

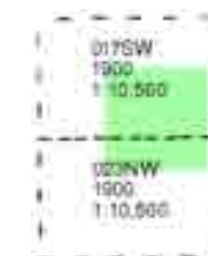
Oxfordshire

Published 1900

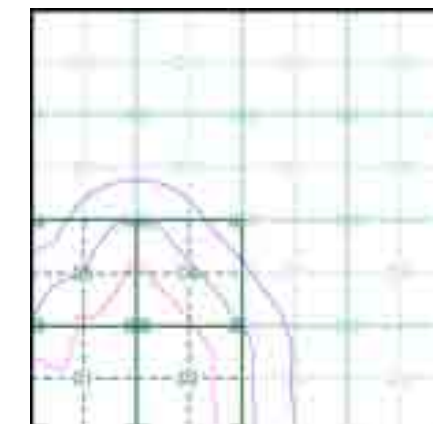
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice D

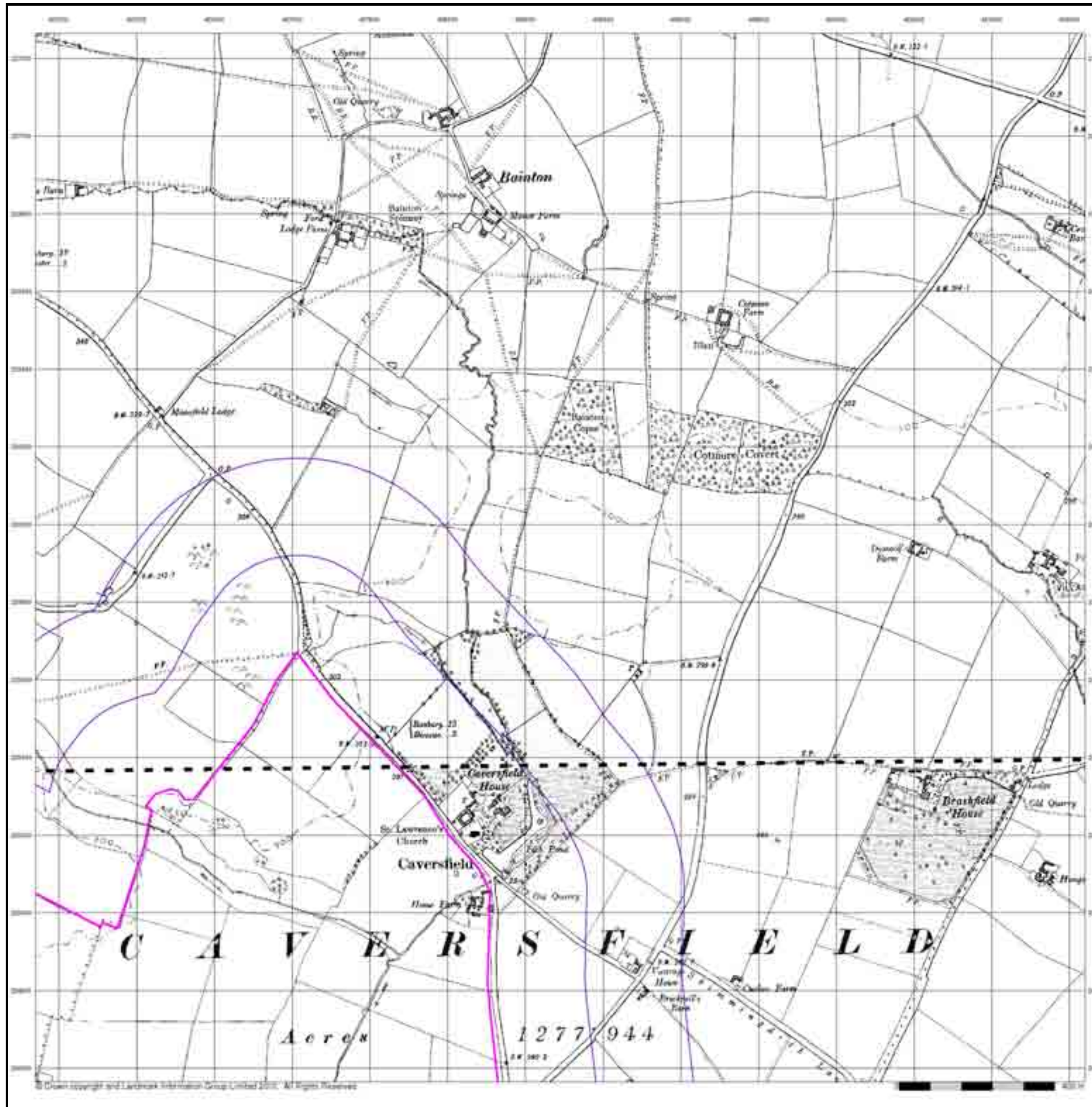


Order Details

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 Search Buffer (m): 500

Site Details

Site at, Bicester, Oxfordshire



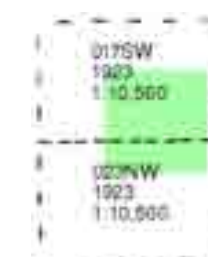
Oxfordshire

Published 1923

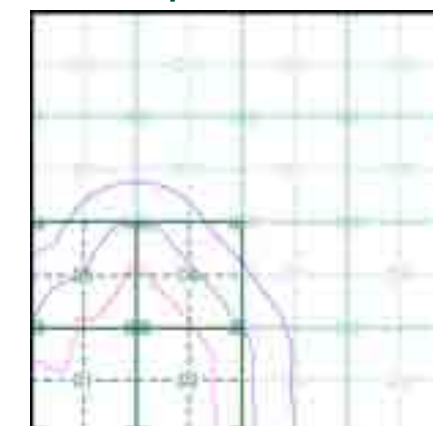
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Site Details

Site at, Bicester, Oxfordshire

Oxfordshire

Published 1923

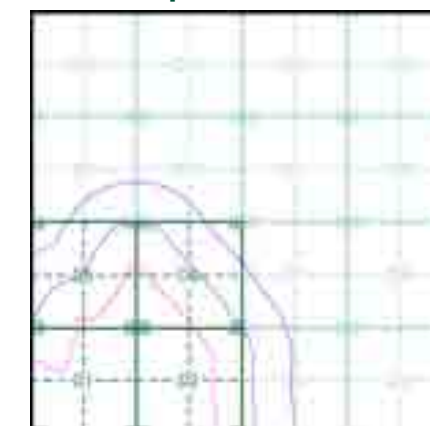
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Site Details

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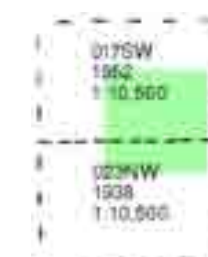
Oxfordshire

Published 1938 - 1952

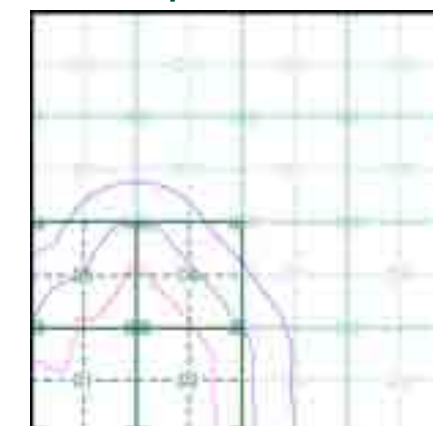
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Site Details

Site at, Bicester, Oxfordshire

Historical Aerial Photography

Published 1947

Source map scale - 1:10,560

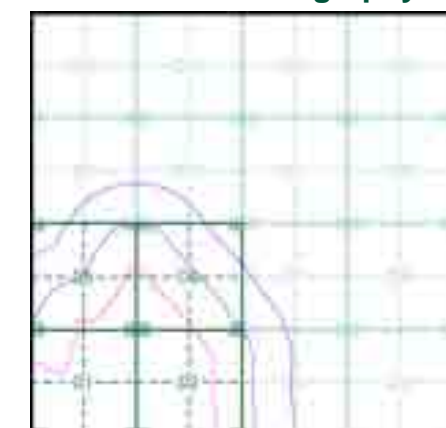
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

© Landmark Information Group and/or Data Suppliers 2010.

Map Name(s) and Date(s)

SP52NE
1947
1:10,560
SP52SE
1947
1:10,560

Historical Aerial Photography - Slice D

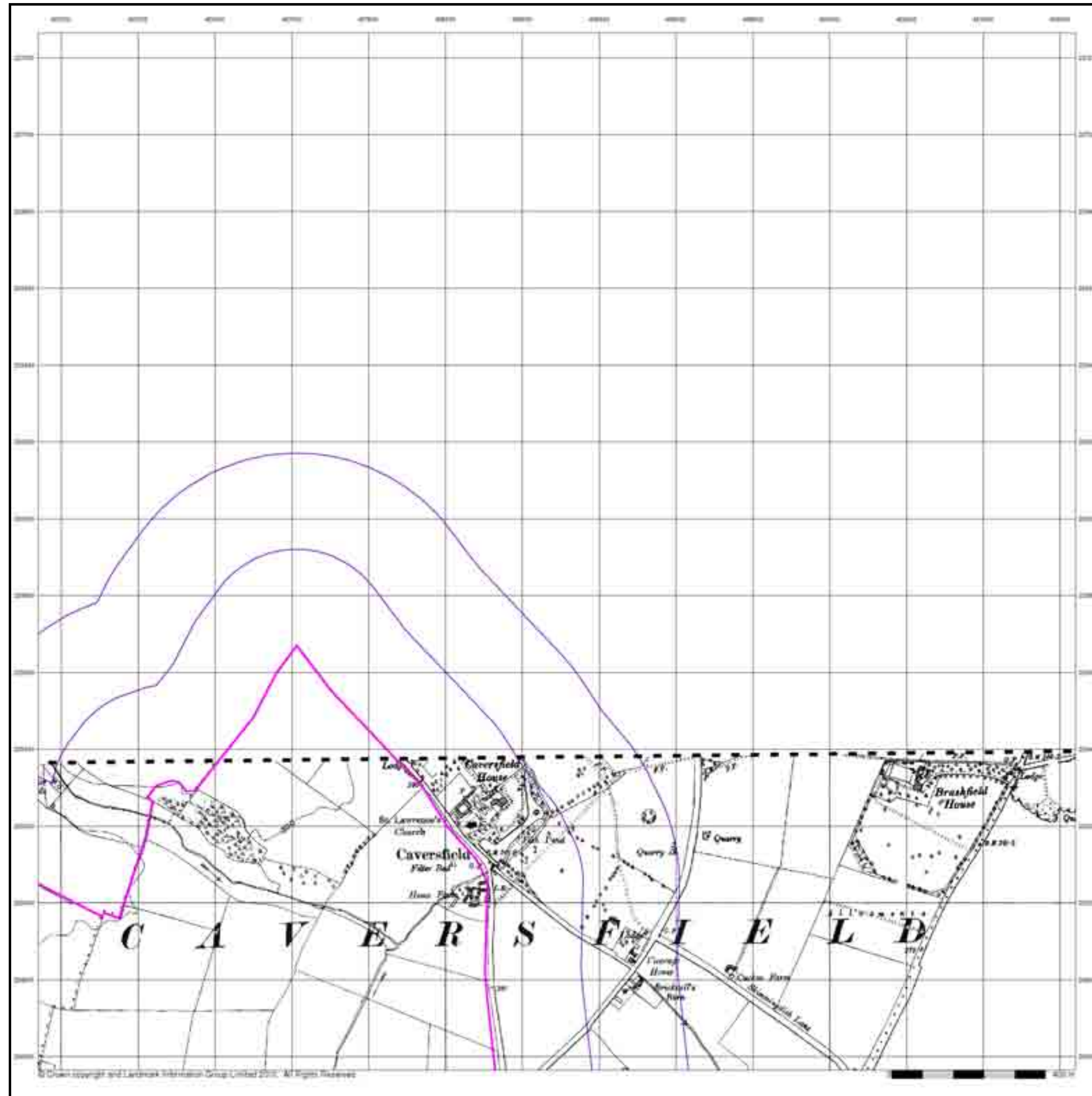


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Search Buffer (m):	500

Site Details

Site at, Bicester, Oxfordshire



Oxfordshire

Published 1952

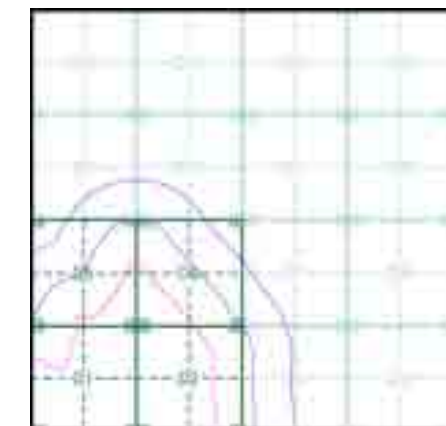
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Site Details

