evidence can be seen of the RAF base in close proximity to the Site.
- Historic Map 1955 – The Site has remained unchanged post WW2.
- Modern-day Aerial Photo, the Site at present is predominantly unchanged from the previous map. However, there has been significant development within close proximity to the Site location.

4.2 WWI

Although many people associate wartime bombing with The Blitz during World War II, the first airborne terror campaign in Britain took place during the First World War. Air raids in World War One caused significant damage and took many lives. German raids on Britain, for example, caused 1,413 deaths and 3,409 injuries. Air raids provided an unprecedented means of striking at resources vital to an enemy's war effort. Many of the novel features of the war in the air between 1914 and 1918—the lighting restrictions and blackouts, the air raid warnings and the improvised shelters—became central aspects of the Second World War less than 30 years later. The East End of London was one of the most heavily targeted places. Poplar, in particular, was struck badly by some of the air raids during the First World War. Initially these were at night by Zeppelins, which bombed the area indiscriminately, leading to the death of innocent civilians.

The first daylight bombing attack on London by a fixed-wing aircraft took place on 13 June 1917. Fourteen German Gotha G bombers led by Squadron Commander Hauptmann Ernst Brandenberg flew over Essex and began dropping their bombs. It was a hot day, and the sky was hazy; nevertheless, onlookers in London's East End were able to see 'a dozen or so big aeroplanes scintillating like so many huge silver dragonflies'. These three-seater bombers were carrying shrapnel bombs, which, were dropped just before noon. Numerous bombs fell in rapid succession in various districts. In the East End alone 104 people were killed, 154 seriously injured and 269 slightly injured.

The gravest incident that day was a direct hit on a primary school in Poplar. In the Upper North Street School at the time were girls' class on the top floor, a boys' class on the middle floor and an infant class of about 50 students on the ground floor. The bomb fell through the roof into the girls' class; it then proceeded to fall through the boys' classroom before finally exploding in the infant class. Eighteen students were killed, of whom sixteen were aged from 4 to 6 years old. The tragedy shocked the British public at the time.

There are no recorded incidents of the Site being targeted during WWI.

4.3 WWII

4.4 The Blitz Around Britain

The 'Blitz' – from the German term Blitzkrieg ('lightning war') – was the sustained campaign of aerial bombing attacks on British towns and cities carried out by the Luftwaffe (German Air Force) from September 1940 until May 1941.

The Blitz began on 7 September, 'Black Saturday', when German bombers attacked London, leaving 430 dead and 1,600 injured. London was then bombed for 57 consecutive nights, and often during daytime too. London experienced regular attacks and on 10-11 May 1941 was hit by its biggest raid. German bombers dropped 711 tons of high explosive and 2,393 incendiaries. 1,436 civilians were killed. However, this proved to be the last major raid until January 1943.

While London was bombed more heavily and more often than anywhere else in Britain, the Blitz was an attack on the whole country. Very few areas were left untouched by air raids. In relatively small compact cities, the impact of a severe air raid could be devastating.

From mid-November 1940, major provincial cities and industrial centres were targeted. In early 1941 another wave of attacks began, primarily against ports. Respite finally came from June when much of the Luftwaffe was directed against Russia and targets in the Mediterranean.

4 .5 Oxfordshire during the Blitz

PHOTO 4.1: *This shows that there were 3831 bombs of all types dropped over Oxfordshire, causing 20 deaths and 60 other casualties, as well as 65 head of cattle. Over 300 houses were damaged as well as other buildings and utilities.*
NOTE: *Upper Heyford falls within the Rural district of Banbury.*

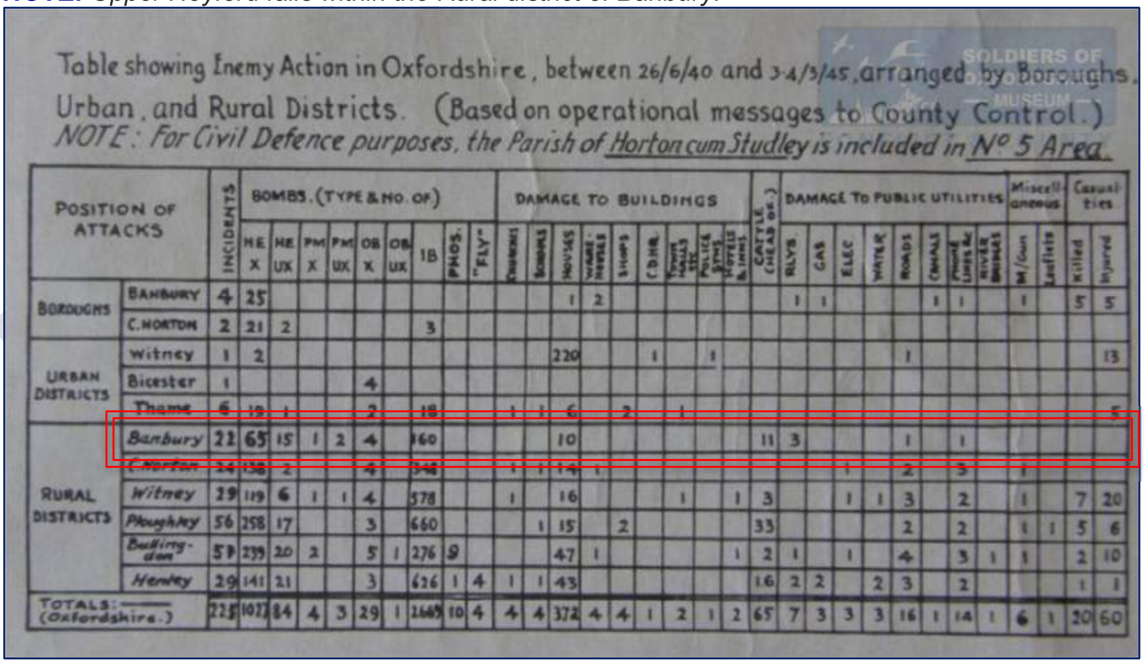


Table showing Enemy Action in Oxfordshire, between 26/6/40 and 3-4/5/45, arranged by Boroughs, Urban, and Rural Districts. (Based on operational messages to County Control.)
NOTE: For Civil Defence purposes, the Parish of Horton cum Studley is included in Nº 5 Area.

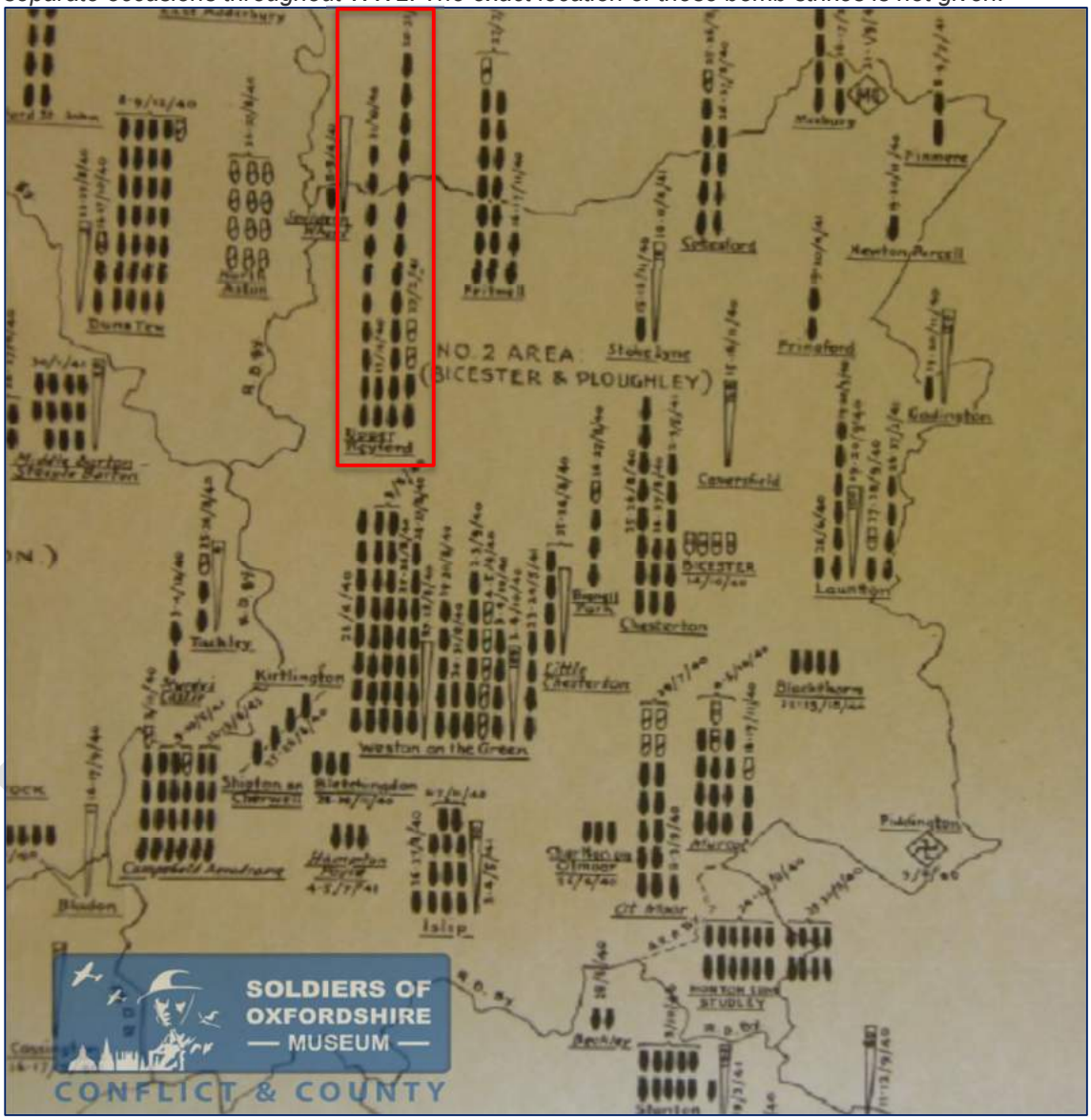
Position of Attacks		Incidents	Bombs (Type & No. of): HE X	HE UX	PM X	PM UX	OB X	OB UX	IB	Phos.	"Fly"	Damage to Buildings: Churches	Schools	Houses	Warehouses	Shops	C.D.HQ.	Town Halls etc.	Police Stns	Hotels & Inns	Cattle (Head of)	Damage to Public Utilities: Rlys	Gas	Elec	Water	Roads	Canals	Phone Lines &c	River Bridges	Miscellaneous: M/Gun	Leaflets	Casualties: Killed	Injured
Boroughs	Banbury	4	25											1	2							1	1				1	1		1		5	5
	C.Norton	2	21	2					3																								
Urban Districts	Witney	1	2											220			1		1							1							13
	Bicester	1					4																										
	Thame	6	19	1			2		18			1	1	6		2		1															5
Rural Districts	Banbury	22	65	15	1	2	4		160					10							11	3				1		1					
	C.Norton	24	138	2			4		348			1	1	14	1									1		2		3		1			
	Witney	29	119	6	1	1	4		578			1		16				1		1	3			1	1	3		2		1		7	20
	Ploughley	56	258	17			3		660				1	15		2					33					2		2		1	1	5	6
	Bullingdon	57	239	20	2		5	1	276	9				47	1					1	2	1		1		4		3	1	1		2	10
	Henley	29	141	21			3		626	1	4	1	1	43							16	2	2		2	3		2				1	1
Totals: (Oxfordshire.)		225	1027	84	4	3	29	1	1665	10	4	4	4	372	4	4	1	2	1	2	65	7	3	3	3	16	1	14	1	6	1	20	60

Upper Heyford & RAF Heyford During WW2

Towards the end of World War 1, RAF Upper Heyford was established by the Royal Flying Corps. During World War 2 it served a number of units and was predominantly involved in the training of bomber crews in the 16th OTU (operational training unit), flying Handley Page Hampden bombers. Number 18 squadron, equipped with Bristol Blenheim Bombers, was also based at Upper Heyford at the start of the war by 1944, the airfield had three concrete runways and six aircraft hangars (Type A). After World War 2, the base was the home of the No. 1 Parachute Training School.

Although bomb maps indicating the exact location of strikes could not be identified ECL does hold within its archives the below map which shows the Site location.

PHOTO 4.2: *The below map is number 2 of 5 maps drawn up by F.C. Condon, the Chief BRO (Bomb Recording Officer) in Oxfordshire in 1945. It shows that Upper Heyford was targeted on 4 separate occasions throughout WW2. The exact location of these bomb strikes is not given.*



During the Cold War, the base was leased to the United States and taken over by the US Air Force and initially served as a base for the United States Air Force Strategic Air Force Command. Three other airfields that were surplus after World War 2 were also leased to the Americans, these being Brize Norton, Fairford and Greenham Common. On the 26th of June 1950, 801st Aviation Engineering Battalion moved to the site and extended the runway from 6000ft to 8300ft and constructed hard stands capable of holding the Strategic Air Commands B-36 & B-50 bombers. On the 15th of May 1951, the base was formally handed over to the USAF 3rd Air Force and 328th Bombardment Squadron moved to the base. The first Aircraft to arrive at the airfield were 15 B-50s, and six months later, the full complement of 45 aircraft arrived at the base, and in 1954, the B-36 Peacemakers started to arrive.

In the 1960's, the arrival of B-52 bombers started, and became a regular occurrence throughout the 60's. In the summer of 1962, the Soviets escalated their testing of nuclear weapons behind the Iron Curtain and this saw a detachment of U-2 spy planes operating from the base. Their mission was to take air samples from the upper atmosphere to try and determine the characteristics of the new weapons. In 1964, the base was re-designated the 3918th strategic wing. Later that year, the SAC (Strategic Air Command) bomber aircraft in the UK were stood down, and the bases at Greenham Common, Brize Norton and Fairford were put on care and maintenance and were in a state of deployment without equipment, ready to be reactivated in a short period of time.