Site at, Bicester, Oxfordshire

Ordnance Survey Plan

Published 1955

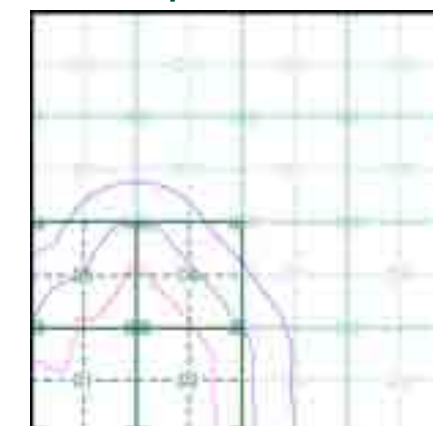
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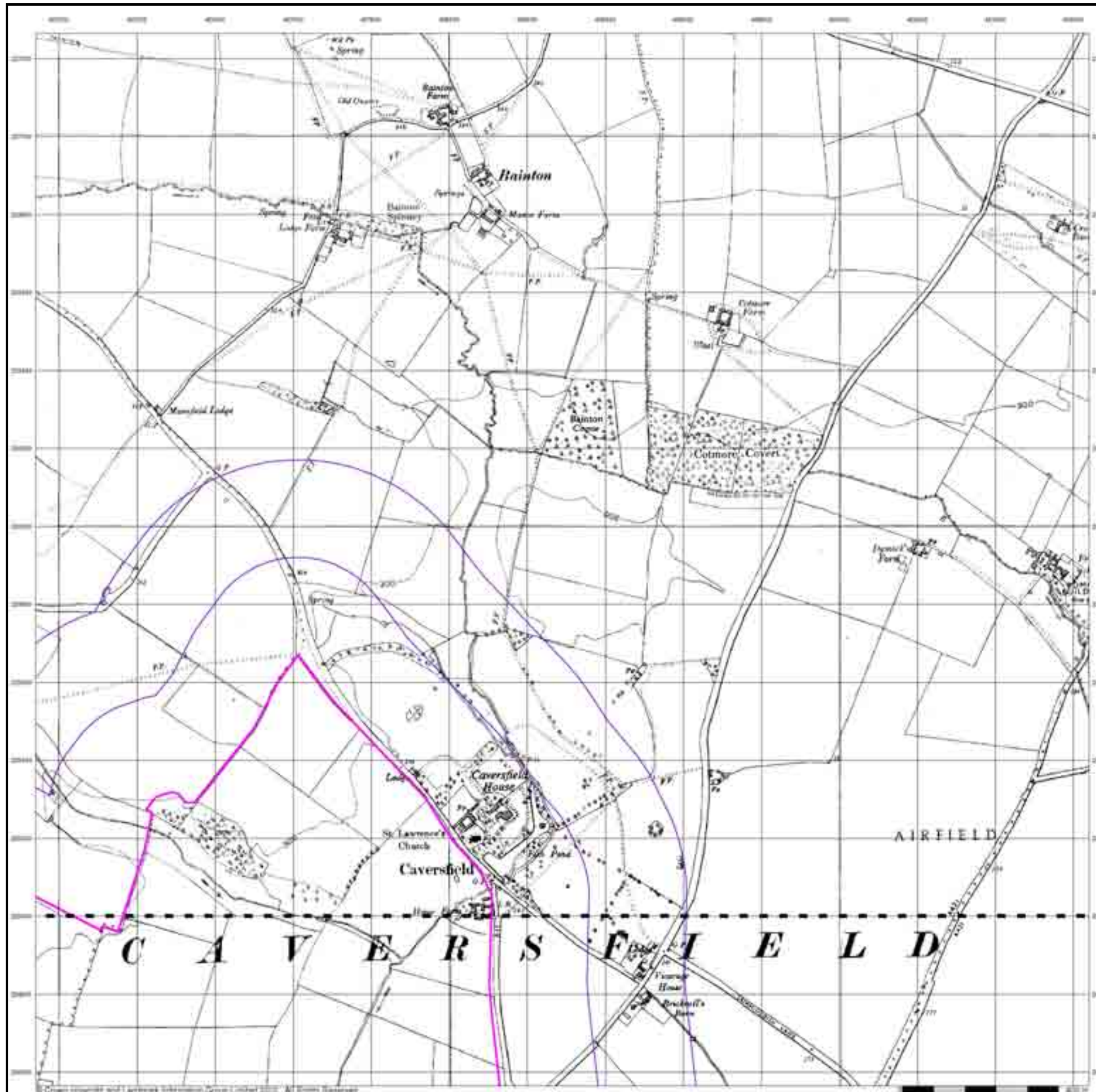


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Site Details

Site at, Bicester, Oxfordshire



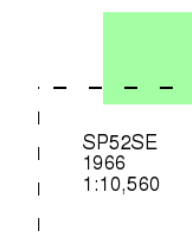
Ordnance Survey Plan

Published 1966

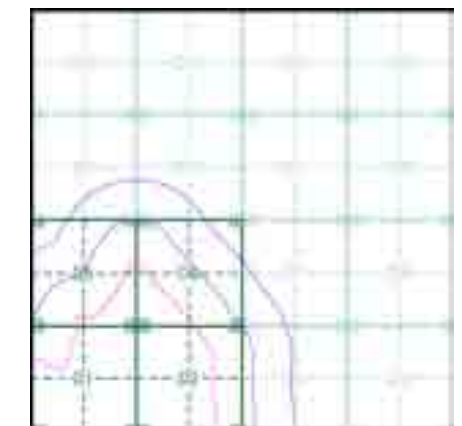
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Site Details

Site at, Bicester, Oxfordshire

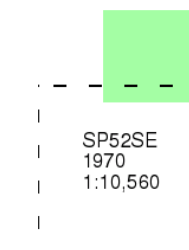
Ordnance Survey Plan

Published 1970

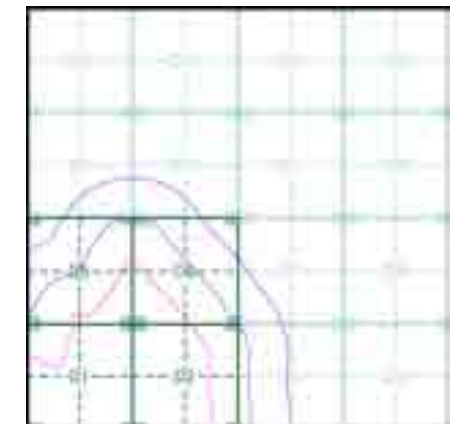
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Site Details

Site at, Bicester, Oxfordshire

Ordnance Survey Plan

Published 1982 - 1988

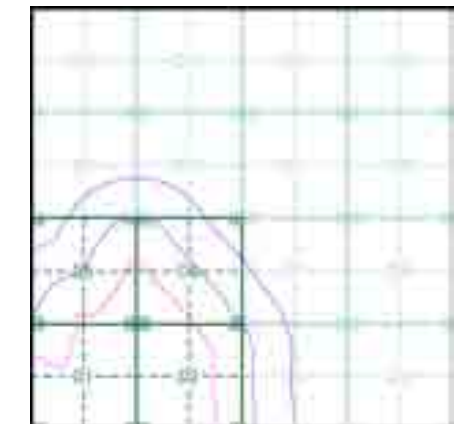
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Site Details

Site at, Bicester, Oxfordshire

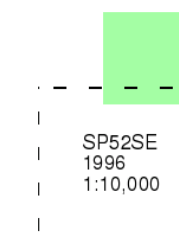
Ordnance Survey Plan

Published 1996

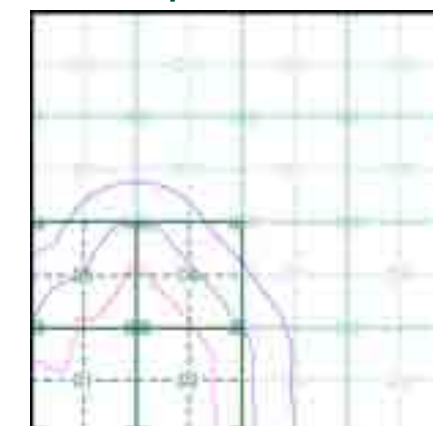
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

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Site Details

Site at, Bicester, Oxfordshire

10k Raster Mapping

Published 1999

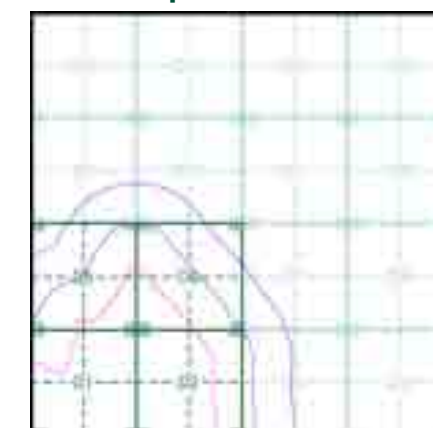
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice D



Order Details

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Site Details

Site at, Bicester, Oxfordshire

10k Raster Mapping

Published 2006

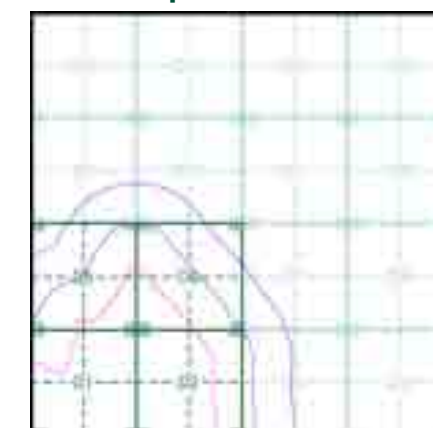
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Site Details

Site at, Bicester, Oxfordshire

10k Raster Mapping

Published 2010

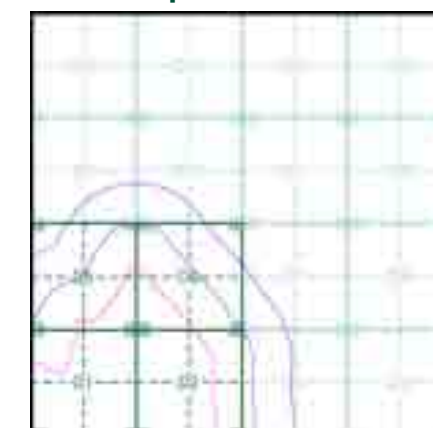
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Site Details

Site at, Bicester, Oxfordshire

Appendix C

Risk Assessment Classification Definitions

Definition of Potential Consequence

Classification	Human Health	Controlled Waters	Ecological	Built Environment
Severe	Irreversible damage to human health	Substantial pollution of sensitive water resources	Significant change to the number of one or more species or ecosystems	Irreparable damage to buildings, structures or the environment
Moderate	Non-permanent health effects to humans	Pollution of non sensitive water resources or small scale pollution of sensitive water resources	Change to population densities of non sensitive species	Damage to sensitive buildings, structures or the environment
Mild	Slight short term health effects to humans	Slight pollution to non sensitive water resources	Some change to population densities but with no negative effects on the function of the ecosystem	Easily repairable effects of damage to buildings or structures
Negligible	No measurable effects on humans	Insubstantial pollution to non-sensitive water resources	No significant changes to population densities in the environment or in any ecosystem	Very slight non-structural damage or cosmetic harm to buildings or structures

Definition of Probability

Very Unlikely	0 to 5%
Unlikely	5 to 45%
Possible	45 to 55%
Likely	55 to 95%
Almost Certain	95 to 100% (i.e. impact noted during the investigation).