With France pulling out of NATO in 1966, and American units being ordered to leave the country, Upper Heyford was now to serve as a base for the 66th Tactical Reconnaissance Wing. The Unit moved in during September of that year and brought with them the RF-101 aircraft. In 1968, the RF-101 were replaced with the new RF-4C Phantoms. However, these planes were moved from the base 2 years later. That same year the 20th Fighter Tactical Wing were moved to the base, because of the stand down of RAF Wethersfield. With the move of the 20th fighter Tactical Wing, new aircraft arrived at the base. These were the F-111 Aardvark tactical strike aircraft.

During the operation of RAF Upper Heyford, the base was involved in two major sorties. The first was Operation El Dorado Canyon, which was a strike on Libya, where 20 F-111's and 5 EF- 111 were launched from the base. The second was during Operation Desert Storm, where 1,798 combat sorties were flown, and 4,714 tonnes of ordnance dropped on various targets throughout Iraq. Upper Heyford saw zero losses during these operations. After the Cold War, and the Gulf War, RAF Upper Heyford was deemed surplus to requirements and gradually phased out. The last plane left on the 7th of December 1993. On the 30th of September 1994, the base was returned to the Ministry of Defence. The base now stands derelict, with various activities happening on site, and English Heritage have listed the site as a conservation area as it is the best-preserved Cold War airbase in England.

During the 1980's when the Cold War was at its height, the base was home to a Nuclear Peace Camp, similar to the one at Greenham Common. The camp was protesting the fact that there were planes on fast responses armed with Nuclear Weapons. One of the largest demonstrations happened in 1983, and over 700 people were arrested as a result.

4.6 Abandoned Bombs/UXO

EOD Contracts records could find no evidence of any items of UXO abandoned in or around the subject site.

4.7 Anti-Aircraft Artillery

There is no evidence to suggest there was a HAA Gun Emplacement within the Site location. However, due to the nature of the Site location this cannot be ruled out.

4.8 Prior Clearance Operations

EOD Contracts could find no evidence to suggest that there have been any prior UXO clearance operations in or around the site footprint.

4.9 V1 & V2 Bomb strikes

There is no evidence to suggest that the Site or its surrounding area was targeted with one of these weapon systems.

5.0 SOURCES OF UXO CONTAMINATION

The main source of UXO contamination that are deemed a threat to the Site are:

- Air delivered ordnance bombs and sub-munitions/incendiaries.
- Buried or discarded items of ordnance.
- Close proximity to a military establishment

5.1 GENERAL

EOD Contracts conclude that a **MEDIUM** risk is considered to exist with respect to UXO for areas within the site footprint.

- The Site area has remained relatively unchanged, with very little construction works carried out within its boundary.
- RAF Heyford/Upper Heyford was the subject of bombardment throughout WW2, being targeted on at least four separate occasions. The exact whereabouts of where these bombs landed is unknown.
- HAA gun emplacements could have been located within the Site boundary.

UXOs are essentially dangerous; therefore, further information on UXO and Safety is detailed in **Annex D.**

5.2 BOMB PENETRATION DEPTHS

5.3 Weapon Sub-surface Penetration.

Weapons penetrate a significant depth into the ground and other types of ammunition are designed to permit the weapon time to penetrate deeply into the target before detonating a short time after coming to rest or a considerable number of hours afterwards. The second reason is where the weapon has failed to function as designed becoming a UXB. A number of studies have been carried out into weapon penetration and it is an inevitable consequence of a number of variable factors acting on the bombs trajectory that figures can and do differ significantly. Careful consideration must be given to the weapon's velocity, trajectory and shape. Also surface conditions and subsurface geology. The largest of the common German bombs, (500kg) can penetrate to significant depths given favourable conditions for penetration. In the case of projectiles and shells, the potential for deep penetration is significantly less.

5.4 Penetration Assumptions.

A number of assumptions were used in determining the maximum threat depth within the project footprint, which were.

5.5 Factors Affecting Penetration

The penetration of sub-surface bombs will be affected by the following:

- Height of release
- Weight, shape and design of bomb
- Aerodynamic qualities
- Angle of flight and impact
- Nature of impact surface

- Nature of sub soil

The expected bomb depths for the site assuming the following criteria:

- 15,000 feet, the vast majority of bombs were dropped from height to avoid AA fire and balloons
- General Purpose Bombs of 50kg to 1000kg
- Near Vertical impact 80 to 90 degrees
- Surface geotechnical conditions are made ground
- Subsurface geotechnical conditions are generally clays.

Therefore, the expected depths for Air dropped UXBs on site are indicated in **RED** in the following table:

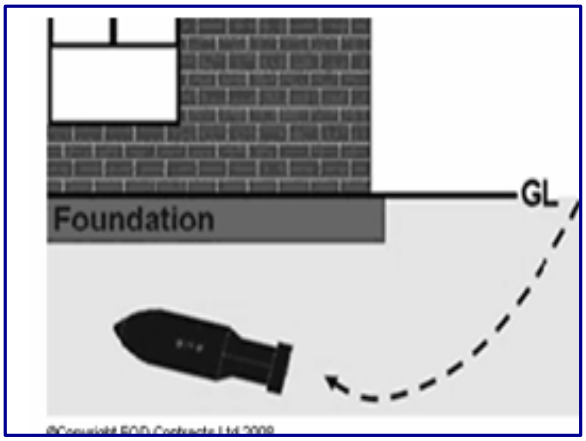
TABLE 5.1: *Bomb Penetration Depths*

	Bomb Weights			
Sub Soil Type	50kg	250kg	500kg	1000kg
Soft Rock	**2.442**	**5.016**	**6.006**	**7.062**
Gravel	2.442	5.016	6.006	7.062
Sand	**2.442**	**5.016**	**6.006**	**7.062**
Chalk	3.7	7.6	9.1	10.7
Shingle	3.7	7.6	9.1	10.7
Dry Clay	3.7	7.6	9.1	10.7
Wet Sand	5.55	11.4	13.65	16.05
Wet Clay	5.55	11.4	13.65	16.05
Average Offset (m)	**0.8-1.6**	**1.6-3.7**	**3-4.5**	**3.4-5.3**

Bombs on penetration of the surface do not follow a straight-line trajectory they can and do curve; this is called a “J” curve where the bomb’s path bends back towards the surface. This gives what is known as the Offset, which may place a bomb under a structure and at a shallow depth.

Figure 5.1 – 5.3: Sub-Surface Trajectories & Safety Buffers

Figure 5.1: *Common Sub-Surface Trajectory &* ***Figure 5.2:*** *Anomalous Sub-Surface Trajectory*



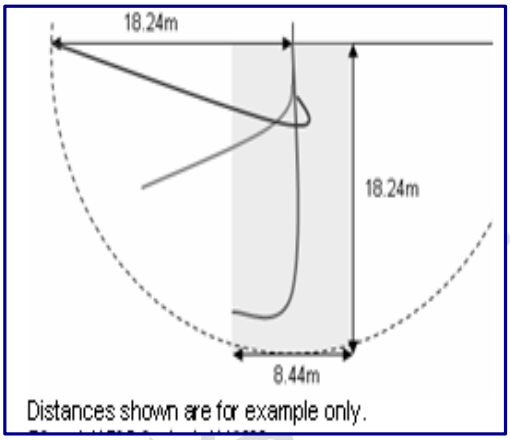
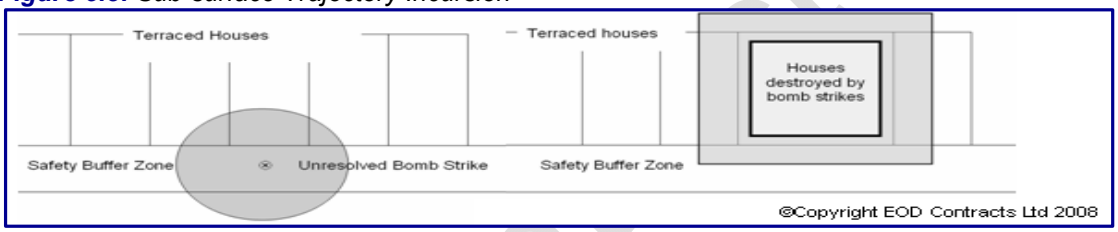


Figure 5.3: *Sub-surface Trajectory Incursion*



NOTE: *the common sub-surface trajectory will follow a path best described as a 'J' curve. The curve can result in a weapon coming to rest some distance from its impact point. The distance from impact point to resting place is referred to as the "Off set Distance and is normally considered to be 1/3 of the depth. This mechanism can permit a weapon to strike outside a building and travel below ground finally coming to rest within the building footprint. Where a strike is known to have occurred close to a building or structure such as a dock wall, a danger zone should be considered to exist around the area of the strike of sufficient size to accommodate the likely sub-surface travel distance for the weapon.*

NOTE: *the typical offset distance is shown as the shaded area, on rare occasions a near surface deflection of the weapon can occur and the offset distance can be substantially increased up to 5/4 of the penetration depth. This mechanism does however reduce the penetration depth considerably with the net result that while the offset is increased the overall travel distance is for the most part unaffected.*

NOTE: *scenario 1 (Figure 5.1) shows a hypothetical bomb strike outside a structure or building. The strike location has been accurately identified and as a consequence; a potential danger zone (circular shaded area) can be placed around the point of impact. Scenario 2 shown top right; depicts a direct HE bomb or Incendiary strike within a building which totally destroyed the building. In circumstances such as this UXB entry the building rubble may have concealed hole and the weapon may still be present within the building footprint or it may have travelled sub-surface and come to rest outside the footprint. Here the danger zone (square shaded Area) extends outwards on all sides of the original building footprint.*

5.6 Recent UXO finds within the UK

The present-day threat of finding items of UXO within the UK is still high, as highlighted within **Annex E**.

PHOTO 5.1*: On (or around the) 2nd April 2019. Two items of ordnance were located within a construction site on Camp road (Upper Heyford). The two devices were subsequently destroyed by a bomb disposal team from the RAF.*
SOURCE*: https://www.oxfordmail.co.uk/news/17546873.unexploded-bomb-upper-heyford-cordon-lifted/*

6.0 RISK ASSESSMENT

6.1 Risk Assessment

Assessing both the likelihood of occurrence and the consequences of the encounter has derived the overall risk for the site from unexploded ordnance. Review of the site's history and geographic location can provide an overall likelihood of encounter factor, which is used in the subsequent determination of a risk level when a Figure can be determined for the consequence.

6.2 Likelihood of Encounter

Given the study findings and other criteria (See **Annex F** Tables) it is considered that there is a **MEDIUM** risk of encountering UXO within the site footprint. This finding is based on assessment of all of the available information.

6.3 Consequence of Encounter

The consequence (See **Annex D**) of an uncontrolled encounter with UXO, given its lethal design and its unpredictable nature could be catastrophic and warrants a high severity factor. With regards to the consequences, the following factors were considered:

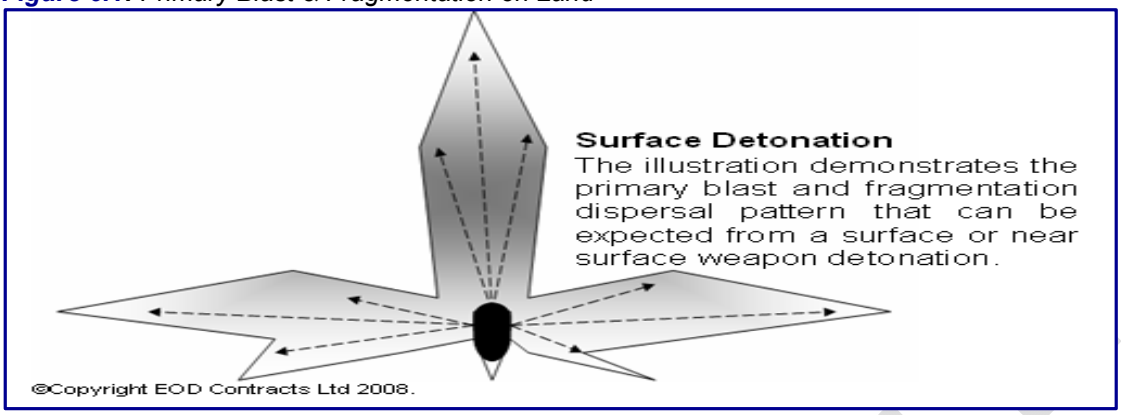
The project works may make use of a number of common ground investigation and construction techniques in its methodology during the project. Any intrusive groundwork has the potential to encounter UXO.

Intrusive earthwork, piling driving and dynamic ground compaction are by nature, aggressive, significant force (kN) is often required to achieve the desired results. As a precaution it is prudent to assume that any external stimulus, no matter how slight, may result in an unstable weapon detonating.

Records of encounters with UXO, particularly where plant machinery has been involved have resulted in detonations of the items with varying degrees of consequence; ranging from slight injuries sustained to piling contractors when a bomb detonated at 6.0m bgl to fatal injuries sustained to a construction worker while conducting near surface machine works on a motorway.

Detonation on land; the effects of a detonation at depth will be more localised and less destructive than one occurring on the surface. Figure 6.1 shows an illustration of the primary blast and fragmentation dispersal from explosive ordnance when it detonates on the surface. The weapon's design, and other key factors such as the ratio of explosive charge weight to total weapon weight (CWR) and the Net Explosive Quantity (NEQ) will determine the size and effects of a blast. The effects will also be enhanced or reduced by a number of factors including, the presence of other energetic materials in close proximity to the blast or if the weapon is buried or exposed on the surface. As a guide Figure 6.1 gives an indication of the likely blast radius for common types of UXO.

Figure 6.1: *Primary Blast & Fragmentation on Land*



In addition to the dangers of explosion, many common chemicals used in the manufacture of explosive ordnance fillings are; in sufficient quantity, and level of exposure, toxic or poisonous. Although it is unlikely that such chemicals would be encountered in significant quantity to represent a significant risk to personnel, leakage or venting could pose a risk to the local marine environment. In addition to heavy metals; copper, lead, zinc etc used in the weapon body and fuze, hydrocarbon propellants such as Kerosene may also be present.

6.4 Risk Level

The overall risk has been determined to apply to all of the ground within the site footprint.

The prevailing risk level has been determined to be **MEDIUM** risk.

6.5 Encounter Consequences

It is acknowledged that when viewed from a “likelihood versus consequence” scenario; the consequences of an explosion may have the potential to include:

- Multiple casualties or fatalities.
- Extensive damage to high value private and public assets and property.
- Significant delays to the construction project.

6.6 Those at Risk

The risk is considered to have the potential to pose a direct and indirect threat to a wide range of individuals and facilities. While the impact on fixed assets can be estimated based on the asset’s proximity to the seat of the explosion. The impact to transient assets and people will, for the most part, be the result of both; proximity to the explosion and the time at which the event occurs. The overall impact therefore has the potential to range from little more than a minor localised event to a level, which may be considered to be a more widespread major incident involving some or all of the following:

- Construction and other specialist personnel carrying out the work.
- General public in open spaces, at their places of work and transient population on foot or road users in proximity to the construction work.
- Public services including transport, water, gas and electricity supplies.

- Public facilities, including buildings, vehicles, other high value assets and equipment.
- Private business property including construction equipment.
- Private residential property in proximity to the work.

6.7 At Risk Activities

Based on our understanding of the scope of the most common construction projects, it is considered that a wide range of intrusive processes may be required to complete the project. Any intrusive groundwork's have the potential to encounter UXO and each activity therefore has a degree of risk attached to it. The severity or level of the risk is derived as a consequence of activity's; location, methodology and volume or quantity of risk material to be worked, at risk activities are considered to include:

- Intrusive geotechnical and archaeological investigations including drilling and pitting.
- Foundation construction, trenching and other excavations.
- Intrusive construction works, which may include piling. The study findings and other criteria (See **Annex F** Tables) it is considered that there is a **MEDIUM** risk of encountering UXO within the site footprint.

7.0 CONCLUSIONS

Based on the information researched by EOD Contracts Ltd for the proposed works being carried out on the land to the NE, E, SE of RAF Heyford, EOD Contracts Ltd can conclude the following.

There are no recorded incidents of the site being the subject of bombardment throughout WW1. However, the RAF station was operational throughout this period but only for training purposes.

Upper Heyford/RAF Heyford was targeted on at least four separate occasions throughout WW2. The exact location of where these bombs landed is not available (or likely exists).

The Site area itself would not have been considered a viable target to the Luftwaffe. However, its close proximity to RAF Heyford negates this fact. The Site area is situated at the eastern edge of the main runway, bombing accuracy throughout this period was very low meaning bombs dropped could easily overshoot their intended target.

There was no evidence to suggest that there was a HAA/LAA Gun Emplacement located within the Site area. However, again due to the Sites proximity to the RAF station this cannot be ruled out. This premise is also relevant when considering the placement of trenching/defensive positioning & military troop training.

The Site has remained relatively unchanged post WW2.

Therefore (to summarise) EOD Contracts Ltd deem that there is a **MEDIUM** Risk pertaining to items of UXO being located within the Site location.

8.0 RECOMMENDATIONS

It is recommended that the following risk mitigation strategy be executed during phases of the project indicated previously indicated as a **MEDIUM** risk.

Communicating the risks, all stakeholders should be made aware of the UXO situation on the site and the possible impact it may have on the project works and day to day running of the district. Clients have a legal duty under the Construction Design & Management Regulations (CDM) and Health & Safety at Work legislation to provide Designers and Contractors with project specific information needed to identify hazards and risks associated with the design and construction work. The possibility that UXO may be encountered on site falls within the category of a significant risk and as such it should be addressed as early as possible in the lifecycle of the project.

Further planning; the risks posed by UXO should be brought to the attention of the Project CDM Coordinators and other individuals with a responsibility for project safety and operations at the site. The matter of UXO should be considered critical to project safety and one requiring high priority action.

UXO safety awareness training should be given at all levels of site personnel and selected individuals on the project staff with relevant responsibilities. A competent person as part of the project safety induction course should provide the awareness training. It should be reinforced with specific safety briefings and toolbox talks to individuals involved in conducting intrusive earthworks.

Project overview and the responsibilities of those working on site with regard to duty of care and public safety.

UXO recognition and safety procedures to be followed on discovery of a suspicious object or the alarm being sounded.

Emergency procedures to be followed in the event of an explosion. Evacuation routes, muster stations and accounting for personnel.

Work permits, works methodology and specific UXO risk mitigation methods. Post-incident inspections and returning to normal works.

Prior to any intrusive piling or drilling commencing, UXO safety testing and appropriate clearance certification into the ground to sufficient depth to provide clearance from UXO. This can be done using a progressive drilling process or (where large numbers of piles are to be placed and ground permitting) using a vehicle borne hydraulic system to push a magnetometer into the ground to test for the presence of UXO prior to piling.

UXO safety monitoring of all “at risk” excavations, including geotechnical or archaeological trial pits to be conducted during the project. This should be provided by a UK Home Office Authorised EOD/UXO Contractor using qualified EOD Engineer with specialist locators and detectors to scan the ground ahead of the excavation wherever possible.

9.0 SPECIFICALLY

Geotechnical investigations, percussive drilling/trial pits/window/samples, require an EOD Engineer over watch.

The removal of all buildings within the site footprint can be removed down to natural ground level (including basements).

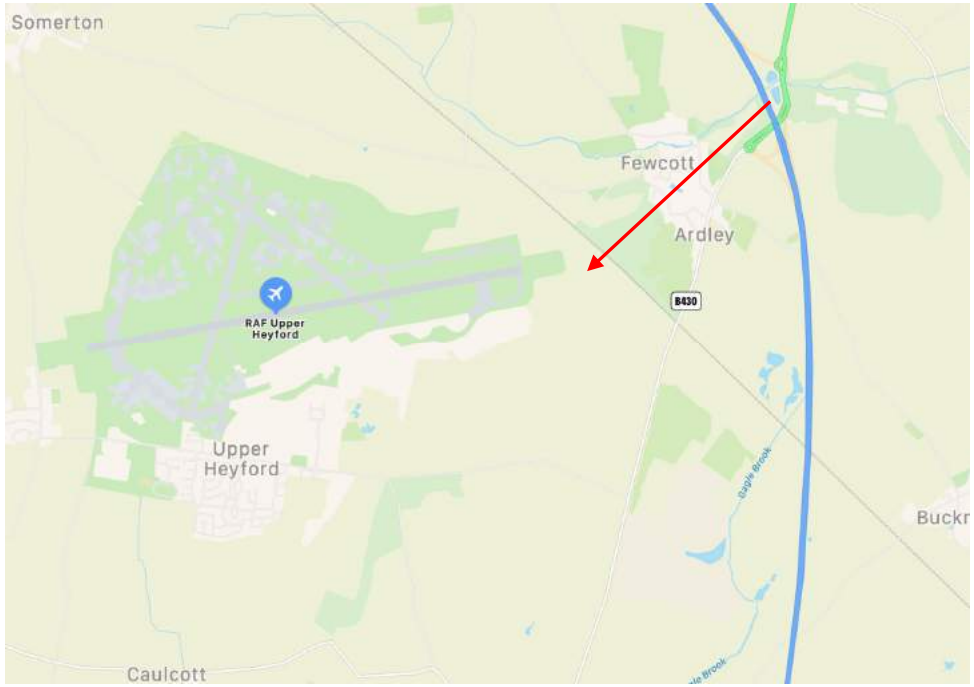
New foundations with piling should be mitigated by the insertion of a magnetometer to encompass the pile position, this would be carried out using a CPT rig (magcone), the expected radius of the magcone is 1.5m therefore multiple piles could be checked.

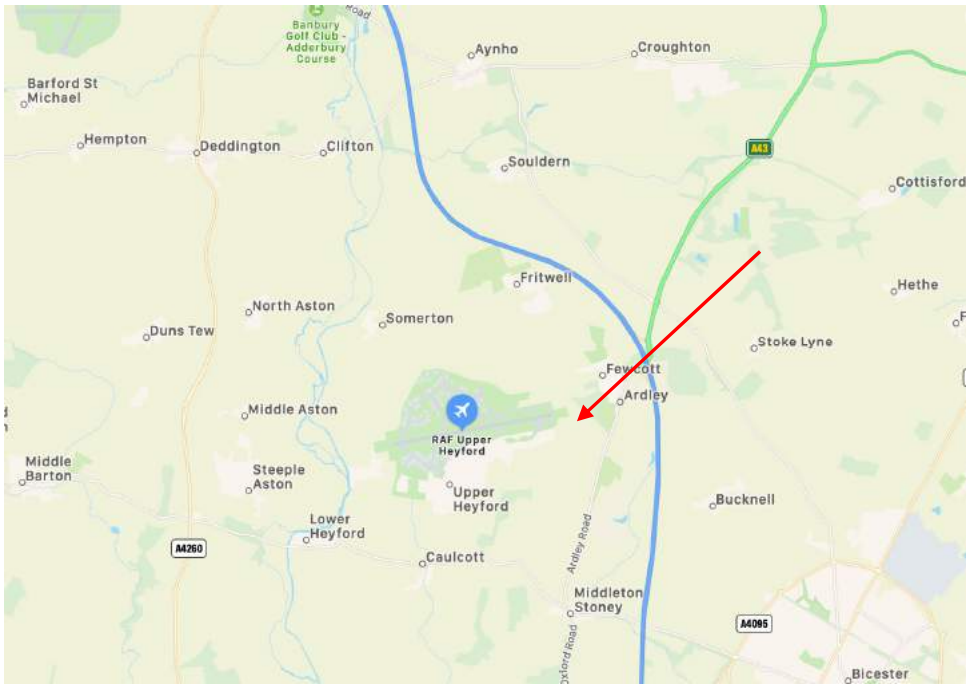
Non-Intrusive Magnetometer surveys generally prove inconclusive on “Brownfield sites”, this is due to the high ferromagnetic background, therefore this methodology is not recommended for this site and shallow excavations should be overseen by a qualified EOD Engineer. This methodology could however be used on the grassed areas within the site confines.

Annex A

SITE LOCATION

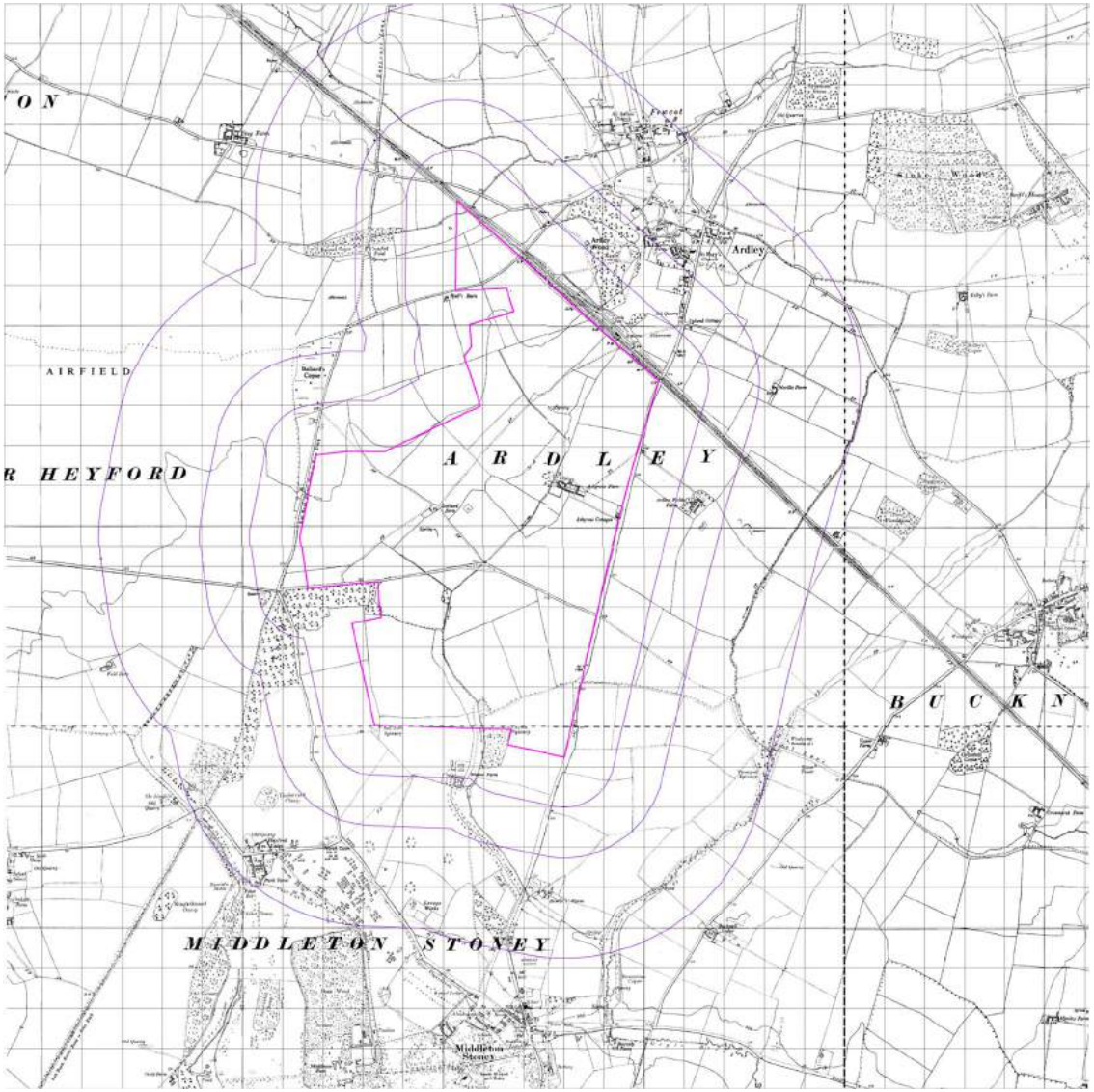
NOTE: *Site indicated by red arrow. Due to the size of the Site area, there are multiple access and egress.*