Assignment of Risk Using Consequence / Probability Matrix

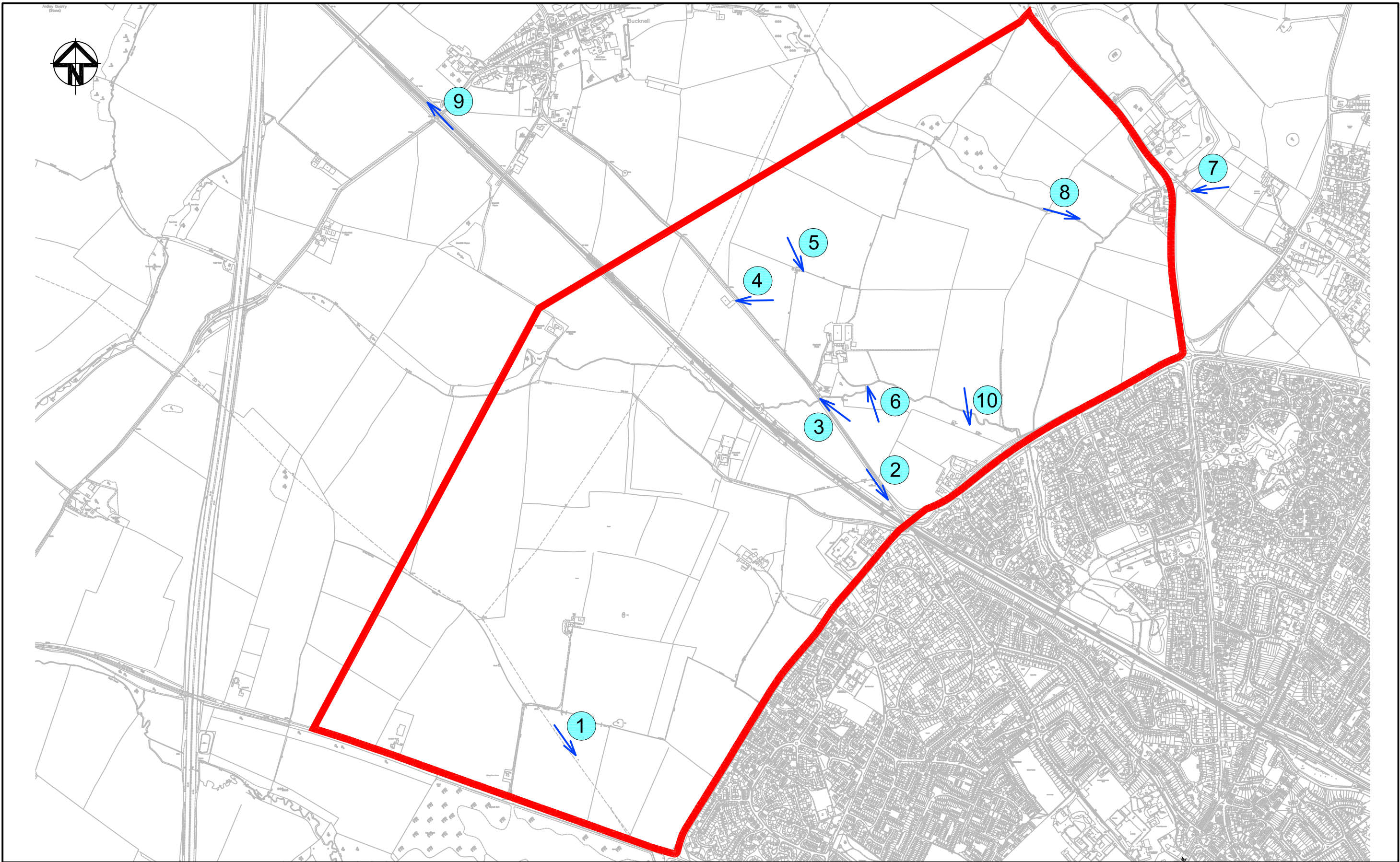
Consequence	Risk				
Severe	Low	Low to moderate	Moderate to high	Very High	Very High
Moderate	Negligible to low	Low	Moderate	Moderate to high	High
Mild	Negligible	Low	Low	Low to moderate	Moderate
Negligible	Negligible	Negligible	Negligible to low	Low	Low
Probability	Very Unlikely	Unlikely	Possible	Likely	Almost Certain

Definition of Overall Risk

Negligible	The presence of the identified source does not give rise to the potential to cause significant harm.
Low	It is possible that harm could arise to a designated receptor from an identified source, however, this is likely to be mild. It is unlikely that the issue will arise as a liability/cost for the freehold/leasehold owner (as appropriate) of the Site.
Moderate	It is possible that harm could arise to a designated receptor from an identified source, but it is likely that such harm would be relatively localised or non permanent -remedial action may be necessary. It is possible that the issue could arise as a liability/cost for the freehold/leasehold owner (as appropriate) of the Site. Further work is usually required to clarify the risk.
High	A designated receptor is likely to experience significant harm from an identified source without remedial action. It is likely that the issue will arise as a liability/cost for the Site freehold/leasehold (as appropriate) owner of the Site.
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified source without appropriate remedial action. It is highly likely that the issue will arise as a liability/cost for the Site freehold/leasehold (as appropriate) owner of the Site.

Appendix D


Site Walkover Photographs



01	FIRST ISSUE	13/07/10
Issue	Description	Date

KEY

1 PLATE NUMBER

 PHOTOGRAPH LOCATION AND DIRECTION

Client





Status **PRELIMINARY**
NOT TO BE USED FOR CONSTRUCTION

Scales	1:12,500	Current Issue Signatures	
Original Size	A3	Author S.JONES	
Height Datum	-	Checker D.THOMAS	
Grid	GRID	Approver C.PLUMB	
Filename: 2000-UA001881-UP33D-01.DWG			

Project **BICESTER ECO TOWN**

Title **SITE WALKOVER PHOTOGRAPH LOCATION PLAN**



Hyder Consulting (UK) Limited
29, Bressenden Place
London
SW15 5DZ
Tel: +44 (0)870 000 3006
Fax: +44 (0)870 000 3906

Drawing No.	Project No.	Issue
2000	UA001881	01



Plate 1: View of typical farmers fields at Bicester, with 33kv overhead cable



Plate 2: One of four mobile telecommunications masts (all on Messrs. Malins' land). This one is located near the roundabout at Bicester Road and the A4095



Plate 3: Stone-faced drainage culvert crossing beneath Bucknell Road at a location some 500m NW of the junction (roundabout) with the A4095 (Lord's Lane)



Plate 4: Asbestos clad building along Bucknell Road, located some 950m NW of the junction (roundabout) with the A4095 (Lord's Lane)



Plate 5: Cattle grazing in fields



Plate 6: Most northerly of the two streams that feed the River Bure



Plate 7: Possible location of former quarry (see Reference D5 on the Envirocheck Information drawing in Appendix A)



Plate 8: Bed of the most southerly of the two streams that feed the River Bure



Plate 9: The London to Birmingham railway line as it passes within the cutting beneath Middleton Road to the south-west of Bucknell village



Plate 10: Water Abstraction Point located on Messrs. Malins' land, between two mobile telecommunications masts (see Reference B3 on the Envirocheck Information drawing in Appendix A)

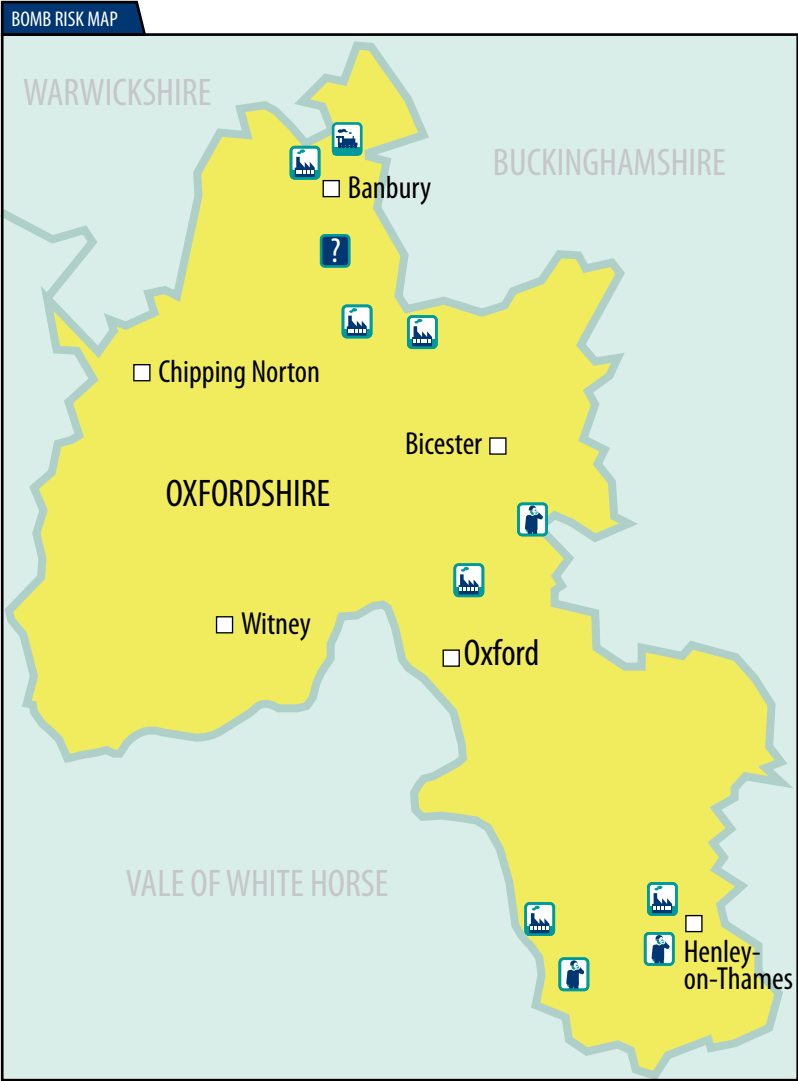
Appendix E

Zetica UXO Datasheet

REGIONAL UNEXPLODED BOMB RISK

OXFORDSHIRE

DENSITY OF BOMBS PER BOROUGH			
Borough	High explosive	Anti-personnel	Incendiary
Oxford	1	0	1
Banbury	105	0	4
Witney	124	0	4
Bicester	0	0	4
Chipping Norton	187	0	4
Henley on Thames	162	0	4



The information in this regional UXB risk map is derived from a number of sources and should be read in conjunction with the "Users' Guide" (printed overleaf). Zetica cannot guarantee the accuracy or completeness of the information or data.

This map covers regions of coast with beaches, estuaries and alike. Further consideration of the bomb risk is required in these areas. The often inaccessible nature and changing ground conditions (e.g. movement of silt that may contain ordnance) means that historical bombing records for these areas are often poor or inaccurate and further assessment of the bomb risk may be required as part of a site specific study.

A FOUR-STEP PROCESS



Risk assessment and method statement from a qualified explosive ordnance clearance (EOC) operative.



Surface geophysical survey to allow shallow groundwork.



MAGCONE detects UXBs and obstructions on piling layout to the no-risk depth.



Detected UXBs can be dealt with by our EOC engineers and a Clearance Certificate issued for the site.

zetica

For more details on this and related services, telephone: +44 (0) 1993 886682 or visit our website: www.zetica.com

BOMB MAP USERS' GUIDE

Sources of information and explanation of bomb risk

Why?