Annex B

HISTORIC MAPPING



Annex C

BOMB RAIDS WWI

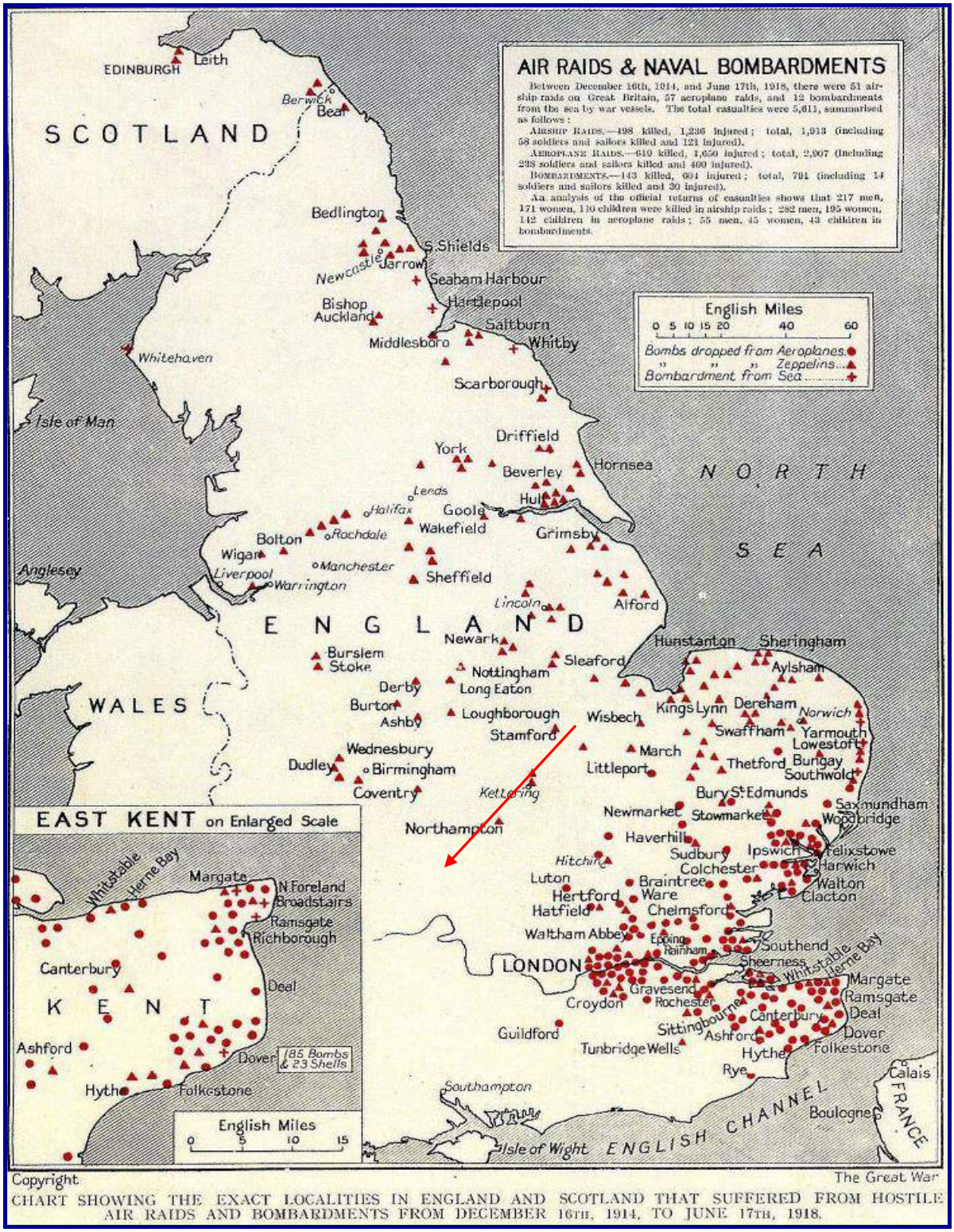


CHART SHOWING THE EXACT LOCALITIES IN ENGLAND AND SCOTLAND THAT SUFFERED FROM HOSTILE AIR RAIDS AND BOMBARDMENTS FROM DECEMBER 16TH, 1914, TO JUNE 17TH, 1918.

NOTE: Site indicated by red arrow.

Annex D

EXPLOSIVE ORDNANCE SAFETY AND INFORMATION

UNEXPLODED ORDNANCE

Since the end of WWII, there have been a limited number of recorded incidents in the UK where bombs have detonated during engineering works, though a significant number of bombs have been discovered.

The threat to any proposed investigation or development on the site may arise from the effects of a partial or full detonation of a bomb or ordnance item. The major effects usually being shock, blast, heat and shrapnel damage. It should be noted that the detonation of a 50kg buried bomb could damage brick/concrete structures up to 16m away and unprotected personnel on the surface up to 70m away from the blast. Larger ordnance is obviously more destructive. Table 1 denotes recommended safe distance for UXO.

Table 1: Safety Distances for Personnel

UXO (Kg)	Safety Distances (m)			
	Surface UXO		Buried UXO	
	Protected	Unprotected	Protected	Unprotected
2	2O	200	10	20
10	50	400	20	50
50	70	900	40	70
250	185	1100	120	185
500	200	1250	140	200
1000	275	1375	185	275
3000	450	1750	300	450
5000	575	1850	400	575

Explosives rarely become inert or lose effectiveness with age. Over time, fuzing mechanisms can become more sensitive and therefore more prone to detonation.

This applies equally to items that have been submersed in water or embedded in silt, clay, peat or similar materials.

Once initiated, the effects of the detonation of the explosive ordnance such as shells or bombs are usually extremely fast, often catastrophic and invariably traumatic to the personnel involved.

The degradation of a shell or bomb may also offer a source of explosive contamination into the underlying soils. Although this contamination may still present an explosion hazard, it is not generally recognised that explosives offer a significant toxicological risk at concentrations well below that at which a detonation risk exists.

TYPES OF ORDNANCE

German Air Delivered Ordnance. Technical information on the nature and characteristics of the ordnance used by the German Air Force during both world wars has been available for a number of years. Assessment that began during the 1930's has continued to the present day. Experts have conducted research in many countries as part of national research programmes and as individual research projects. Consequently, a well-informed assessment of the threat posed by unexploded

ordnance, and the hazards that they represent, can be made with a high degree of confidence.

Terminology. It should be noted that two terms used in bomb records can lead to some confusion as to their meaning and therefore significance. The term Unexploded Bomb (UXB) refers to a bomb that has fallen, failed to function and has been subsequently dealt with and removed from the site. The term Abandoned Bomb (A/UXB) refers to a UXB that could not be found or recovered, or the decision was taken not to pursue the matter further. Consequently the unexploded bomb remains where it came to rest when it was dropped or fell to the present day. It should also be noted the word 'bomb' can be used to describe an airdropped bomb or a shell as in some cases no differentiation was made and the term was interchangeable.

Abandoned Bombs. The records of known abandoned unexploded bomb locations in the London area were released in response to a written Parliamentary Question from Simon Hughes. (Hansard: Volume; 282. Dated 15th October 1996). The information was provided by the Ministry of Defence (MOD) and supplied under an indemnity.

Explosive Ordnance Failure Rates. Over the course of both World Wars a considerable quantity of ordnance dropped on UK targets failed to function as designed and subsequently penetrated the ground without exploding. Information gathered during the war by the MOD and its research partners provide typical failure rates for different types of ordnance. Figures significant to this study are:

- 10% of all German airdropped bombs failed to function as intended.
- 30% of all anti-aircraft and other types of shells failed to function as intended.

Deductions & Considerations. The following points were considered as part of the assessment and have been given due consideration:

Records were found that indicated that the general area was subjected to heavy bombing.

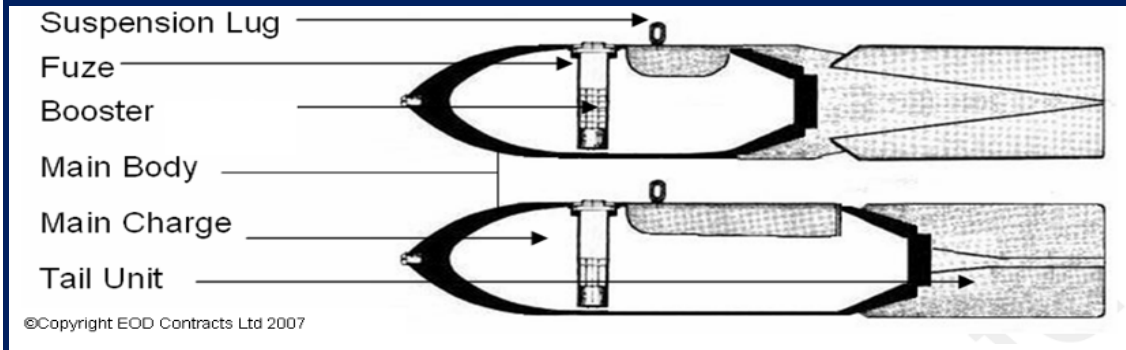
Bombs, which struck previously, hit or burned out targets and did not function; consequently their impact was unseen and therefore no report was ever made.

In all likelihood, the local anti-aircraft battery would have fired a far higher number of shells than the bombers dropped HE bombs. Contamination by anti aircraft shells cannot be rules out.

Generic German Bomb Types. The majority of German bombs dropped were 50kg in weight, accounting for approximately 16% of the total bombs dropped. The range of common bombs increased in weight to a maximum of 1700kg. Regardless of size, German bombs were fitted with one or more Electrical Condenser Resistance (ECR) fuzes many of which included a mechanical component. The fuzes were mounted transversely in the bomb body with the booster directly below, and in contact with, the fuze. The booster; sometimes referred to as the Gaine, is composed of a sensitive explosive material (Picric Acid). Picric Acid is known to deteriorate over time becoming increasingly unstable. The internal layout of two common German bombs and a German fuze is shown in Figures 6.1 & 6.2.

FIGURE 1: Generic German Bomb Design.

Graphic Cross Section through the most common German bombs (50kg)



NOTE: the diagram shows that there can be a significant difference in the quantity of High Explosive contained within bombs of similar size and shape; the Grade 1 bomb on the bottom having 30% more HE than the Grade 2 shown at the top. This serves to demonstrate the importance of an accurate identification of any item of UXO.

FIGURE 2: Generic German Bomb Fuze Design.

Graphic Cross Section through a typical German fuze (ECR)

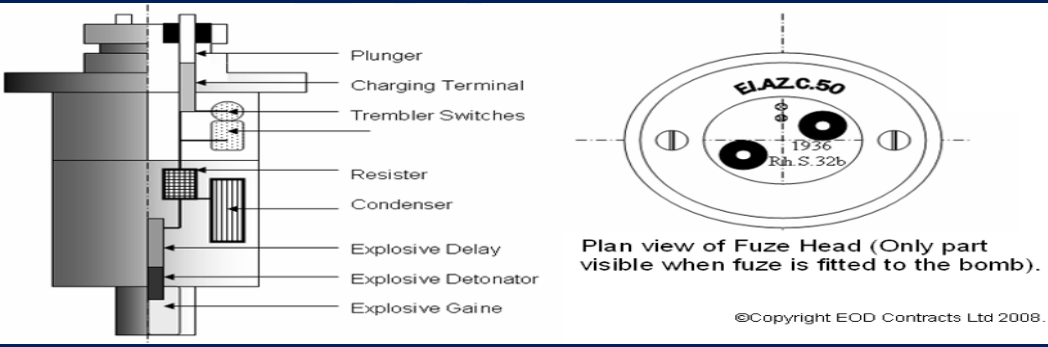


FIGURE 3: Range of HE bombs dropped on the United Kingdom.

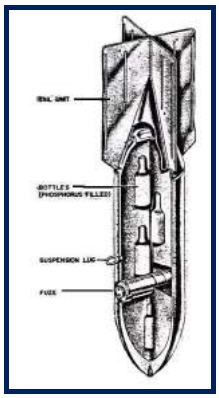
NOTE: The smaller sub-munitions (Bomblets) seen to the right, ranged in size between 1 and 3kg, were dropped in large numbers and were intended as incendiary bombs, anti-personnel bombs or as bombs filling both roles. The smaller bomblets were dropped in larger container bombs designed to hold between 360 and 620 of the bomblets. The containers were designed to burst open at a predetermined height above ground level, dispersing the bomblets over a wide area. Air raid damage was far greater by using both incendiary, and HE bombs on a single raid. The fires started by the incendiaries being rapidly spread by the blast waves from the HE bomb. This scenario was shown to devastating effect on the 14th February 1945 in the German city of Dresden. Where fires started and spread by the bombing increased to a point where the oxygen was being sucked into the flames at such a high speed that the fire became a “Fire Storm”. At the time the city's population had increased due to a high number of refugees fleeing the Russian advance to the east, the exact civilian death toll from fire and suffocation will never be known, but is considered to be somewhere between 25,000 and 100,000.

High Explosive (HE) Bomb. Some of the most common type of ordnance to be dropped on the United Kingdom, HE bombs are often the type encountered as UXBs. Relatively thick cased, they are still recovered in remarkably good condition. Ranging in size from 50 to 1700 kg, their typical release height (1,500m) allowed them to penetrate deep into the ground as a result of design or flaw. Towards the end of the bombing campaign, as steel became scarce the German Engineers produced a range of bombs that used steel reinforced concrete as the bomb body. Figure 6.3 shows the range of steel HE bombs dropped on the UK.

Incendiary Bomb. The larger incendiary bombs, containing bottles of white phosphorus and an incendiary mixture contained within a thin steel case were designed to burst on contact with the ground. A fixed dispenser on the aircraft delivered the smaller type of bomb or ‘Bomblet’ to the target area in container bombs or; both types of container would open dispersing the smaller Incendiary bombs. Relatively small and light they were unlikely to penetrate the ground to any significant depth. However, once concealed in bomb damage rubble or below water they were easily missed and are still unearthed today from in-fill and drained land. Later versions of the incendiary bomb contained an additional explosive charge used as a short delay “Booby Trap” device that contained a significant amount of high explosive. The Booby Trap component was designed to kill or injure fire fighters and hinder the damage control. See Figure 4.

FIGURE 4: Incendiary Bombs.

Common German Incendiary Bombs



Left, 1kg incendiary bomblet, and right a 50kg incendiary bomb containing bottles of white phosphorus.

NOTE: Incendiary bomblets were made of a flammable alloy similar in appearance to aluminium, which resists corrosion well. The tail unit was made of thin tin-plate steel and is more prone to have rusted away. Some Incendiary models were fitted with a High Explosive (HE) steel nose. With the tail and explosive nose attached the bomb was 480mm long.

Blast Bomb / Parachute Mine. The parachute mine was extensively used on land and at sea and was fitted with specialist fuzes designed to trigger the weapon at a predetermined altitude, water depth or to switch on other magnetic influence mechanisms to trigger the weapon when a ship approached (Magnetic or Acoustic influence). While early versions were based on the standard 1000kg SD Bomb case others were specially designed and manufactured with an aluminium body, making them extremely difficult to detect using magnetometers. The thin cased versions would normally disintegrate on impact on land and are normally considered to pose little threat to work on land based projects, but the risk increases significantly on projects over water or in marshland. Thicker cased versions however will survive impact and pose a significant risk regardless of the local ground conditions. (See Figure 5)

FIGURE 5: Common Airdropped Mines.

Parachute & Ground Mines

NOTE: all mine fuzes were designed to arm after deployment from the ship, submarine or aircraft, some fuze designs incorporated anti-removal booby traps. Unexploded mines found today are the result of a failure within the arming mechanism or procedure whereby the mine never fully armed. Sudden shock or jarring of a weapon in this state has the potential to complete the arming sequence and could result in the mine detonating with lethal consequences.

Non-Steel Cased Bombs. Used primarily in the construction of training or practice bombs, some high explosive variants were introduced towards the end of the war. With resources running scarce, German Engineers produced a small number of blast bombs with a concrete body. The design utilised a steel framework onto which concrete was cast. The explosive filling was also contained within a thin steel container within the bomb body. Very few “concrete” bombs were dropped on the UK. In common with standard steel cased weapons, this type of bomb can be detected using standard magnetometer detection techniques (albeit; providing a smaller ferromagnetic signature than its all steel counterparts). This type of bomb represents a very small percentage of the total number of bombs dropped worldwide and are not considered a significant threat, particularly when viewed from an overall bomb threat in the UK.

Anti-Personnel Bomb. Generally these were small weapons of 1-3 kilograms in weight and are often referred to as ‘Bomblets’ and possessing similar ground penetration ability as the Incendiary Bomblets. They were often located during the post-raid searches. This type of bomb has been recovered within the bomb rubble being cleared or used as in-fill on construction projects and poses the same potential to function as the Incendiary bomb with a greater potential to cause localised casualties.

Specialist Bomb. These types of bombs were designed to meet a specific mission requirement. Typically, this would be a design modification or special fusing to enable the bomb to destroy hardened/armoured targets or deep buried and sub-marine targets. Similar to the more common HE bombs, they differ in that they rarely contain large amounts of high explosive. Therefore the consequence of a detonation is reduced but remains a significant risk, particularly when the detonation occurs on or near the surface.

Depth Bombs & Depth Charges. These types of weapons were designed to meet a specific mission requirement. Typically, the modifications would include the type of explosive filling and special fusing to enable the bomb to penetrate to a significant depth into the ground or water before detonating. Depth bombs intended for maritime attack and sub-marine targets would be fitted with one or more fuzes, one of which would be a hydrostatic fuze designed to detonate the bomb at a predetermined depth. The bomb would be fitted with an anti skip ring to reduce the deflection of the bomb as it entered the water. Similar in many ways to Depth Bombs, Depth Charges were exclusively designed to detonate at a predetermined depth. This was achieved by fitting the Charge with a short time delay or hydrostatic fuze. Depth bombs; having a similar configuration to general purpose bombs had the potential to penetrate deeply into the sea bed where an attack occurred in the relatively shallower water of a dock.

Unmanned Rocket Bombs & Missiles. The most famous in this category of weapons were the V1 (Fi103 flying bomb) commonly known as the Doodlebug and the Larger V2 (A4 missile). Both V1 & V2 with high explosive warheads containing 850kg & 1000kg (respectively) represent some of the largest weapons to land in the United Kingdom. Both types were built in a similar manner to an aircraft and would generally disintegrate on impact even if the warhead failed to detonate. The impact would spread debris over a wide area which was difficult to miss and any resulting unexploded 'V' weapons were comprehensively dealt with at the time. For this reason they are rarely encountered on land. However, where a 'V' weapon landed in water the opportunity for the event to have been missed and/or follow-up action abandoned was greater and they continue to pose a significant risk. Other, less well known rocket bombs were also produced by the Luftwaffe to attack maritime targets. Some were equipped with TV/Radio guidance from the parent bomber. Two of the most common were the Fritz X which consisted of an adapted SD1400kg bomb and the Henschel Hs293 which was based on a smaller 500kg bomb. No record of one having been recovered on land as a UXB can be found but these large HE bombs are considered to pose a significant risk, particularly to maritime projects. No records were found to indicate this type of bomb was ever used on targets in the area.

Photoflash Bomb. This type of bomb was dropped by specialist "Pathfinder" aircraft and although this type of bomb can be included with the category of specialist bombs, it is worthy of specific comment due to the danger it may still pose. Photoflash bombs were designed to explode with a blinding flash, rather like a camera flashbulb. They were used to enable photographs to be taken of targets at night and also served to identify ground targets for other aircraft to attack. The speed at which the highly energetic filling detonated, and energy it produced in doing so, was significant. Although these bombs were thin skinned and are prone to corrosion the functioning of one can be compared to a high explosive bomb detonation.

High Explosive Shells & Projectiles. As mentioned previously, one of the most common sources of UXO contamination encountered in the United Kingdom is High Explosive Shells and Projectiles. This is most commonly found to be as the result of firing practice ranges, bombardment and anti-aircraft defence, the latter often positioned to defend Major cities and Strategic installations and ports from German Bombing. Anti Aircraft Shells and projectiles are generally smaller (Up to 4.7" inch diameter) than the airdropped bombs and as a consequence were more easily missed amongst the bomb rubble. However, coastal bombardment guns could fire a shell weighing 1000kg, (larger than most common airdropped bombs) and capable of significant ground penetration. The generic layout of a projectile can be found at Figure 6.6. It should be noted that the fatal incident on the German autobahn in 2006 was thought to be the result of a shell or projectile detonating, not an airdropped bomb as first reported.

The Fuzes used in Anti-Aircraft Ammunition were designed to ensure the projectile would detonate in contact with the target, or at a pre-set altitude, or in close proximity to the target. The fuzes employed different means to achieve this, including; direct impact, or indirect impact, Barometric, Delay and Electro-magnetic influence. Some were fitted with more than one fuze, which served to reduce the chance of the projectile falling to earth and detonating. Artillery fuzes are activated during the firing process, using the projectile's acceleration or spin within the gun barrel to switch off the safety mechanisms. For this reason fired projectiles are considered more dangerous than unfired ones.

FIGURE 6: Generic Shell Design

Generic High Explosive (HE) Shells (recent finds on site around the UK)

Other Types of Ordnance. The following additional sources of ordnance types have been considered, and inherent risks taken account of:

Flares and Pyrotechnics. Flares and pyrotechnics were used for a variety of reasons throughout the war and continue to be found today in the most unlikely places. However, due to the thin casings of these weapons a high level of corrosion is likely to have occurred since manufacture. Depending on the specific nature of the weapon, this effectively renders them inert with the exception of any white phosphorous content or explosive gaine.

Land Service Ammunition (LSA). While as the name implies this type of ammunition was designed for use on land, it was also issued to naval personnel for close protection of vessels and their crew and to provide a limited offensive capability even to relatively small craft. This type of ammunition includes some shells and projectiles such as those covered previously. Other natures of LSA range from Small Arms Ammunition (SAA), having little or no high explosive content to Grenades, Mortars and Rockets which may pose a risk of detonation due to their explosive content and the design of their fuzes (impact) which; if subjected to sufficient shock or friction may result in the weapon functioning. (See Figure 7)

FIGURE 7: Common Categories of Land Service Ammunition

Land Service Ammunition

Small Arms Ammunition

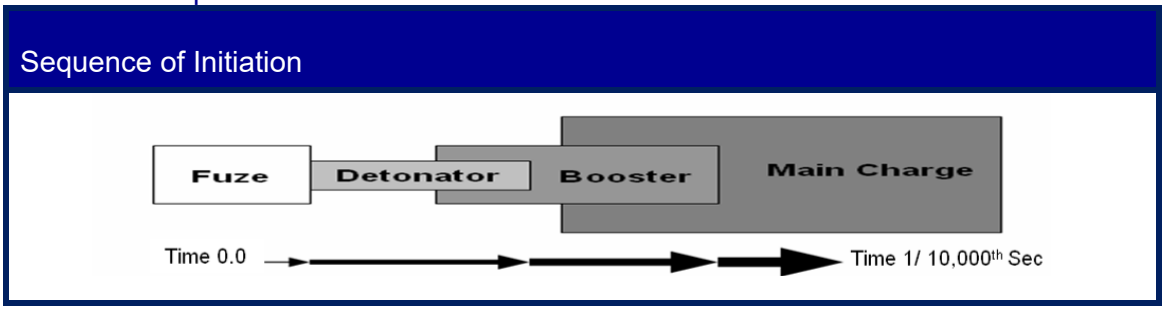
Grenades

Mortar Bombs

Initiation of Unexploded Ordnance. Explosive Ordnance is highly unlikely to spontaneously explode. The energetic chemical compounds, (Explosives) used in weapon manufacture are chosen to be as stable as possible and they all require a significant application of additional energy to create the right conditions for detonation to

occur. If stored correctly, most explosive materials are designed to remain stable for the duration of their expected lifespan (typically 20 years). During this time, the correct functioning of the weapon is achieved by means of the 'Initiation Train' (See Figure 8).

FIGURE 8: Explosive Ordnance Initiation Train.



Initiation Train. This is a means by which, once the safety features have been switched off or removed, a chain reaction occurs through the weapon. Starting within the fusing system as a small ignition or spark, causing a detonator to explode, which in turn causes the booster charge to detonate with a greater energy and ending in the full detonation of the main explosive filling. Each part of the process has in-built safety features to prevent an unintended detonation. A failure in any of the components within the Initiation Train can result in a UXO. In the case of a UXB; the chain reaction has broken down and the Initiation Train is brought to a halt, albeit, a temporary one. There are a number of ways that sufficient energy could be introduced to the otherwise stable UXB / UXO that may allow the Initiation Train to set off once more, overcoming the initial reason for failure. In addition to subjecting the weapon to excessive heat, such as a fire, the most common methods to bring about an explosive detonation in such items are considered to be:

Direct impact onto the main body of the bomb by mechanical excavation or pile driving: Such an occurrence can cause the bomb to detonate, should the point of impact be on the bomb fuze; less force would be required to bring about a full or partial explosive detonation.

Re-starting the clock timer in the bomb fuze. Only a small percentage of bombs were fitted with clockwork fuzes. It is likely that corrosion has taken place within the fuze that may prevent the clockwork mechanism from functioning. However, the restarting of the clock is by no means a scenario that can be completely ruled out. This is considered to be one of the two most credible mechanisms by which sufficient energy could be introduced to the bomb and result in a detonation.

Induction of a static charge or exposure to an external power source (Electrical Services), causing a current in an electrical fuze. The majority of German bombs employed an electrical component within the fuzes, it is likely that corrosion would have taken place within the fuze mechanism and that it would no longer contain, or conduct sufficient electrical charge to initiate the bomb.

Friction initiating the sensitive fuze explosive. Some chemical constituents may have deteriorated, due to oxidisation. Components designed with a high degree of stability at the time of manufacture may no longer be as safe. **This is considered to be the most likely mechanism by which sufficient energy could be introduced to the bomb and result in a detonation.**

Annex G

Unexploded World War 2 bomb found on a Soho building site

LONDON | LONDON | SOHO | Monday 3 February 2020, 3:33pm

Bomb disposal teams have removed an unexploded Second World War bomb from a busy area of central London.

Officers were called to a building site near Dean Street in Soho at 1.42pm after reports of the suspected explosive device.
Videos posted on Twitter showed people leaving buildings and gathering as police set up a cordon.

Witnesses described "lots of commotion" as the area surrounding the site was shut off.
A Royal Engineers bomb disposal unit was called in and removed the half-tonne device.
Shortly after 8.30pm, the Metropolitan Police's Soho team said the cordons in Oxford Street, Charing Cross Road, Shaftesbury Avenue, Lexington Street and Poland Street had been lifted.

A Ministry of Defence spokeswoman said: "An Army explosive ordnance disposal team has been called out to Soho to support the Metropolitan Police after discovery of a 500kg Second World War device.

"The Army EOD team have confirmed the bomb was safe to remove overnight to a location where it will be detonated," the spokesperson continued.
"Military personnel are regularly required to assist with the disposal of historic ordnance such as this, ensuring every situation is dealt with as quickly as possible for the safety of the general public."

https://www.itv.com/news/london/2020-02-03/suspected-world-war-2-bomb-discovered-at-building-site-in-soho

NEWS

Bomb disposal teams called to Luton after 'cannonball' found on a building site

ANGLIA | BOMB | CANNONBALL | POLICE

Friday 13 March 2020, 12:00pm

Bomb disposal teams and police cordoned off an area in Luton today (Friday 13) after what is thought to have been a cannonball was found on a building site.
Hitchin Road was closed between Stopsley Way and Stockingstone Road.

Police were called at around 10.30am after someone reported seeing something suspicious on a nearby construction site.