Unexploded bombs (UXB) still present a risk to construction projects long after the end of the Second World War (WWII). UXBs often entered the ground unnoticed at high velocity and penetrated to a depth of several metres. Here they remain – vulnerable to disturbances from construction work. Beyond the depth of shallow excavation work, the greatest risk is to piling, drilling and probing crews. A piling rig could repeatedly hit a UXBs with considerable force before the crew realises an obstruction has been impacted. It could then be up to 72 hours before the detonator activates.

Who?

The responsibility for avoiding UXB risk usually lies with construction companies or house builders particularly those who are redeveloping urban sites. In addition, project engineering or environmental consultants are expected to advise their clients of a site's history. Other interested parties include those organisations whose employees are physically at most risk from intrusive works, normally piling companies, drillers or probing operators.

How?

UXB risk should be assessed for every site, but especially those in known heavily bombed areas or those situated near war-time strategic installations that were priority targets for enemy aircraft, for example, airfields. Zetica's regional bomb risk map is therefore a first point of reference from which the relative, potential abundance of UXBs can be judged. Consultants then advise their clients that an ordnance-risk desk study is required, which they may obtain from external sources. Construction companies or house builders who assess their own risk could choose to come direct to Zetica.

When?

Do not wait for the piling or drilling company to be on site before thinking about UXB risk – it will inevitably cause delays and higher costs. Request the regional bomb risk map from Zetica as soon as a site is being considered, and then use it to help you or your clients to decide if an ordnance-risk desk study is required.

Where?

Maps can be obtained for any county in England, Scotland, Wales or Northern Ireland – or for any London borough. They can help determine the areas that were most heavily bombed – but no part of the country should be considered 100% safe from UXB risk. Even remote rural areas can have a high risk if, for example, they were locations for decoy airfields or beacons that were lit to fool enemy pilots into thinking they had located a burning city that had been successfully hit by others in the raid.

How to use this regional map

This map is designed to give you an indication of the potential risk from UXBs in your area. If you are conducting work that involves excavation, piling or other disturbance of the ground, then you should use the map to identify the category of risk for your site.

The risk boundaries are a guide, compiled from data based on the political areas for which records are held; being just outside a high-risk area does not mean there is no UXB risk. You should use the map to assist in your decision of whether to investigate the UXB risk further.

Information on the regional risk remaining from UXBs in the UK

Zetica has built the largest UXB database of its kind in the UK. It includes a unique digital library of bomb census data, and maps showing key strategic points and bombing densities from the First and Second World Wars. The main sources of information include records from central government (Public Records Office), the Ministry of Defence, and the German Luftwaffe.

Using information from this database, Zetica has published maps of UXB risk on a regional, county and borough scale. The maps indicate relative degrees of UXB risk based on available records for bombing densities and known targeted areas for regions within the UK. The risk is broken down into individual boroughs, towns or cities. The data are based on the historical boroughs and are then overlaid onto the modern map. It is important to note that more-detailed research may be required for individual sites, particularly where proximity to a potential WWII target means the local risk may be higher.

High risk

Areas designated as high risk are those that show a high density of bombing hits (50+ bombs per 1000 acres) and abundant potential WWII targets. In high-risk regions, further action to mitigate UXB risk is considered essential.

Moderate risk

Moderate-risk regions are those that show a bomb density of between 11 and 50 bombs per 1000 acres and that may contain potential WWII targets. Action to mitigate the risk is considered essential, albeit more likely that a reduced scope of work is required compared with that needed for high-risk regions.

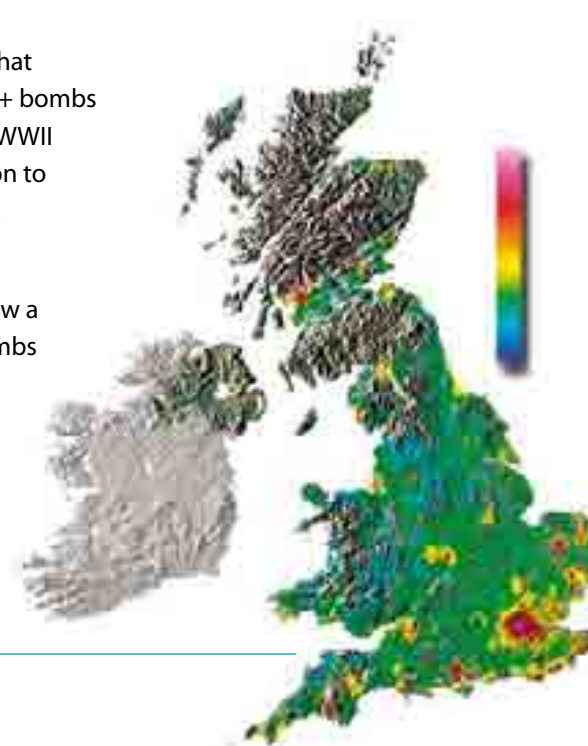
Low risk

Low-risk regions are those with a bombing density of up to 10 bombs per 1000 acres. These areas are considered to have a significant but low UXB risk. In general, further action to mitigate the risk is considered prudent, although not essential. Care is required when assessing the risk for specific sites where the risk may be higher because of local wartime activity.

Other WWII targets

Other regions with the risk of UXBs are key strategic points as defined by the government during WWII as representing potential enemy targets. Where these exist outside areas mapped as high, moderate or low risk, a site-specific assessment of the UXB risk may be required.

Relative UXB risk across UK



What to do if...

...you have a site that has a potential UXB risk

In the absence of current legislation requiring you to address the risk from UXBs, your responsibilities under health and safety legislation and regulations such as construction design and management require that you address all identified risks. The first stage is to request further advice from a professional adviser such as Zetica, or to gain more site-specific information by commissioning an ordnance-risk desk study. Then a strategy to deal with the risk can be established that is tailored to your proposed work.

...you find a suspect item or require advice

If during site works you find a suspect (ordnance-related) item, it is very important that you do not touch or move it (even if it has already been moved by an excavator). If it is clearly ordnance related, then dial 999 and ask for the police. Ensure that the area around the item is kept as clear as possible without placing yourself at risk. If you are unsure and do not wish to cause undue alarm, or you just require some advice, then you can call Zetica. We have experienced qualified UXB specialists on hand who can offer support and advice during any site works.

More-detailed procedures should be established in advance if you are in an area where the risk of finding a UXB is shown to be significant (moderate to high).

Site-specific desktop studies

Zetica is able to provide high-quality, site-specific UXB risk information for any residential, industrial or commercial property in the UK. These desktop studies provide details of the bombing density within an area and for the site itself, in order to indicate the risks of UXBs still being present. A risk assessment is provided to facilitate informed decision making on whether any further risk mitigation measures are required.

Appendix F

BGS Borehole Logs

(Refer to Drawing “Envirocheck Information” in Appendix A for borehole locations)

BGS Geological Site Assessment

DESCRIPTION OF WORK		QUANTITY		UNIT PRICE		TOTAL PRICE	
NO.	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	REMARKS	DATE
1	Excavation for foundation	100	cuyd	1.25	125.00		
2	Foundation concrete	100	cuyd	1.50	150.00		
3	Foundation masonry	100	cuyd	1.00	100.00		
4	Foundation reinforcement	100	cuyd	1.00	100.00		
5	Foundation formwork	100	cuyd	1.00	100.00		
6	Foundation backfill	100	cuyd	1.00	100.00		
7	Foundation inspection	100	cuyd	1.00	100.00		
8	Foundation completion	100	cuyd	1.00	100.00		
9	Foundation total	100	cuyd	1.00	100.00		
10	Foundation total	100	cuyd	1.00	100.00		
11	Foundation total	100	cuyd	1.00	100.00		
12	Foundation total	100	cuyd	1.00	100.00		
13	Foundation total	100	cuyd	1.00	100.00		
14	Foundation total	100	cuyd	1.00	100.00		
15	Foundation total	100	cuyd	1.00	100.00		
16	Foundation total	100	cuyd	1.00	100.00		
17	Foundation total	100	cuyd	1.00	100.00		
18	Foundation total	100	cuyd	1.00	100.00		
19	Foundation total	100	cuyd	1.00	100.00		
20	Foundation total	100	cuyd	1.00	100.00		
21	Foundation total	100	cuyd	1.00	100.00		
22	Foundation total	100	cuyd	1.00	100.00		
23	Foundation total	100	cuyd	1.00	100.00		
24	Foundation total	100	cuyd	1.00	100.00		
25	Foundation total	100	cuyd	1.00	100.00		
26	Foundation total	100	cuyd	1.00	100.00		
27	Foundation total	100	cuyd	1.00	100.00		
28	Foundation total	100	cuyd	1.00	100.00		
29	Foundation total	100	cuyd	1.00	100.00		
30	Foundation total	100	cuyd	1.00	100.00		
31	Foundation total	100	cuyd	1.00	100.00		
32	Foundation total	100	cuyd	1.00	100.00		
33	Foundation total	100	cuyd	1.00	100.00		
34	Foundation total	100	cuyd	1.00	100.00		
35	Foundation total	100	cuyd	1.00	100.00		
36	Foundation total	100	cuyd	1.00	100.00		
37	Foundation total	100	cuyd	1.00	100.00		
38	Foundation total	100	cuyd	1.00	100.00		
39	Foundation total	100	cuyd	1.00	100.00		
40	Foundation total	100	cuyd	1.00	100.00		
41	Foundation total	100	cuyd	1.00	100.00		
42	Foundation total	100	cuyd	1.00	100.00		
43	Foundation total	100	cuyd	1.00	100.00		
44	Foundation total	100	cuyd	1.00	100.00		
45	Foundation total	100	cuyd	1.00	100.00		
46	Foundation total	100	cuyd	1.00	100.00		
47	Foundation total	100	cuyd	1.00	100.00		
48	Foundation total	100	cuyd	1.00	100.00		
49	Foundation total	100	cuyd	1.00	100.00		
50	Foundation total	100	cuyd	1.00	100.00		
51	Foundation total	100	cuyd	1.00	100.00		
52	Foundation total	100	cuyd	1.00	100.00		
53	Foundation total	100	cuyd	1.00	100.00		
54	Foundation total	100	cuyd	1.00	100.00		
55	Foundation total	100	cuyd	1.00	100.00		
56	Foundation total	100	cuyd	1.00	100.00		
57	Foundation total	100	cuyd	1.00	100.00		
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59	Foundation total	100	cuyd	1.00	100.00		
60	Foundation total	100	cuyd	1.00	100.00		
61	Foundation total	100	cuyd	1.00	100.00		
62	Foundation total	100	cuyd	1.00	100.00		