Bedfordshire police say the explosive ordnance disposal team were called as a precaution. The roads have since reopened.

https://www.itv.com/news/anglia/2020-03-13/bomb-disposal-teams-called-to-luton-after-cannonball-found-on-a-building-site

Mirror

World War 2 bomb 'found yards away from West Ham's London Stadium' ahead of Arsenal clash

The Hammers' clash with Arsenal on December 9 could now be postponed although their match with Tottenham next Saturday will go ahead as planned

Police cordoned off an area after an object believed to be a bomb was found near the stadium (Image: PA)

A bomb that dates back to World War Two has reportedly been found just yards away from West Ham's London Stadium. Ongoing work on an apartment development nearby had to be halted after the bomb was discovered on Friday morning.

Police officers set up a 150 metre cordon around the site after they were called to the scene just before midday, reports the Sun .
The area has been declared safe by experts for the time being, with a specialist mining team set to attend the site on November 25.

West Ham's match with Arsenal scheduled for December 9 is now under threat of postponement if there is any change in the safety status of the site.

Due to the timeframe of the visit from specialists, the Hammers clash with Tottenham next Saturday November 23 is due to go ahead as planned.

“It’s crazy to think of all the people walking around here during the Olympics and we had no idea it was here.
"The bomb is in a tricky position, so could take up to two weeks to sort it out, which takes us into the second week of December.
“We will continue our efforts to safely establish what the object is but the park and its venues will continue to remain open.” “Between now and 25 November teams will be putting together a plan of what to do.” However, despite suggestions that the object is a bomb, a spokesman for the London Legacy Development Corporation (LLDC) who handle Olympic Park, were keen to stress the item is as yet unidentified.

Andover Advertiser

02nd March 2019

Schools and homes have been evacuated after a Second World War bomb was discovered on a building site.

Army bomb disposal experts are on the scene after the unexploded device was found in Brent, north-west London.

Work on the site is expected to continue until at least Friday afternoon, Brent Council said.
A police cordon has been established at the scene and will be extended to around 300m on Friday morning, forcing more residents to leave their homes.
More than 50 people are currently staying at a rest centre set up at St Martin's Church on Mortimer Road, Kensal Green.

Several British Red Cross volunteers are on hand to provide support to affected residents.
Scotland Yard said it was called to The Avenue, near Brondesbury Park, at around 11.30am on Thursday following the discovery.

Nearby schools, businesses and residents were evacuated, and roads closed.

Mail Online

5th February 2019

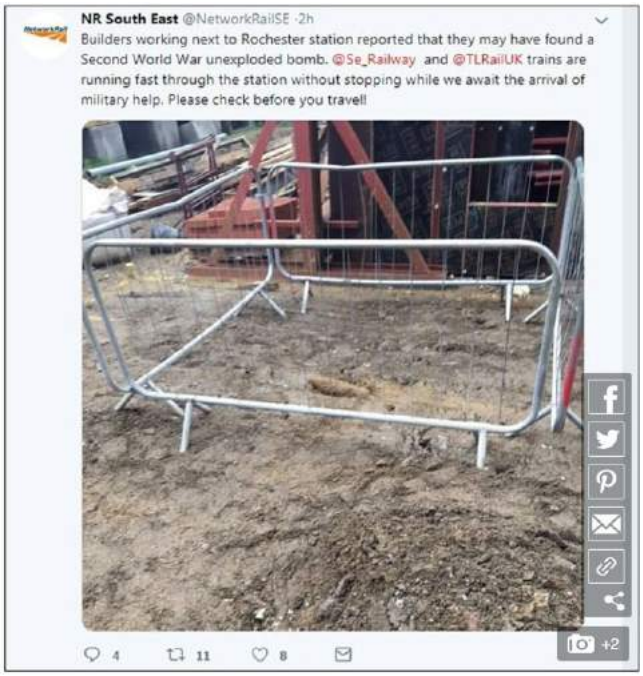
Railway station is evacuated and trains ordered not to stop when builders find unexploded World War Two bomb;

- Rochester Station was closed for over two hours after the bomb was found
- The military and British Transport Police were called in to deal with the threat
- While they worked trains were allowed to run fast through the station
- Builders at a nearby construction site found the shell in the mud at around 1pm

A railway station was evacuated this afternoon after a WWII bomb was discovered by builders working in Rochester, Kent.

British Transport Police and military personnel descended on the train station following the construction workers finding the unexploded shell underground.

The station was evacuated at 1.25pm and trains could run fast through the station while they worked to remove the hazard.



By 3pm - and in time for rush hour - the bomb had been safely removed by the bomb squad and Rochester Station could resume normal service.
South Eastern Tweeted: 'Builders working next to Rochester station reported that they may have found a Second World War unexploded bomb.
'@Se_Railway (Southeastern) and @TLRailUK (Thameslink) trains are running fast through the station without stopping while we await the arrival of military help. Please check before you travel!'
The WWII bomb was discovered on a building site off the station's land, but close enough that trains were unable to stop as a safety precaution.
Later on Network Rail updated passengers and wrote: 'The bomb has been removed and normal service has resumed. Thank you for your patience.'

Annex F

Risk Assessment Tables

Table 1: Summary of Potential Contamination Sources

Source	Applicable	Not Applicable
Enemy Attack & Counter Measures		
Bombing WW1		☒
Manned Aircraft Bombing WW2 (potentially)	☒	
Unmanned V1 & V2 Rocket Attack		☒
Shelling		☒
Anti-Shipping Mines & Depth Charges		☒
Anti-Aircraft Shells & Rockets		☒
Beach Mines & Coastal Defences.		☒
Airfield/Key Point Defensive Mines/Charges		☒
Abandoned Unexploded Bomb (A/UXB)		☒
Migration of UXO		
UXO Migration in Rubble & Infill		☒
UXO Migration by Tide & River Current		☒
UXO Migration by Marine Dredging		☒
Shipwrecks		☒
Dispersal by Explosion, Fire & Accident		☒
Aeroplane Crash		☒
Private Collections		☒
MOD Facilities		
Bombing Range		☒
Artillery, Mortar & Tank Range		☒
Grenade Range		☒
Small Arms Firing Range		☒
Weapon Research & Development Facilities		☒
Ammunition Burial Grounds		☒
Docks & Harbour Facilities		☒
Offshore Ammunition Dumping Grounds		☒
Ammunition Storage & Manufacture Sites		☒
Airfields & Air Stations (close proximity)	☒	
Bombing Decoy Site		☒
Army Barracks & Camps		☒
MOD Training / Concentration Areas		☒
Home Guard & SOE Weapon Caches		☒

Table 2: Airdropped Weapon Strike Indicators (UK)

Item	Increasing Potential level ⇨			
Site Location	Rural	Small Town	Brown Field Large Towns	**Cities**
Site Description and Use	**Greenfield or Agricultural Land**	Near Strategic Target	Adjacent to Strategic Target	Strategic Target
Site History	No history of Attack	Near area of Attack	Immediate Area Attacked	Direct Attack

Strategic Target: Military Installation, Industrial or Munitions Manufacturer, Power Station, Gas or Water Works, Port, Dock, Railway Yard, Decoy Site.

Table 3: Weapon Strike Records (UK)

Source	Availability			
Archive	None	Non-specific	Specific	**Extensive**
In-house	None	Non-specific	**Specific**	Extensive
Anecdotal	None	**Non-specific**	Specific	Confirmed

Table 4: Anti-Aircraft Weapon Strike Indicators (UK)

Item	Increasing Potential level ⇨			
Site Location	**Rural**	Town	City	Military Site
Fixed Battery Location	None	**General Area**	Nearby	Onsite
Mobile Battery	**Rural**	Town	City	Military Site

Military Site: Airfield, Port, Radar, Barracks, Depots, Arsenal or Similar.

Table 5: Abandoned Bomb Records (UK)

Item	Increasing Potential level ⇨		
In-house	**None**	Yes	On-site
Other	**None**	Yes	On-site

Table 6: Bomb Strike Density Assessment

Bombs & Mines	There were 3831 bombs of all types dropped over Oxfordshire, causing 20 deaths and 60 other casualties, as well as 65 head of cattle. Over 300 houses were damaged as well as other buildings and utilities.

Table 7: Opportunity to have detected Bomb or Shell Strikes (UK)

Increasing Potential level ⇨
No bombs recorded
Good ARP cover
Significant development (carried out prior to WW2)
No significant ground cover
Bomb recorded within close proximity to Site boundary
Moderate ARP cover
Moderate development (across some areas of the site)
Frequent public access
Little ground cover
Bombs recorded within Site boundary
Poor ARP cover
Minimal development limited to shallow excavations (within some areas of the site location)
Infrequent public access
Moderate ground cover
Heavy bomb damage/total destruction
No ARP cover
None too little development
Controlled private access
Heavy ground cover, vegetation, ploughing or body of water

Table 8: Post Contamination Development Indicators (UK)

Nature of Post Contamination Development	Highlighted
	100% excavations of the entire site to below contamination depth.
	Significant development (across some areas of the site, post WW2)
	Moderate development (across some areas of the site)
	Minimal development (across some areas of the site)
	No development

Table 9: Construction Activities Encounter Indicators

Activities	Highlighted
	Borehole Drilling
	Dynamic Sampling
	Shallow Trial Pit (within made ground)
	Services Trenching (within made ground)
	Bored (CFA) Piling
	Sheet Piling
	Shallow Excavations over extended area (within made ground)
	Deep Excavations over a limited area
	High Density Piles
	Deep Excavations over extended area
	Bulk Excavations

Risk Category Key	Mitigation Requirement
Green	No/Minimum Mitigation measures required (see document recommendations)
Amber	Medium risk of encountering items of UXO (or items there off) within the site boundary, mitigation required for safe systems of work.
Red	High risk of finding items of UXO (or items there off) within the site boundary, mitigation required for safe systems of work.

SSSI Citations

COUNTY: OXFORDSHIRE **SITE NAME:** ARDLEY CUTTING AND QUARRY

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981(as amended)

Local Planning Authorities: Cherwell District Council, Oxfordshire County Council

National Grid Reference: SP540269

Ordnance Survey Sheet 1:50,000: 164 **1:10,000:** SP52 NW, NE

Date Notified (Under 1949 Act): 1972 **Date of Last Revision:**

Date Notified (Under 1981 Act): 1988 **Date of Last Revision:** 28 July 1999

Area: 40.13 ha 99.12 ac

Other information: Part of the site is managed by the Berkshire, Buckinghamshire and Oxfordshire Wildlife Tru

Description and Reasons for Notification

This site lies in the eastern part of the Oxfordshire Cotswolds along a section of the London to Birmingham railway line. It is of geological interest for its exposures of Jurassic rocks and has biological interest associated with limestone grassland, scrub, ancient woodland and wetland habitats. The soils are mostly shallow loams of the Aberford Series, interrupted in places by bands of ill-draining clays and outcrops of Northants sands giving rise to changes in the flora.

The railway cutting and southernmost quarry constitute one of southern England's key sites for Jurassic strata. It has exposures ranging from the lowest Bathonian Chipping Norton Formation to the White Limestone Formation thus exhibiting the entire local Bathonian development with the exception of the Forest Marble.

The Chipping Norton Formation is composed of oolitic limestones, sandy limestones, and mudstones. The formation is deeply excavated by sand-filled channels which themselves are topped by rootlet horizons and a lignite, indicating a period of emergence as low, marshy land. The overlying Sharps Hill Formation here consists of a thin oyster-bearing clay horizon and indicates the return of marine conditions.

The Taynton Formation, consisting of flaggy, oolitic limestones and a basal oyster bed was deposited in a relatively inshore site under turbulent conditions. The Hampden Marly Formation contains a rich fauna of oysters and brachiopods at a number of horizons. The cutting is the only site where an ammonite has been recovered from this formation and places it in the *Procerites progacilis* Zone, correlating it with the Acuminata Beds of the South Cotswolds and Somerset. The uppermost White Limestone Formation consists of approximately seven metres of micritic and peloidal limestones with subsidiary marls and clays. The site is the type locality for the Ardley Member of this formation. The abundant gastropods, bivalves and brachiopods preserved in these limestones enable correlations with the White Limestone Formation to the south in the Cotswolds, and with the Blisworth Limestone Formation in Lincolnshire and Northamptonshire.

This is a key site for its fossil marker horizons, palaeontology, sedimentary features such as channels and emergent surfaces, and its stratigraphy. The rocks of Ardley enable the Bathonian sections of the Midlands to be correlated with those of the Oxford area and Cotswolds and as such is of national importance for the understanding of the Jurassic Period in Britain.

The limestone grassland on the steep banks of the railway cutting and the adjacent quarry forms the main biological interest. It is one of the largest limestone grassland sites in the Oxfordshire Cotswolds where unimproved grassland is now very

rare.

The grassland is a characteristically tall sward either dominated by upright brome *Bromopsis erectus* or a mixture of brome and tor-grass *Brachypodium pinnatum*. The grassland contains a variety of species associated with limestone grassland including quaking grass *Briza media*, basil thyme *Acinos arvensis*, clustered bellflower *Campanula glomerata*, dropwort *Filipendula vulgaris* and sainfoin *Onobrychis viciifolia*. Other species which are locally common in the sward include horseshoe vetch *Hippocrepis comosa*, kidney vetch *Anthyllis vulneraria*, glaucous sedge *Carex flacca*, blue fleabane *Erigeron acer*, bee orchid *Ophrys apifera*, green-winged orchid *Orchis morio* and cowslip *Primula veris*, as well as a number of well-established introductions such as dragon's teeth *Tetragonolobus maritimus*, elecampane *Inula helenium* and broad-leaved everlasting pea *Lathyrus latifolius*.

The flora of the woodland includes lords and ladies *Arum maculatum*, wood anemone *Anemone nemorosa* and the uncommon green hellebore *Helleborus viridis*. The eastern edge of the quarry has a near vertical rock face with a seasonally dry pool at its base. This pool is contiguous with a low lying, marshy section containing willow carr and a flora dominated by soft rush *Juncus effusus*, reedmace *Typha latifolia*, reed canary grass *Phalaris arundinacea*, and water mint *Mentha aquatica*.