PROJECT INFORMATION		EXCAVATION METHODS		COORDINATE SYSTEM		DATE		HOLE NO.	
OXFORD TO BIRMINGHAM NEW ROUTE - OXFORD TO BANBURY SECTION		EXCAVATION METHOD		COORDINATE SYSTEM		DATE		HOLE NO.	
1. PROJECT NO.		2. EXCAVATION METHOD		3. COORDINATE SYSTEM		4. DATE		5. HOLE NO.	
6. SITE DISTANCE		7. EXCAVATION METHOD		8. COORDINATE SYSTEM		9. DATE		10. HOLE NO.	
11. PROJECT NO.		12. EXCAVATION METHOD		13. COORDINATE SYSTEM		14. DATE		15. HOLE NO.	
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21. PROJECT NO.		22. EXCAVATION METHOD		23. COORDINATE SYSTEM		24. DATE		25. HOLE NO.	
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36. SITE DISTANCE		37. EXCAVATION METHOD		38. COORDINATE SYSTEM		39. DATE		40. HOLE NO.	
41. PROJECT NO.		42. EXCAVATION METHOD		43. COORDINATE SYSTEM		44. DATE		45. HOLE NO.	
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51. PROJECT NO.		52. EXCAVATION METHOD		53. COORDINATE SYSTEM		54. DATE		55. HOLE NO.	
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641. PROJECT NO.		642. EXCAVATION METHOD		643. COORDINATE SYSTEM		644. DATE		645. HOLE NO.	
646. SITE DISTANCE		647. EXCAVATION METHOD		648. COORDINATE SYSTEM		649. DATE		650. HOLE NO.	
651. PROJECT NO.		652. EXCAVATION METHOD		653. COORDINATE SYSTEM		654. DATE		655. HOLE NO.	
656. SITE DISTANCE		657. EXCAVATION METHOD		658. COORDINATE SYSTEM		659. DATE		660. HOLE NO.	
661. PROJECT NO.		662. EXCAVATION METHOD		663. COORDINATE SYSTEM		664. DATE		665. HOLE NO.	
666. SITE DISTANCE		667. EXCAVATION METHOD		668. COORDINATE SYSTEM		669. DATE		670. HOLE NO.	
671. PROJECT NO.		672. EXCAVATION METHOD		673. COORDINATE SYSTEM		674. DATE		675. HOLE NO.	
676. SITE DISTANCE		677. EXCAVATION METHOD		678. COORDINATE SYSTEM		679. DATE		680. HOLE NO.	
681. PROJECT NO.		682. EXCAVATION METHOD		683. COORDINATE SYSTEM		684. DATE		685. HOLE NO.	
686. SITE DISTANCE		687. EXCAVATION METHOD		688. COORDINATE SYSTEM		689. DATE		690. HOLE NO.	
691. PROJECT NO.		692. EXCAVATION METHOD		693. COORDINATE SYSTEM		694. DATE		695. HOLE NO.	
696. SITE DISTANCE		697. EXCAVATION METHOD		698. COORDINATE SYSTEM		699. DATE		700. HOLE NO.	
701. PROJECT NO.		702. EXCAVATION METHOD		703. COORDINATE SYSTEM		704. DATE		705. HOLE NO.	
706. SITE DISTANCE		707. EXCAVATION METHOD		708. COORDINATE SYSTEM		709. DATE		710. HOLE NO.	
711. PROJECT NO.		712. EXCAVATION METHOD		713. COORDINATE SYSTEM		714. DATE		715. HOLE NO.	
716. SITE DISTANCE		717. EXCAVATION METHOD		718. COORDINATE SYSTEM		719. DATE		720. HOLE NO.	
721. PROJECT NO.		722. EXCAVATION METHOD		723. COORDINATE SYSTEM		724. DATE		725. HOLE NO.	
726. SITE DISTANCE		727. EXCAVATION METHOD		728. COORDINATE SYSTEM		729. DATE		730. HOLE NO.	
731. PROJECT NO.		732. EXCAVATION METHOD		733. COORDINATE SYSTEM		734. DATE		735. HOLE NO.	
736. SITE DISTANCE		737. EXCAVATION METHOD		738. COORDINATE SYSTEM		739. DATE		740. HOLE NO.	
741. PROJECT NO.		742. EXCAVATION METHOD		743. COORDINATE SYSTEM		744. DATE		745. HOLE NO.	
746. SITE DISTANCE		747. EXCAVATION METHOD		748. COORDINATE SYSTEM		749. DATE		750. HOLE NO.	
751. PROJECT NO.		752. EXCAVATION METHOD		753. COORDINATE SYSTEM		754. DATE		755. HOLE NO.	
756. SITE DISTANCE		757. EXCAVATION METHOD		758. COORDINATE SYSTEM		759. DATE		760. HOLE NO.	
761. PROJECT NO.		762. EXCAVATION METHOD		763. COORDINATE SYSTEM		764. DATE		765. HOLE NO.	
766. SITE DISTANCE		767. EXCAVATION METHOD							

1997-1998

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL	REMARKS
1	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
2	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
3	Installation of trench cover	m ²	10.00	1.00	10.00	
4	Transportation of materials to site	m ³	50.00	0.50	25.00	
5	Labour charges	m ³	50.00	0.20	10.00	
6	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
7	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
8	Installation of trench cover	m ²	10.00	1.00	10.00	
9	Transportation of materials to site	m ³	50.00	0.50	25.00	
10	Labour charges	m ³	50.00	0.20	10.00	
11	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
12	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
13	Installation of trench cover	m ²	10.00	1.00	10.00	
14	Transportation of materials to site	m ³	50.00	0.50	25.00	
15	Labour charges	m ³	50.00	0.20	10.00	
16	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
17	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
18	Installation of trench cover	m ²	10.00	1.00	10.00	
19	Transportation of materials to site	m ³	50.00	0.50	25.00	
20	Labour charges	m ³	50.00	0.20	10.00	
21	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
22	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
23	Installation of trench cover	m ²	10.00	1.00	10.00	
24	Transportation of materials to site	m ³	50.00	0.50	25.00	
25	Labour charges	m ³	50.00	0.20	10.00	
26	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
27	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
28	Installation of trench cover	m ²	10.00	1.00	10.00	
29	Transportation of materials to site	m ³	50.00	0.50	25.00	
30	Labour charges	m ³	50.00	0.20	10.00	
31	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
32	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
33	Installation of trench cover	m ²	10.00	1.00	10.00	
34	Transportation of materials to site	m ³	50.00	0.50	25.00	
35	Labour charges	m ³	50.00	0.20	10.00	
36	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
37	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
38	Installation of trench cover	m ²	10.00	1.00	10.00	
39	Transportation of materials to site	m ³	50.00	0.50	25.00	
40	Labour charges	m ³	50.00	0.20	10.00	
41	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
42	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
43	Installation of trench cover	m ²	10.00	1.00	10.00	
44	Transportation of materials to site	m ³	50.00	0.50	25.00	
45	Labour charges	m ³	50.00	0.20	10.00	
46	Excavation and backfilling of trench 1.00m wide x 0.50m deep x 10.00m long	m ³	50.00	1.00	50.00	
47	Reinforcement concrete for trench walls and bottom	m ²	100.00	2.00	200.00	
48	Installation of trench cover	m ²	10.00	1.00	10.00	
49	Transportation of materials to site	m ³	50.00	0.50	25.00	
50	Labour charges	m ³	50.00	0.20	10.00	

DATE	BY	NO.	POLICE NO.
1979.02.16	10.11	1003	1011102

DECLARATION OF METHOD The authors have nothing to disclose.

5000000000 3 1000 1 5000000000 4 2000000000

$$10^{-3} \text{ m} = 0.1 \text{ cm} = 10^{-2} \text{ m} = 10^{-2} \times 10^3 \text{ mm} = 10 \text{ mm}$$

$$216 = 5.4 \times 10^1 \times 10^2 \times 10^3 \times 10^4 \times 10^5 \times 10^6 \times 10^7 \times 10^8 \times 10^9$$

2014年12月31日 星期三

1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 26



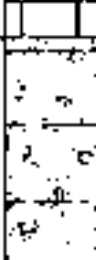
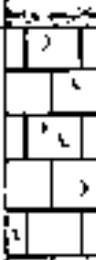

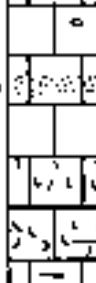
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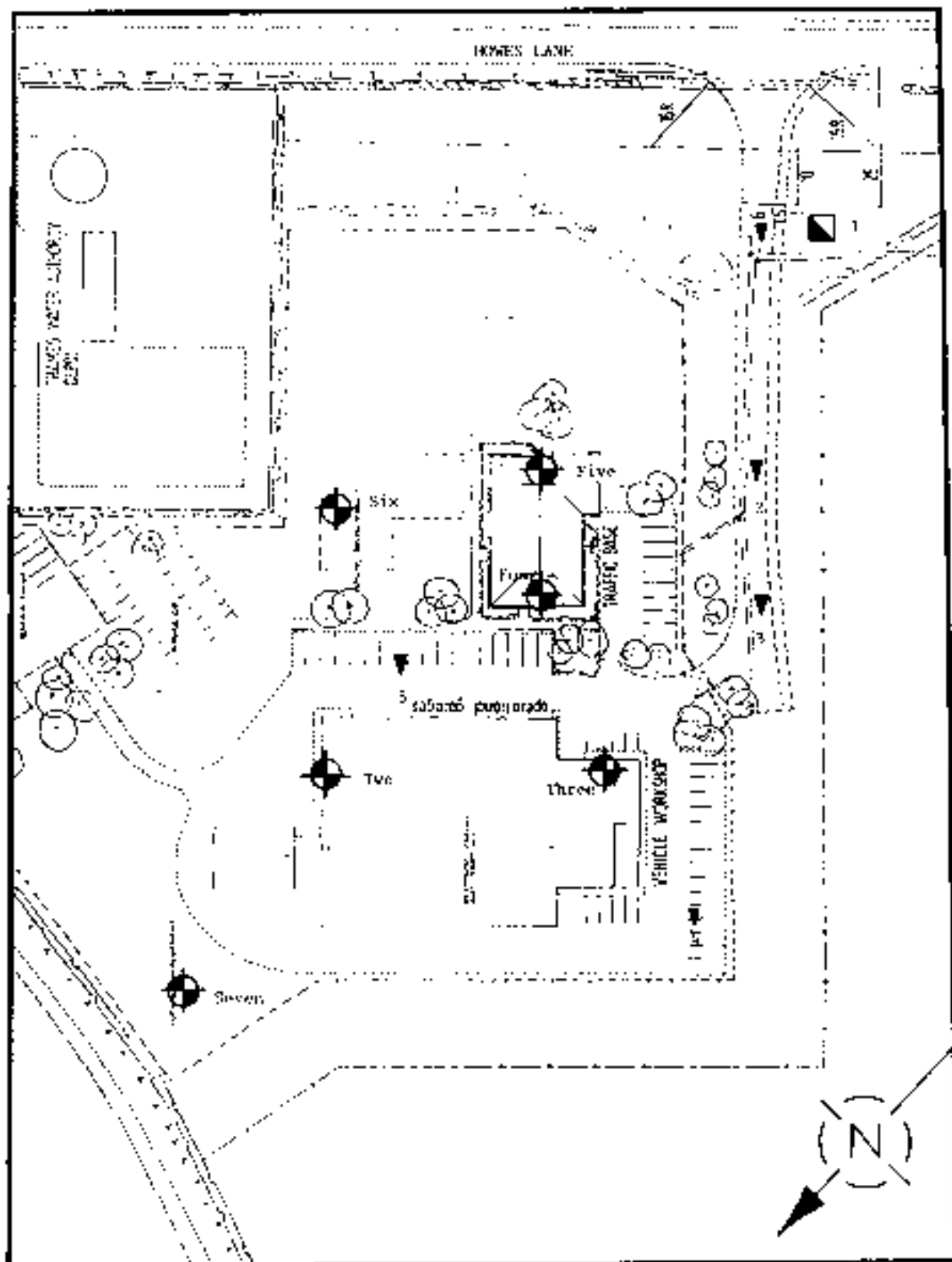
LOCATION: Howell Farm, Bicester.

BOREHOLE No. Two

SP52SE209

DATE OF BORING: 06.04.1989.

Description of Strata	STRATA CHANGE		P C J	R C J	M C J	Description of Discontinuities	STATE OF WEATHERING
	LEGEND	DEPTH m					
TOPSOIL		0.54				Non - intact with horizontal discontinuities.	
CORNBRASS Light brown grey, coarse grained LIMESTONE - moderately strong to strong		0.95					
Light brown slightly sandy CLAY with limestone fragments		1.73	0	37	22		W.II
Light grey, weathered light brown fossiliferous LIMESTONE - moderately strong to strong - pitted		2.00	0	90	12	L. - 50mm, non - intact from 2.30-2.90m. Horizontal discontinuities	W.III W.III
Mid grey, coarse grained LIMESTONE with occasional black lithic fragments - strong		3.58	10	100	100	L. 6mm. Horizontal discontinuities.	W.II
Mid, dark grey, medium grained LIMESTONE with a brown weathered sandy lens - strong - black with abundant large shells - weak - mid grey, clayey - weak to moderately weak		4.00	58	100	58	L. 9mm. Horizontal and vertical discontinuities	W.II
		6.00					
BOREHOLE DIAMETER: 46.30mm GROUND LEVEL: : WATER LEVEL: : 0.50m after 27 days REMARKS: : Borehole drilled from existing ground level DEPTH OF CASING: : DRILLING METHOD: : Rotary/Water Flush ORIENTATION: : Vertical OS GRID REFERENCE:							
DATE April 1989	BOREHOLE LOG						REPORT NO. S.929(1)



Borehole Location



Trial Pit Location

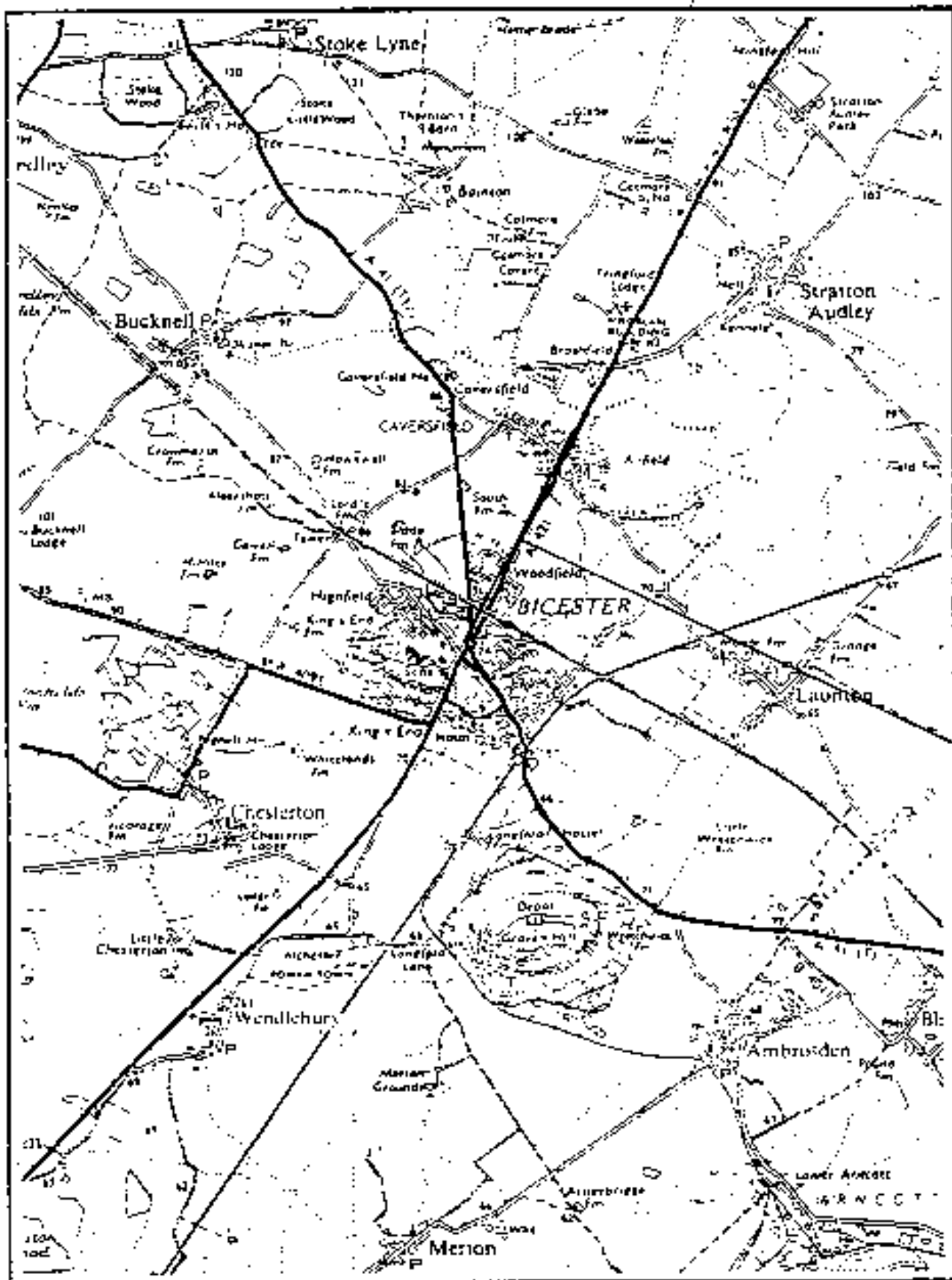


MEXE Probe Location

Date
April 1989

BOREHOLE / TRIAL PIT
LOCATION PLAN

Report No.
S.929(1)



Location No. 7209/13

Location BICESTER

KEY PLAN

1 : 50 000

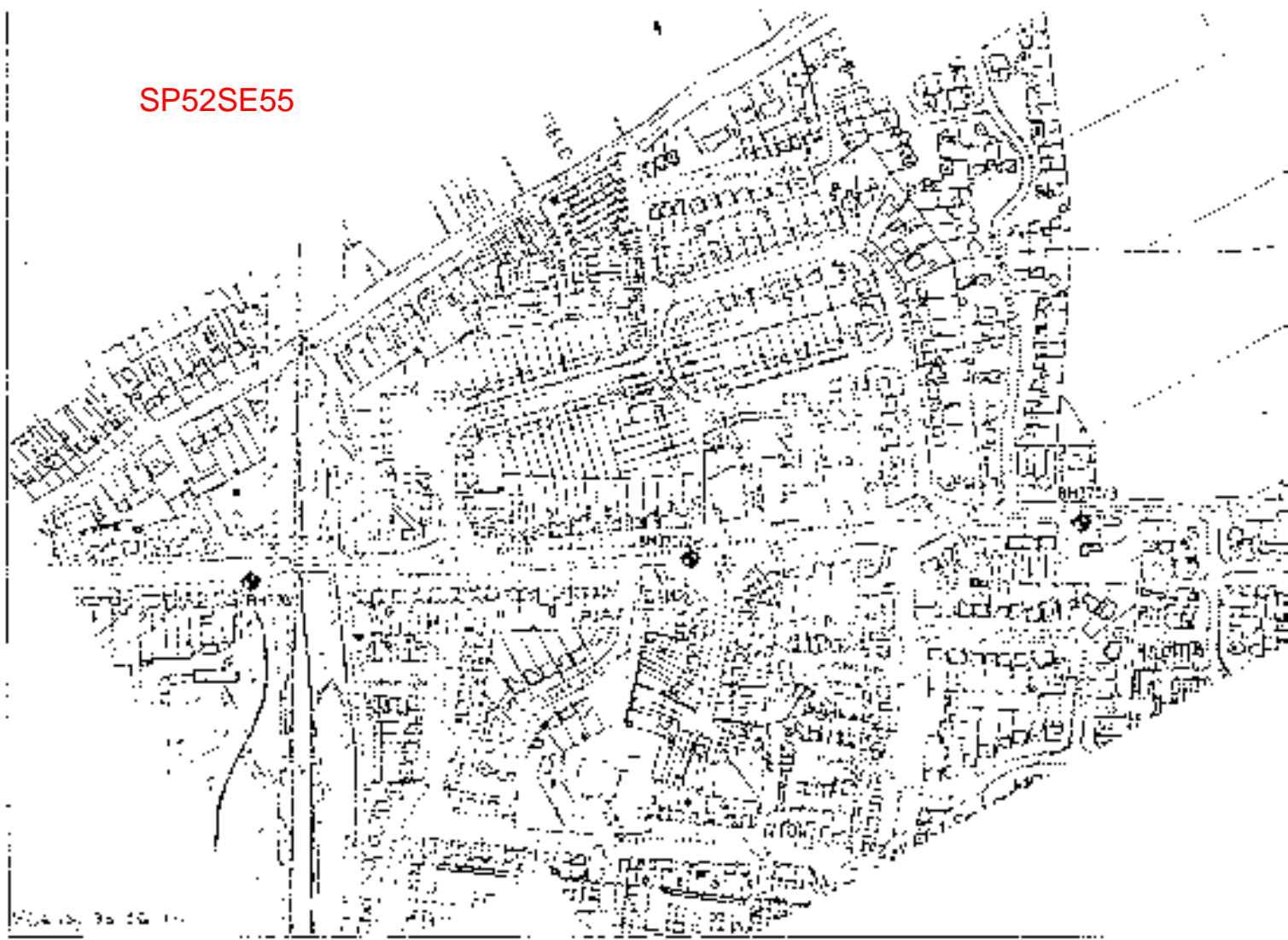
SP 52 SE

O.S. Sheet No 7209/13

"Reproduced from the Ordnance
Survey map with the permission
of the controller H.M. Stationery
Office Crown Copyright Reserved"
Licence No. AL543691

SOIL MECHANICS LIMITED
ASKERN ROAD
CARCROFT
DONCASTER

SP52SE55



Equipment & Methods

Hand dug pit to 1.00m
Cable tool boring, 150mm diameter, 1.00m to 5.50m

Location No. 7209/13

GRID REF: 51080 24550

Location CAVERSFIELD FOUL OUTFALL SEWER

Carried out for

Thames Water Authority

Ground Level

81.65m OD

Coordinates

See site plan

Date

22.10.85

Description

Reduced Level

Legend

Depth and Thickness

Samples/Tests

Depth

Sample Type

No.

Test

Field Records

Friable dark brown sandy slightly gravelly TOPSOIL. Occasional rootlets

81.81

0.00

(0.80)

0.50

D

1

80.81

0.80

0.80 - 1.00

B

2

1.00 - 1.45

B

3

C

N=44

Recovered as subangular to subrounded gravel and cobbles of brown and grey medium grained generally moderately to highly weathered LIMESTONE moderately strong becoming strong with variable amounts of calcareous sand or clay

Completely to highly weathered.

(Probably Highly Weathered Limestone with occasional Clay Sand)

(2.25)

1.80

WS

4

Water struck at 1.80m

1.85 - 3.05

B

4

78.50

3.05

3.05 - 3.50

U

5

3.55

D

6

Very soft grey calcareous CLAY becoming moderately weathered calcareous MUDSTONE weak

(2.45

pm)

4.20 - 4.65

U

7

4.70

D

8

5.00 - 5.075

D

9

S

(100)

Bands of grey strong limestone.

5.40 - 5.475

D

10

S

(100)

76.11

5.50

BOREHOLE COMPLETE AT 5.50m

Water Level Observations During Boring

Date	Time	Depth of Hole m	Depth of Casing m	Depth to Water m	Remarks
22.10.1985	1530	1.80	0.00	1.80	Water struck

Remarks

1 Chipping 1.35m to 3.05m, 4.50 hours; 4.75m to 5.50m, 2.50 hours

Logged by

TS

Scale

1:50

Fig.

7

Notes

Soil types are described in accordance with Appendix 1. For explanation of symbols and abbreviations see Fig. 1. All depths and reduced levels in metres. Thicknesses given in brackets in depth column.



BICESTER URBAN DISTRICT COUNCIL

WATER SUPPLY AND IMPROVEMENTS TO HEADWORKS

<p><i>Clerk to the Council</i></p> <p>LEONARD V. MURPHY</p> <p>Council Office</p> <p>The Causeway</p> <p>BICESTER</p> <p>Tel.: Bicester 19</p>	<p><i>From:-</i></p> <p>Consulting Engineer</p> <p>W. HERBERT BATEMAN</p> <p>M.C., M.I.E.R., C.E.</p> <p>Bathurst</p> <p>BATH</p> <p>Phone: Bathurst 2223-4</p> <p>4 VICTORIA ST., S.W.1.</p> <p>Tel.: Victoria 0005</p> <p>also ST. MICHAEL'S CHAMBERS,</p> <p>ST. ANDREW ST., NORWICH</p> <p>Tel.: Norwich 3600</p>	<p><i>Clerk of Works</i></p> <p>A. P. BOUGHEN</p> <p>BICESTER WATERWORKS</p> <p>BICESTER</p> <p>Tel.: Bicester 195</p>	<p><i>Contractors</i></p> <p>W. HAINES & SON</p> <p>Tel. 239 CAMDEN, GLOS.</p> <p>& BICESTER WATERWORKS</p> <p>BICESTER</p> <p>Tel.: Bicester 191</p>
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SP52SE29

My Ref. EB/SM

Tuesday,
7th March,
1939

Dear Sir,

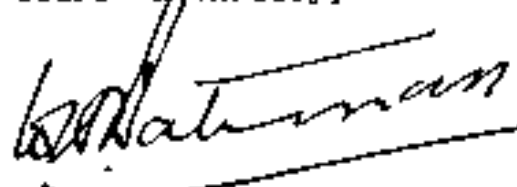
I return herewith a form headed Record of Bore which Messrs Francois Cementation Company forwarded to me and asked me to complete. I have fully completed this form except for the information regarding pumping, which I have no doubt the Council will be able to give you. I believe that the amount pumped daily is ^{100,} 8,000 galls over a 15 hour day.