The invertebrate fauna is particularly rich along the railway cutting, with large populations of calcareous grassland butterflies like small blue *Cupido minimus*, brown argus *Aricia agestis*, dark green fritillary *Argynnis aglaja*, green hairstreak *Callophrys rubi* and Duke of Burgundy *Hamearis lucina*, all of which are uncommon in Oxfordshire. There is also a colony of the nationally rare four-spotted moth *Tyta luctuosa* whose larvae feed on field bindweed *Convolvulus arvensis*, as well as the nationally uncommon leaf beetles *Cryptocephalus hypochaeridis* and *C. moraei*.

The Cutting and adjacent quarry also support a notably wide range of vertebrates. These include part of a large population of the internationally protected great crested newt *Triturus cristatus* which spreads into several adjacent quarries.

Site Name: Ardley Trackways SSSI **County:** Oxfordshire

District: Cherwell

Status: Site of Special Scientific Interest (SSSI) notified under section 28 of the Wildlife and Countryside Act 1981, as substituted by Schedule 9 to the Countryside and Rights of Way Act 2000.

Local Planning Authority: Cherwell District Council

National Grid reference: SP540248 **Area:** 63.59 ha

Ordnance Survey Sheet: **1:50,000:** 164 **1:10,000:** SP 52 NW, SP 52 SW

Notification date: 19 January 2010

Reasons for notification:

Ardley Trackways SSSI is a nationally important site containing a rock horizon close to the top of the Shipton Member of the White Limestone Formation which, in the immediate vicinity of the SSSI, has revealed the presence of an array of fossilised trackways. These trackways were formed by the passage of a herd of sauropod dinosaurs, and several theropod dinosaurs, along a shoreline in what is now north-eastern Oxfordshire, during the Middle Jurassic (approximately 165 million years ago). Such extensive and relatively complete assemblages of trackways are otherwise unknown in England and are rare in the Middle Jurassic worldwide. The rarity of these trackways and their geological and environmental context for future research, mean that Ardley Trackways SSSI can be regarded as being of international importance. Based on the orientation of the trackways studied to date, the SSSI has been identified as containing a finite buried reserve of the trackway bed, which is accessible for scientific study.

General description:

Ardley Trackways SSSI consists of a series of working quarries lying either side of the railway line from Bicester to Banbury, to the south of the village of Ardley, about 4 km northwest of Bicester in Oxfordshire. The bedding-plane in which the trackways lie is near the top of the Shipton Member of the White Limestone Formation. The general trend of the trackways is on a bearing north-north-east to south-south-west, although a few trend north-east to south-west. The Shipton Member of the White Limestone Formation is of Bathonian age (Middle Jurassic – approximately 165 million years ago) and was deposited within a belt of near-shore lagoons on the north-western margin of the London Platform (a land mass extending over part of the area now consisting of south-eastern England, the southern North Sea and Belgium).

In locations where it has previously been exposed immediately adjacent to the SSSI, the bedding-plane surface has so far revealed the presence of over 40 more-or-less continuous trackways attributed to two-legged, carnivorous (theropod) dinosaurs and four-legged vegetarian (sauropod) dinosaurs. The trackways yield information relevant to our understanding of dinosaur locomotion, their burial and how they came to be preserved (taphonomy), the implications these trackways have for the classification (systematic taxonomy) of the footprints, the evolutionary relationships of the dinosaurs thought to be represented by the trackways, the taxonomic composition of this particular ecosystem, and insights into the behaviour (ethology) of these animals.

Evidence of a change in the stride (gait transition) associated with a temporary increase in speed on a theropod trackway has important implications for understanding the mechanics of the limb movement and the evolution of the oldest theropods. The interpretation of many of the sauropod tracks as having been formed by members of the Titanosauria (a large group of sauropods characterised by their wide-gauge limb posture), pushes the origins of this group back into the Middle Jurassic. This provides evidence to counter theories that titanosaurs originated in Gondwana (the continent consisting of Africa, Antarctica, Australia and South America) after the break-up of Pangea (the supercontinent consisting of Gondwana combined with Eurasia and North America) during the late Middle Jurassic. The similar directions of the trackways, combined with the relatively limited time period over which the tracks could have been formed, may suggest that the sauropods were moving in a mixed herd. It has also been speculated that the theropods were following the sauropod herds and that additional evidence from the site might provide insights into pack behaviour in large theropod dinosaurs.

Appendix E

Preliminary Geotechnical Risk Register

Geotechnical Hazard Identification – Desk Study Stage

Potential geotechnical hazards have been assessed in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622. The following pages set out the identified geotechnical risks and hazards which are associated with the proposed development and establish the approach which is to be taken to manage the risks including the geotechnical input and analysis.

Table E.1 is a preliminary assessment of possible geotechnical hazards at the site at Desk Study stage. This information is used to assist with site investigation design.

Table E.1: Possible geotechnical hazards

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Uncontrolled Made Ground (variable strength and compressibility).	Will be present, as Made Ground has been proven in historical investigation. Likely to be limited in extent and depth, but recorded/noted in Field 3, Field 5, Ashgrove Farm and isolated areas around the site.	✓	
	Historical landfill in the north-west of the site, to the east of the B430. The proposed rail line connection from the rail terminal to the mainline passes across / through the former Ardley Quarry / Ardley Landfill.		
Soft / loose compressible ground (low strength and high settlement potential).	In areas of superficial deposits (e.g. Alluvium) and rock joint / weathering profiles.	✓	
Shrinkage/ swelling of the clay fraction of soils under the influence of vegetation.	Clay in areas of superficial deposits and weathered rock. Likely to be limited in extent and depth.	✓	
Variable lateral and vertical changes in ground conditions.	Variations between rock and superficial soils (Alluvium and Head Deposits). Variations in rock material strength, with varied lithological units (limestone, marl, mudrock and siltstone) within the geological units. Variations in rock mass characteristics (fracture spacing, aperture, infilling etc). Variations in the weathering profile of limestone or other bedrock.	✓	
High sulphates present in the soils.	The soils are not expected to have high sulphate concentrations. However, testing is required to prove this.		✓
Adverse chemical ground conditions, (e.g. expansive slag).	There is no evidence of such materials from historical investigation.		✓
Obstructions.	Including existing foundations at Ashgrove Farm, historical structures on the site and the drainage structure present in the north.	✓	

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Difficult excavation.	Rock of differing strengths and fracturing will be encountered. The limestone rock is anticipated to be difficult to excavate and will require heavy duty plant / rippers, and may require wide spaced blasting.	✓	
Existing below ground structures to remain	Some existing buildings to be retained and potential vibration damage associated with excavation in close proximity. Some of the farm buildings are Grade 2 listed. The covered reservoir in the south-east of the site is to be retained. Review of the preliminary cut to fill indicates limited cut in this section of the site. Impact of construction will need to be accounted for in the design and in temporary works.	✓	
Shallow groundwater.	Potential for shallow groundwater at existing spring lines and close to the level of the existing streams.	✓	
	Potential impact on proposed surface water attenuation features.	✓	
Changing groundwater conditions.	Impact of groundwater in cuttings and excavations. Multiple groundwater bodies are expected, with the cut surface likely to intercept springs, leading to wet or flooded conditions.	✓	
Running sands and / or loose Made Ground, leading to difficulty with excavation and collapse of side walls.	Generally low risk across the majority of the site. However, likely to be a significant risk in the alluvial soils in the base of the valley and the landfill Made Ground in the north-east of the site (to the east of the B430).	✓	
Risk from flooding.	Risk from erosion due to surface water and groundwater flooding.	✓	
	Changes in surface water run-off to neighbouring land.		
Earthworks – suitability of site won material to be reused as fill.	Selective excavation of soils will be required. Differing engineering classifications likely to be assigned to the: Made Ground, Topsoil, Alluvium, Head, significantly (near surface) weathered limestone, partially weathered limestone, unweathered limestone and mudrock/ siltstone.	✓	
Earthworks – suitability of site won material to be reused as fill.	Significant processing of excavated limestone is likely to be required to allow reuse as an engineered fill. The limestone is currently processed to a 6F5 / 6F2 class from Dewars Farm Quarry adjacent to the site.	✓	

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Earthworks - differential bearing capacity and settlement	Will vary according to: • The underlying ground conditions (rock or clay soils (Alluvium and Head Deposits)). • Varying rock units (limestone, marl, mudrock and siltstone). • The thickness and type of fill. • Transition from cut rock to fill.	✓	
Slope stability issues – general existing slopes.	There are no significantly steep existing slopes on the majority of the site. No evidence of slope instability during the walkover.		✓
	Steep slopes are present to the north in the railway cutting. These appear poorly maintained.	✓	
Slope stability issues - instability of cut and fill slopes and excavations.	Significant, steep, cut slopes are proposed, especially in the north. Slope stability will depend on: geology (rock or clay), rock mass quality, dip of the strata, fracturing, presence of unsupported boulders and blocks of rock and groundwater conditions. Fill slopes are also prosed for development plateaux and landscape bunds	✓	
Slope stability issues – retaining walls.	Significant sub-vertical cut is required in the north-west, associated with the intermodal terminal. Significant retaining walls will be required to support interbedded limestone and mudrock of the White Limestone Group and the Rutland Formation.	✓	
Effect of earthworks and construction on assets outside the site boundaries such as the railway cutting slopes.	The railway line is close to the northern site boundary. Consideration of earthworks and impacts on the railway will need to be considered.	✓	
Earthworks – poor bearing capacity of new fill.	Unlikely to be a significant issue. However, Topsoil will only be suitable for Class 4 fill (non-structural) and Alluvium and Head Deposits may need improvement to increase bearing capacity.	✓	
Faults	Faults are present in the north of the site and will need to be reviewed in detail as investigation progresses. These are not likely to be tectonically active.	✓	
Solution features in limestone.	Noted as low risk in the Groundsure database report and no evidence of cavities in the wider area.		✓
Cavities in the Superficial Deposits due to solution features.	As above		✓

Hazard	Comment	Hazard status based on desk study	
		Could be present and / or affect site (i.e. Plausible)	Unlikely to be present and/or affect site
Dissolution (associated with 'wet rock head').	The site is not in area affected by these hazards.		✓
Brine extraction.			✓
Mining.	Low risk from underground mining. Historical surface mining recorded to the east and north. No known mining on the site. Minerals are assessed in the separate Minerals Resource Assessment Report.		✓
Cambered ground with gulls possibly present.	No periglacial slopes nearby and the depth to clay strata is likely to be relatively deep.		✓
Relic slip surfaces.			✓
Solifluction.			✓
Impacts to SSSIs.	The Ardley Cutting and Quarry SSSI is on the northern site boundary, and the proposed connections from the rail terminal to the mainline will pass through it.	✓	
	The Ardley Trackways SSSI is off-site to the north-west, south, and south-east. Whilst specific impacts to the SSSI are likely to be low, the top of the Shipton Member will be exposed in the cut surfaces in the west of the site.	✓	
Problematic soils (silts and rewetting etc.).	Likely only to be a potential issue with soils won from the Alluvium, the Head Deposits and heavily weathered limestone (top 1.0m).	✓	

Appendix F

Plausible Source-Pathway-Receptor Contaminant Linkages

Summary of Potential Contaminant Linkages

Table F.2 lists the plausible contaminant linkages which have been identified. These are considered as potentially unacceptable risks in line with guidelines published in CLR 11 and additional risk assessment is required.

Source – Pathway – Receptor Linkages have been assessed in general accordance with guidance in CIRIA Report C552 (Rudland et al 2001) but with the addition of a 'no linkage' category (See Table F.1).

It should be noted that whilst the risk assessment process undertaken in this report may identify potential risks to site demolition and redevelopment workers, consideration of occupational health and safety issues is beyond the scope of this report and need to be considered separately in the Construction Phase Health and Safety Plan.

Table F.1: Consequence versus probability assessment.

		Consequence			
Probability		Severe	Medium	Mild	Minor
	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			

Table F.2: Exposure model – preliminary risk assessment of source-pathway-receptor contaminant linkages

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Made Ground associated with isolated areas of historical development and field spreading. (metals, metalloids and PAH).	Ingestion, inhalation or direct contact.	Site users.	Likely	Medium	Moderate	Made Ground is only likely in the limited areas of historical development (Ashgrove Farm, Ashgrove Cottages, Scotland Barn, the water tower, the caravan park and isolated historical construction (drainage features and made-up tracks). Also associated with Field 3 and Field 5, where man-made items are prolific and have been spread. The source of Made Ground is unknown and may contain metals, metalloids and PAH. Contact with these materials is likely in limited areas of landscaping, especially at the proposed conversion of Ashgrove Farm. However, over the majority of the site, the risk will be low as the proposed development will comprise hardstanding and building footprints.	Mitigation measures may be required to break the S-P-R linkage. Mitigation would generally comprise materials management and reuse of Made Ground soils at depth in landscaped areas. Made Ground is unlikely to be suitable for use as fill in the construction platforms, but will be suitable for landscape bunds.
	Inhalation of fugitive dust.	Neighbours.	Low likelihood	Medium	Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled.
	Leaching through unsaturated zone.	Groundwater.	Low likelihood	Medium	Low		The site is underlain by high permeability strata and the waterbodies below the site are a Principal Aquifer. However, there are no active groundwater abstractions within 1km of the site and any impact from the small areas of isolated Made Ground will be limited.
	Surface run-off.	Aquatic ecosystems. Surface water and possible abstractors.	Low likelihood	Medium	Low		The topography of the site would cause surface water to run into on-site drainage ditches and off site. Mitigation would generally comprise materials management and reuse of Made Ground soils at depth, or in landscaped bunds on the edge of the site (a significant distance from the watercourses). There are no active groundwater abstractions within 1km of the site and any impact from the small areas of isolated Made Ground will be limited.
	Base flow from contaminated groundwater.		Low likelihood	Medium	Low		The site is underlain by high permeability strata. Groundwater flow is anticipated to be to the south-east, but also locally to the stream in the centre of the site. Any impact from the small areas of isolated Made Ground will be limited.
	Direct contact	Water supply pipes.	Likely	Medium	Moderate		It is possible that the Made Ground will contain contaminants of concern at levels in excess of the GAC. Direct contact with buried water supply pipes is therefore possible. However, it will be limited to small areas of the site.

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Made Ground associated with isolated areas of historical development and also associated with field spreading. (metals and metalloids).	Root uptake.	Landscape planting	Likely	Minor	Low	Made Ground is only likely in the limited areas of historical development (Ashgrove Farm, Ashgrove Cottages, Scotland Barn, the water tower, the caravan park and isolated historical construction (drainage features and made-up tracks). Although is also associated with Field 3 and Field 5, where man-made items are prolific and have been spread. The source of Made Ground is unknown and may contain metals and metalloids. Whilst root uptake is possible in areas of landscaping, the plants currently on site did not show any signs of growth issues.	
Made Ground associated with isolated areas of historical development and also associated with field spreading. (asbestos).	Inhalation of fugitive dust.	Site users.	Likely	Severe	Very High	Made Ground is only likely in the limited areas of historical development (Ashgrove Farm, Ashgrove Cottages, Scotland Barn, the water tower, the caravan park and isolated historical construction (drainage features and made-up tracks). Although is also associated with Field 3 and Field 5, where man-made items are prolific and have been spread. The source of the Made Ground is unknown and ACM and asbestos fibres may be present.	Contact with these materials is likely in limited areas of landscaping. However, over the majority of the site, the risk will be low as the proposed development will comprise hardstanding and building footprint. Mitigation measures may be required to break the S-P-R linkage. Mitigation would generally comprise hand picking and possibly disposal, along with materials management and reuse of Made Ground soils at depth in landscaped areas.
		Neighbours.	Unlikely	Severe	Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled. Distances to the boundaries from potential Made Ground sources means it is unlikely to result in significant Made Ground derived dust at the site boundaries.

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Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Landfill Made Ground materials present in the in the historical landfill in the north-east of the site, to the east of the B430. (metals, metalloids, PAHs and petroleum hydrocarbons, phenols, VOCs, SVOCs).	Ingestion, inhalation or direct contact.	Site users.	High Likelihood	Medium	High	Landfill is present in the north-west of the site. The source of Made Ground is landfill and may contain (metals, metalloids, PAHs and petroleum hydrocarbons, phenols, VOCs and SVOCs. This section of the site is proposed as a rail link to the main rail line.	Users of this part of the site are likely to be limited to rail workers, and therefore unlikely to come into contact with the soils. No landscaping likely for this part of the site (railway siding). Mitigation measures may be required to break the S-P-R linkage. Mitigation would generally comprise materials management and reuse of Made Ground soils at depth in landscaped areas and may require disposal, or the placement of a cover system.
	Inhalation of fugitive dust.	Neighbours.	Low likelihood	Medium	Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled.
	Leaching through unsaturated zone.	Groundwater.	Low likelihood	Medium	Low		There is a potentially significant source at the site, the site is underlain by high permeability strata and the waterbodies below the site are Principal Aquifers. However, the site forms part of the existing Ardley Landfill and the existing leachate collection systems will limit the risk that leachate from this small section of a larger landfill would have.
	Surface run-off.	Aquatic ecosystems. Surface water and possible abstractors.	Likely	Medium	Low		The topography of the site may cause surface water to run into off-site drainage ditches. Mitigation may be needed to limit contact between the landfill materials and surface water via the use of impermeable barriers.
	Base flow from contaminated groundwater.		Low likelihood	Medium	Low		There is a potentially significant source at the site, the site is underlain by high permeability strata and the waterbodies below the site are Principal Aquifers. However, the site forms part of the existing Ardley Landfill and the existing leachate collection systems will limit the risk that leachate from this small section of a larger landfill would have.
	Direct contact	Water supply pipes.	Low likelihood	Medium	Low		It is possible that the Made Ground will contain contaminants of concern at levels in excess of the GAC. Direct contact with buried water supply pipes is therefore possible. However, it will be limited to small areas of the site.

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Landfill Made Ground materials present in the in the historical landfill in the north-east of the site, to the east of the B430. (asbestos fibres and Asbestos Containing Materials (ACM).	Inhalation of fugitive dust.	Site users.	Likely	Severe	Very High	There is likely to be Made Ground in localised areas of the site, and ACM and asbestos fibres may be present. Users of this part of the site are likely to be rail workers, and therefore unlikely to come into contact with the soils. No landscaping is likely for this part of the site (railway siding). Mitigation measures may be required to break the S-P-R linkage. Mitigation would generally comprise materials management and reuse of Made Ground soils at depth in landscaped areas and may require disposal or the placement of a cover system.	
		Neighbours.	Likely	Severe	Very High	The risk of significant generation of dust is high during site development process but can be controlled. This part of the site is proposed as a railway sidings and risk of dust generation is high and cannot be controlled during operation. Mitigation measures may be required to break the S-P-R linkage. Mitigation would generally comprise materials management and reuse of Made Ground soils at depth in landscaped areas and may require disposal or the placement of a cover system.	
Petroleum hydrocarbons and VOCs associated with spills and leaks from tanks at Ashgrove Farm.	Ingestion, inhalation or direct contact.	Site users.	Likely	Medium	Moderate	Spills and leaks from vehicles and tanks on site are likely. However, the extent of contamination will be very limited (relative to the size of the site). Testing required to confirm.	Contact with these materials is likely only in limited areas. However, over the majority of the site, the risk will be low as the proposed development will comprise hardstanding and building footprints. Mitigation measures may be required to break the S-P-R linkage. Mitigation may comprise small scale excavation, reuse of Made Ground / impacted soils at depth in landscaped areas and possibly small scale bio-remediation or disposal.
	Vapours.	Neighbours.	Low	Medium	Low		No significant vapours detected in historical investigations.
	Inhalation of fugitive dust.	Neighbours.		Medium	Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled.
	Leaching through unsaturated zone.	Groundwater and possible abstractors.	Low	Medium	Low		The site is underlain by high permeability strata and the waterbodies below the site are a Principal Aquifer. However, there are no active groundwater abstractions within 1km of the site and any impact from the small areas of isolated Made Ground will be limited. Historical investigations did not identify a significant risk.

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Petroleum hydrocarbons and VOCs associated with spills and leaks from tanks at Ashgrove Farm. (Cont…)	Surface run-off.	Aquatic ecosystems. Surface water and possible abstractors.	Low likelihood	Medium	Low	Spills and leaks from vehicles and tanks on site are likely. However, the extent of contamination will be very limited (relative to the size of the site). Testing required to confirm.	The topography of the site would cause surface water to run into on-site drainage ditches and potentially off site. Mitigation would generally comprise materials management and reuse of Made Ground soils at depth in landscaped areas. However, no significant impact identified in previous investigations.
	Base flow from contaminated groundwater.						The site is underlain by high permeability strata and the waterbodies below the site are a Principal Aquifer. However, there are no active groundwater abstractions within 1km of the site and any impact from the small areas of isolated Made Ground will be limited. Historical investigations did not identify a significant risk.
	Direct contact	Water supply pipes.	Likely	Medium	Moderate		It is possible that the Made Ground will contain contaminants of concern at levels in excess of the GAC. Direct contact with buried water supply pipes is therefore possible. However, it will be limited to small areas of the site.
PCBs and oils from transformers in the electricity sub-station on site	Ingestion, dermal contact	Site users	Unlikely	Medium	Very Low	An electrical substation has been present on the site, which has the potential to have leaked. Testing required to confirm.	Contact with these materials is likely in limited areas. However, over the majority of the site, the risk will be low as the proposed development will comprise hardstanding and building footprints. Mitigation measures may be required to break the S-P-R linkage. Mitigation may comprise small scale excavation, re-use of Made Ground / impacted soils at depth in landscaped areas and possibly small scale bio-remediation or disposal.
	Inhalation and ingestion of dust.	Site users Neighbours	Unlikely	Medium	Very Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled.
	Leaching through unsaturated zone	Groundwater	Unlikely	Medium	Very Low		The site is underlain by high permeability strata and the waterbodies below the site are a Principal Aquifer. However, there are no active groundwater abstractions within 1km of the site and any impact from the small areas of isolated Made Ground will be limited.

Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments
Ground gases (carbon dioxide and methane) from organic materials in the Made Ground below the site.	Migration, build up and asphyxiation.	Site users.	Unlikely	Medium to Severe	Low to Moderate	Ground gas concentrations from Made Ground and Alluvium are unlikely to be significantly elevated.
		Neighbours.	No Linkage			There are no neighbours within influencing distance of the proposed development.
Ground gases (methane) from organic materials in the Made Ground.	Migration, build up and explosion.	Site users.	Unlikely	Medium to Severe	Low to Moderate	Ground gas concentrations from Made Ground and Alluvium are unlikely to be significantly elevated.
		Neighbours.	No Linkage			There are no neighbours within influencing distance of the proposed development.
		Buildings on site.	Unlikely	Medium to Severe	Low to Moderate	Ground gas concentrations from Made Ground and Alluvium are unlikely to be significantly elevated.
		Buildings on adjacent sites.	No Linkage			The closest building to the Made Ground and Alluvial materials are built on an historical landfill and the site is not considered a risk to these properties
Ground gases (carbon dioxide and methane) from the Ardley landfill located to the east of the site.	Migration, build up and asphyxiation.	Site users.	Likely	Medium to Severe	Moderate to High	Ground gas concentrations from the off-site landfill have been reported as significantly elevated, although gas flow was not recorded. Rocks on site are permeable and will transmit ground gas. Ground gas protection measures may be required.
Ground gases (methane) from organic materials from the Ardley landfill located to the east of the site.	Migration, build up and explosion.	Site users.	Likely	Medium to Severe	Moderate to High	
		Buildings on site.	Likely	Medium to Severe	Moderate to High	

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Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Petroleum hydrocarbons and phenols contaminated groundwater from the former RAF Upper Heyford from its use as an airbase and leaks from POL storage.	Ingestion, or direct contact.	Site users.	Low likelihood to Likely	Medium	Low to Moderate	Petroleum hydrocarbons and phenol have been historically recorded in groundwater on the immediate western edge of the site. Although the risks were classified as low in historical reports and the risks were reviewed and the proposed remedial measures approved by the Environment Agency. There is the potential for petroleum hydrocarbons and phenols to be present.	If present petroleum hydrocarbons and phenol may be present in groundwater exposed in cut rock faces.
	Surface run-off.	Aquatic ecosystems.	Low likelihood to Likely	Medium	Low to Moderate		If present in groundwater petroleum hydrocarbons and phenol may emerge in spring lines (natural or made by cut surfaces) and migrate as surface water to the stream in the central-east of the site.
		Surface water and possible abstractors.	Unlikely	Medium	Very Low		No surface water abstractions in close proximity to the site.
	Base flow from contaminated groundwater.	Aquatic ecosystems.	Low likelihood to Likely	Medium	Low to Moderate		If present in groundwater petroleum hydrocarbons and phenol may contaminate a wide area, as the groundwater below the airfield is in continuity with the wider aquifer.
		Surface water and possible abstractors.	Unlikely	Medium	Very Low		No surface water abstractions in close proximity to the site.

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Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
PFOS / PFAS contaminated groundwater from the former RAF Upper Heyford from its use as an airbase and the potential use of firefighting foam.	Ingestion, or direct contact.	Site users.	Low likelihood to likely	Medium to sever	Low to Very High	PFOS / PFAS may be present in groundwater from the former RAF Upper Heyford. The site is located at the edge of the former runway and firefighting foams may have been used. To Hydrock's knowledge, no testing has been historically undertaken. There is the potential for PFOS / PFAS to be present.	If present in groundwater PFAS / PFOS may emerge in cut rock faces.
	Surface run-off.	Aquatic ecosystems.	Low likelihood to likely	Medium to sever	Low to Very High		If present in groundwater PFAS / PFOS may emerge in spring lines (natural or made by cut surfaces) and migrate as surface water to the stream in the central east of the site.
		Surface water and possible abstractors.	Unlikely	Medium to sever	Very Low to Low		There are no surface water abstractions in close proximity to the site.
	Base flow from contaminated groundwater.	Aquatic ecosystems.	Low likelihood to likely	Medium to sever	Low to Very High		If present in groundwater PFAS / PFOS may contaminate a wide area, as the groundwater below the airfield is in continuity with the wide aquifer.
		Surface water and possible abstractors.	Unlikely	Medium to sever	Very Low to Low		There are no surface water abstractions in close proximity to the site.
Asbestos fibres from insulation or asbestos-containing materials in the buildings.	Fugitive dust.	On Site	Likely	Severe	High	Asbestos may be present in existing buildings and in Made Ground. Careful removal from buildings will be required during demolition. However, removal under controlled conditions should limit release of fibres to the air and the ground.	
		Neighbours.	Unlikely	Severe	Low	The risk of significant generation of dust is likely only during site development process and can therefore be controlled.	

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Sources	Possible Pathways	Receptors	Probability	Consequence	Risk Level	Comments	
Agricultural chemicals (pesticides / herbicides)	Ingestion, inhalation or direct contact.	Site users.	Unlikely	Medium	Low	It is very likely pesticides and herbicides have been used on the site in the past. However, persistent chemicals are likely to be unlikely. Testing required to confirm.	Contact with these materials is likely in limited areas of landscaping. However, over the majority of the site, the risk will be low as the proposed development will comprise hardstanding and building footprint.
	Inhalation of fugitive dust.	Neighbours.	Unlikely	Medium	Low		The risk of significant generation of dust is likely only during site development process and can therefore be controlled.
	Leaching through unsaturated zone.	Groundwater and possible abstractors.	Unlikely	Medium	Low		The site is underlain by high permeability strata and the waterbodies below the site are a Principal Aquifer. However, there are no active groundwater abstractions within 1km of the site.
	Surface run-off.	Aquatic ecosystems.	Unlikely	Medium	Low		The topography of the site would cause surface water to run into on-site drainage ditches.
	Base flow from contaminated groundwater.	Surface water and possible abstractors.	Unlikely	Medium	Low		The site is underlain by high permeability strata and the waterbodies below the site are a Principal Aquifer. However, there are no active groundwater abstractions within 1km of the site.
Radon	Inhalation.	Site users.	No Linkage			BR211 indicates the site is in a low radon area and no radon protection is required.	