In addition to the form, I attach a copy of a 6" Ordnance Sheet, a 1/4" scale plan of the site and also a copy of the analysis of the water.

I trust that the information given meets your requirements.

R.V. Melville, Esq.,
Geological Survey and Museum,
Exhibition Road,
South Kensington,
LONDON, S.W.7.

Yours faithfully,



Consulting Engineer
to the Council.

THE COUNTY'S PUBLIC HEALTH LABORATORIES,
91, QUEEN VICTORIA STREET, LONDON, E.C.4.

Ref. L. 886

SP52SE29

Analysis of a sample of water received on 1.7.37 from Francois
Cementation Co. Ltd., per W.H. Bateman, Esq., Bath.

Labelled Discharge main of Borehole via tank.

Taken by D.A. Derry. Witness W.J. Llewellyn. Date. 30.6.37. 5.25 p.m.
Chemical Results in Parts per 100,000

Appearance. Slight film deposit of mineral matter.

Colour. Paint yellowish white, odour nil.
(settles clear and bright).

Reaction pH Neutral: 7.4. Free Carbonic Acid 2.2

Electric Conductivity
at 20° C. 6000
Total Solids, 180 C. 40.0

Chlorine in Chlorides 1.8

Nitrogen in Nitrates nil Nitrites absent.

Hardness. Permanent. 0.0

Temporary. 22.0

Total. 22.0

Metals Iron 0.022 Nil in solution
Manganese, Zinc, Lead, etc. absent

Free Ammonia 0.0360 Ammoniacal Nitrogen. -

Albuminoid Ammonia 0.0360 Albuminoid Nitrogen -

Oxygen absorbed in 4 hrs
at 60° F. 0.020

Bacteriological Results.

No. of Bacteria per c.c. of water.
on agar in 3 days at 20° C. 960
1 day at 30° C. 450
2 days at 37° C. 130

The Bacillus Coli Present in - Absent in 100 c.c.

Bacillus Welchii
(B Enteritidis Sporogenes) Present in - Absent in 100 c.c.

Report. This is a faintly opalescent water showing deposit in slight
amount, of siliceous matter. It is of faint yellow colour, neutral
reaction and contains an appreciable trace of free carbonic acid.

The water contains no excess of saline matter and contains only
a small trace of iron. It is hard in character, although not unduly
so, and the hardness is entirely of a temporary nature.

The water is of a high degree of Organic quality and with the
exception of a large number of bacteria, none of which are of an
objectionable character, and probably due to recent boring operations,
it is of a high degree of bacterial purity.

With the exception of the suspended matter which unless
diminution occurs on pumping, will require preliminary removal,
we regard the water as pure and wholesome, suitable for drinking
and domestic purposes.

(Sgd) John F. Beale Beale.
For Drs. Beale & Suckling.

W. HERBERT CATEMAN,
 M.C., M.I.C.E.,
 CONSULTING CIVIL ENGINEER,
 BATHEASTON, BATH,
 47 VICTORIA ST., S. W. 1.
 & ST. MICHAEL'S CHAMBERS, NORWICH.
 7 MAR 1939

W. HERBERT CATEMAN,
 M.C., M.I.C.E.,
 CONSULTING CIVIL ENGINEER,
 BATHEASTON, BATH,
 47 VICTORIA ST., S. W. 1.
 & ST. MICHAEL'S CHAMBERS, NORWICH.
 7 MAR 1939

219

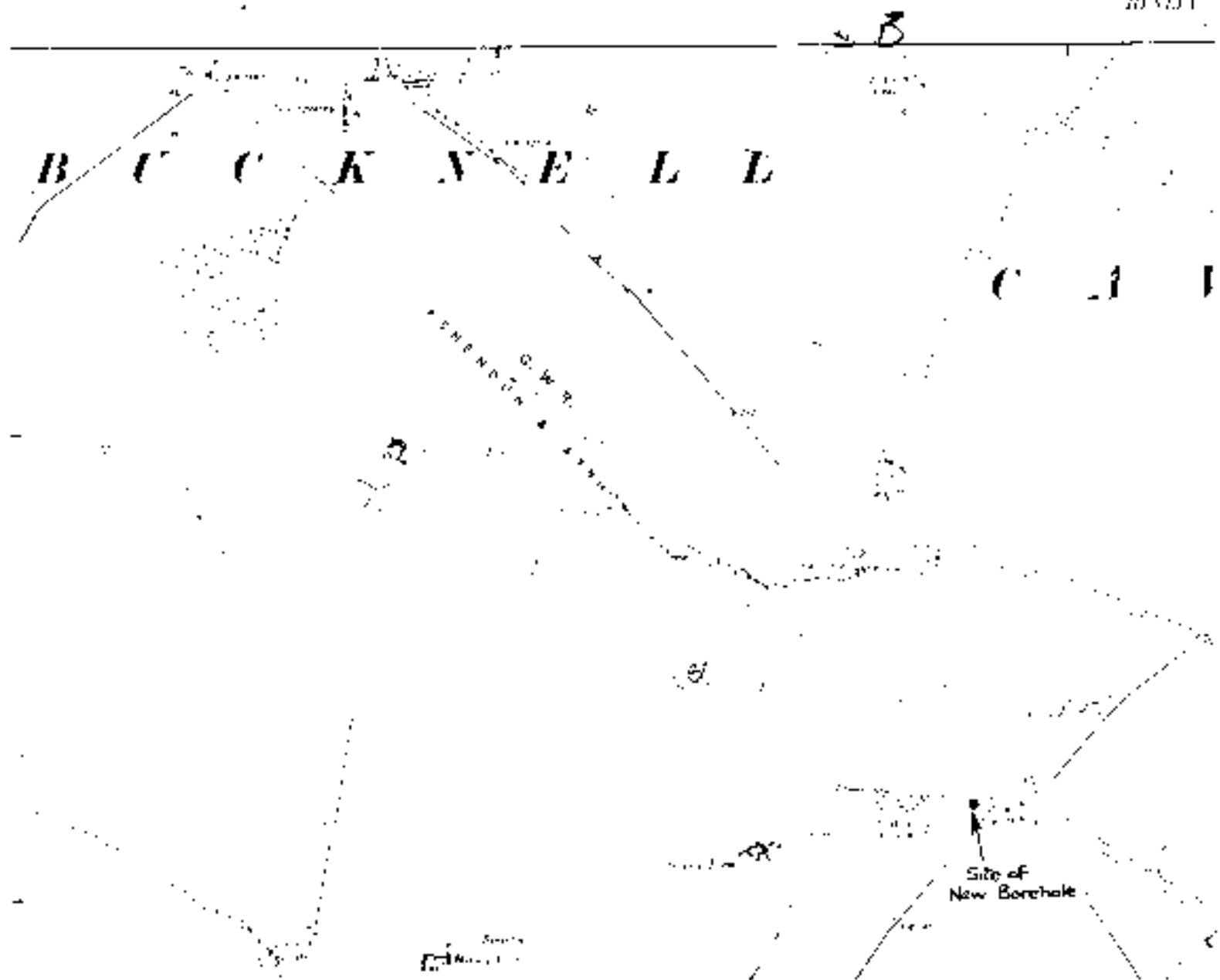
SP52SE29

B 75-0

Ft. Ins.		
1.	6	Surface Soil
3.	0	Grey Rock.
8.	0.	Sandy Marl
3.	0.	Blue Rock
2.	6	Light Shale
2.	0	Limestone.
3.	6	Blue Shale.
7.	0	White Rock.
12.	6	Grey Shale with hard beds.
6.	0	Grey Rock.
1.	0	Dark Shale.
	6	Rock
2.	0	Blue Beds.
1.	6	Blue Shale.
3.	0	Grey Rock.
1.	0	Grey Shale.
1.	0	Grey Rock.
3.	6	Variegated Shale.
3.	0	Grey Rock.
7.	0	Dark Shale.
2.	0	Rock.
5.	0	Blue Clay.
2.	6	Blue Rock.
3.	0	Blue Shale with hard ribs.
1.	6	Limestone.
3.	0	Limestone with Shale beds.
1.	0	Blue Shale.
2.	0	Grey Sandy Shale.
2.	6	Grey Rock.
2.	6	Dark Sandy Shale.
2.	0	Light Sandy Shale.
2.	6	Grey Rock.
6.	0	Soft Rock.
1.	3	Peat.
	8	Light Sand.
2.	4	Dark Clay and Sand. Rock.

SP52SE29

EDITION
REVISED



219/75
SP52SE29

Attach a tracing from a map, or a sketch-map, if possible.

(B)

(17206) 1994年10月7日 10,000 2 11 2.0 1.0 1.0 1.0 1.0 1.0

SP52SE29

NATURE OF STRATA

If measurements start below
ground surface, state how far...

THICKNESS

feet inches

DEPTH

feet inches

?				13	6
Blue clay	7	-	20	6	
Gray rock	11	6	32	-	
" " Broken	5	-	37	-	
" " w. vert. joints	1	6	38	6	
Gray rock	37	6	76	-	
Rock; sandy clay	4	-	80	-	
Shale w. bands of gray rock	6	-	86	-	
Clay	1	6	87	6	
Gray rock w. soft joints	2	6	90	-	
Gray rock	5	6	95	6	
" " dark	11	-	106	6	
Soft rock	5	-	111	6	
Soft sand	7	-	118	6	
Light gray sand	4	-	122	6	
Light sandstone	4	-	126	6	
Dark " w. bands of sandy clay			5		
	4	-	130	6	
Dark clay	10	-	140	6	

219

SP52SE29

75

Lab. report No 121135/1

13th Nov. 1935

Sample of water from Leicester Water works - No 3 pumping at 6740 gph.

Total solids 31.6 parts/100,000

Chlorine 2.2

Solids consist of Magnesium bicarbonate & sulphate

Traces of sodium & calcium. No calcium salts present.

No 3a pumping at 6740 gph.

Total solids 39.6 parts/100,000

Chlorine 3.2

Solids as above

No 4 pumping at 7020 gph.

Total solids 39.0 parts/100,000

Chlorine 2.1

Solids as above

No 4a pumping at 7020 gph.

Total solids 40.6 parts/100,000

Chlorine 2.3

Solids as above

No 5 pumping at 6420 gph.

Total solids 40.0 parts/100,000

Chlorine 2.2

Solids as above.

(J.P.)
John Bell & Co. Ltd.

RECORD OF WELL (SHAFT OR BORE)

Gorell Farm no 2.

SP52SE29

1" N.S. 29
219
75

Town or Village Bicester County Oxon Six-inch quarter sheet XXI.1 NW.
Exact site See 6 inch & 3 inch scale plans attached (A rough sketch map or a tracing from a map is very desirable)

in parish of Bicester U.D.C.

Level of ground surface above sea-level (O.D.) 200.0 ft. If well starts below ground surface, state how far.

Shaft 4 ft. diameter 24 ft. Bore 14 1/2 ft. Diameter of bore: at top 26 ins.; at bottom 23 ins.

Details of permanent lining tubes (internal diameters preferred): 3 1/2 inch inside diam. to 107.34 O.D.
Remainder 22 1/2 inch inside diam. to 141.00 O.D.

Water struck at depths of (feet): SP 5715 2388

Rest-level of water below top of well 226.00 feet. Suction at 141.69 feet. Yield on 14 days' test 7,069 gallons per hour (with pump of capacity --- g.p.h.); depressing water level to 92 feet below top. Time of recovery --- hrs. Amount normally pumped daily --- g.p.h. for --- hours.

Quality (attach copy of analysis if available) ---

Sunk by Francis Cementing Co. Ltd for Bicester U.D.C. Date of well 1936

Information from Bicester U.D.C. & Francis Cementing Co., & D.H. Bellman Eng. & MICE

(For Survey use only):
GEOLOGICAL
CLASSIFICATION.

NATURE OF STRATA
(and any additional remarks).

THICKNESS DEPTH
Feet. Inches. Feet. Inches.

Make good, dry	Surface soil	1	0	1	0
Tough clay, outside	Yellow clay	10	0	11	0
of old Cornmarket	Blue clay	6	0	17	0
<u>mass</u>	White rock	2	0	19	0
Wychwood Beds 2'	Blue clay	7	0	26	0
Kemble Beds 3' 6"	Gray shale	1	6	27	6
	Gray rock	3	6	31	0
	Gray shale	1	6	32	6
Frimston - water level 9'	Gray sandy rock	8	0	40	6
	Gray sand clay	1	0	41	6
	Gray rock	7	0	48	6
White Lias 3' 6"	Sandy shale	1	0	49	6
	Gray rock with bands of shale.	17	0	66	6
	Gray sandy clay	6	6	73	0
Hemphden (Hemph) Beds 13'	Gray rock	5	0	78	0
	Clay	3	6	81	6
	Shale with bands of clay rock	4	6	86	0
Tegworth Stage 16'	Gray rock with bands of shale.	4	0	90	0
	Gray rock	12	0	102	0
	Light gray sand.	16	0	118	0
Surrey Sandstone 25'	Light sandstone	6	0	124	0
	Dark sandstone	3	0	127	0
	Dark clay	15	6	142	6

See letter from H.E. Smith Esq. Bicester U.D.C.

R.H. 16.3.39 dated 26.4.39 in 9502/38
26.4.39 Suction 106 1/2 ft

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON
LONDON, S.W.7.

For Survey use only

Date received	G.S.M. Office File no	Site marked on 1" map (use symbol)
---------------	-----------------------	------------------------------------

(7093) Wt. 3000 (0.842) 5,000 12.33
1.2.2. W. 1.2.2. 10.000

0000 | 10

SP52SE29 [5715 2388] Bleicester Town No 2 Well (1936) Datum +85.3 (Ground level)

	<i>Depth ft</i>	<i>Thickness m</i>	<i>Depth m</i>
Forest Marble Formation	17.00	5.18	5.18
White Limestone Formation: Bladon Member and			
Ardley Member	49.50	9.91	15.09
Shipton Member	66.50	5.18	20.27
Rutland Formation	90.00	7.16	27.43
Taynton Limestone Formation	102.00	3.66	31.09
Sharp's Hill Formation and 'White Sands'	124.00	6.71	37.80
Northampton Sand Formation	127.00	0.91	38.71
Whitby Mudstone Formation	142.50	4.72	43.43

Stratigraphical classification by M G Sumbler, May 1999.

RECORD OF WELL (SHAFT OR BORE)

Growth Farm no 2.

SP52/19B

1" N.B. 249
1" of 4-5-E.
Old
Ref.

Town or Village Bicester County Oxon Six-inch quarter sheet SP 5715 2388
 Exact site See to 1200 ft. & 1200 scale line attached
 in parish of Bicester U.D.C. (A rough sketch-map of a tracing from map is very desirable)

Level of ground surface above sea-level (O.D.) 222.2 ft. If well starts below ground surface, state how far.
 Shaft 440 ft. diameter 32 ft. Hore 1411 ft. Diameter of bore: at top 20 ins: at bottom 23 ins

Details of permanent lining tubes (internal diameters preferred): 1 1/2 inch inside diam. to 107.31 ft. O.
 Remainder 22 inch inside diam. to 141.00 ft.

Water struck at depths of (feet) SP 5715 2388

Rest-level of water below top of well 226.00 feet. O.D. Suction at 141.69 feet. O.D. Yield on 1L 42 hours' tes
7,055 gallons per hour (with pump of capacity 7 g.p.h.); depressing water level to 92 feet

below top Time of recovery — hrs Amount normally pumped daily — g.p.h. for — hours

Quality (attach copy of analysis if available) —

Sunk by Francis Lemington Ltd for Bicester U.D.C. Date of well 1936

Information from Bicester U.D.C. + Francis Consultation Co. + V.H. Belmore, Esq. + C.M.C.

(For Survey use only)
 GEOLOGICAL
 CLASSIFICATION.

NATURE OF STRATA
 (and any additional remarks).

THICKNESS DEPTH
 Feet. Inches. Feet. Inches.

Wells pond, 4' long	Surface soil	106	1	0	1	0
Trough lay, with	Yellow clay	—	10	0	11	0
Gold immediate	Blue clay	—	6	0	17	0
Wells pond	White rock	—	2	0	19	0
Wells pond	Blue clay	—	7	0	26	0
Wells pond	Gray shale	whf	1	6	27	6
Wells pond	Gray rock	(sh. line)	3	6	31	0
Wells pond	Gray shale	(sh. line)	1	6	32	6
Wells pond	Gray clay rock	—	8	0	40	6
Wells pond	Gray sandy clay	—	1	0	41	6
Wells pond	Gray rock	—	7	0	48	6
Wells pond	Sandy shale	—	1	0	49	6
Wells pond	Gray rock with bands of shale	whf (sh. line)	17	0	66	6
Wells pond	Gray sandy clay	—	6	6	73	0
Wells pond	Gray rock	—	5	0	78	0
Wells pond	Clay	whf	3	6	81	6
Wells pond	Shale with bands of clay rock	—	4	6	86	0
Wells pond	Gray rock with bands of shale	—	4	0	90	0
Wells pond	Gray rock	—	12	0	102	0
Wells pond	Light gray sand.	whf	16	0	118	0
Wells pond	Light sandstone	whf	6	0	124	0
Wells pond	Dark sandstone	whf	3	0	127	0
Wells pond	Dark clay	whf	13	6	142	6

43.33m

R.H.

16.3.39

See letter from J.F. Smith Esq. to Mr. J. B. Smith, Bicester, 11.11.39

Date of survey in 1939/40

P.O. 94' 10" Suction 107.31 ft.

Date 26.11.39

				13	6
Blue clay		7	-	20	6
Gray rock		11	6	32	-
" " , broken		5	-	37	-
" " , w. vert. joints		1	6	38	6
Gray rock		37	6	76	-
Rock ; sandy clay		4	-	80	-
Slate w. bands of gray rock		6	-	86	-
Clay		1	6	87	6
Gray rock w. soft joints		2	6	90	-
Gray rock		5	6	95	6
" " , dark		11	-	106	6
Soft rock		5	-	111	6
Soft sand		7	-	118	6
Light gray sand		4	-	122	6
Light sandstone		6	-	128	6
Dark " w. bands of sandy				5	
clay		4	-	130	6
Dark clay		10	-	140	6

RECORD OF WELL (SHAFT OR BORE)

SP52SE29

219

75

SP 52 / 19 B

At Waterbury, Hants
 Town or Village Waterbury
 County Hants Six-inch quarter sheet.
 For Mr. J. B. V. C.

Exact site of well _____

Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) _____ feet.

Is well-top at ground level? _____ If not, state how far above _____ feet.
 below _____

Shaft _____ ft., diameter _____ ft. Details of headings _____

Bore 140 ft.; diameter of bore: at top 2 1/2 ins.; at bottom 2 3/4 ins.

Lengths, diameters, perforations, etc., of lining tubes 24" to 100'; 43' x 2 3/4" perforated
tubes inserted to bottom of bore.

Water struck at depths, below well-top, of (feet) _____

TEST DETAILS { Rest-level of water 75 ft. above well-top. Suction at 33 ft. Yield on 14 hours' pumping 6,500 gallons per 2 (max. capacity of pump _____ g.p.h.).
 Month 3 with depression of 20 feet. Recovery to _____ in _____ mins. hours.
 Year 1937

WORKING CONDITIONS { Rest-level of water in _____ (month), _____ (year), _____ ft. above well-top.
 Highest " in _____ (month), _____ (year), _____ ft. above "
 Lowest " in _____ (month), _____ (year), _____ ft. above "
 Suction at _____ ft. Rate of pumping _____ galls. per _____ for _____ hours per day.
 with average depression of _____ ft. Recovery to _____ in _____ mins. hours

Quality of water (attach copy of analysis if available) _____

Well made by Thomas's Construction Co Date of well 1937

Information from _____

ADDITIONAL NOTES.

* At first, yield was 8-9,000, but later dropped to this figure.

LOG OF STRATA OVERLIES.

RECORD OF WELL (STANDARD FORM)

For this well, the water is used for drinking and for the farm.
 At West Farm 5746 24 24

Town or Village Bicester

County Oxfordshire Six-inch quarter sheet 23 NW

For Dr. Ministry and Bicester UDC

Exact site of well 170 yds. N.E. of West Farm, and
20 yds. S.W. of stream

(Attach a tracing from a map, or a sketch-map, if possible.)

Level of ground surface above sea-level (O.D.) 260 feet.

SP52SE9

Is well-top at ground level? Y. If not, state how far above: _____ feet.
 below: _____ feet.

Shaft _____ ft., diameter _____ ft. Details of headings _____

Bore _____ ft.; diameter of bore: at top 6 ins.; at bottom 6 ins.

Lengths, diameters, perforations, etc., of lining tubes 137 ft. x 1 1/2 in. from surface

Water struck at depths, below well-top, of (feet) _____

TEST DETAILS
 Rest-level of water _____ ft. above well-top. Suction at _____ ft. Yield on _____ hours' days' pumping _____ gallons per _____ (max. capacity of pump _____ g.p.h.)
 Month _____ with depression of _____ feet. Recovery to _____ in _____ mins. hours.

WORKING CONDITIONS
 Rest-level of water in _____ (month), _____ (year), _____ ft. above well-top
 Highest " in _____ (month), _____ (year), _____ ft. above below
 Lowest " in _____ (month), _____ (year), _____ ft. above below
 Suction at _____ ft. Rate of pumping _____ galls. per _____ for _____ hours per day.
 with average depression of _____ ft. Recovery to _____ in _____ mins. hours

Quality of water (attach copy of analysis if available) _____

Well made by _____ Date of well _____

Information from _____

ADDITIONAL NOTES.

Yield from Sept 3, 1936, 1000 g.p.h.

LOG OF STRATA OVERLEAF.

Geological Survey and Museum,
 SOUTH KENSINGTON,
 LONDON, S.W.5.

Date received.	G.S.M. Office File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol)	on 1" Map.	on 0" Map.
8/3/41	53/36	219	453E	0	0	

117200 WEATHERSHEET 10,000 241 A.B.M.W.L.W. 10-1936

If measurements start below
 ground surface, state how far...

Feet Inches

Feet Inches

Concreted	Clay, limonite fragments	7		7	
	Limestone	6	6	13	6
Loose Marble	Clay	1		14	6
	Limestone	3		17	6
	Marble rock	2	6	20	
	Hard blue clay	2		22	
	Marble rock	1		23	
White Limestone	Hard clay and rock fragments	5	6	28	6
	Limestone	4		32	6
	Alternating beds of grey shale rock	33	6	66	
Hampshire Marble	Blue rock	3	6	69	6
	Blue clay & bands of rock	4		73	6
Lignite stone	Alternating bands of blue rock & grey shale	17	6	90	
	Hard sandstone	5	6	95	6
	Alternating bands of grey rock & sandstone	26		121	6
Upper Lias	Hard clay and flints	15	6	137	
	Blue clay & clay stone	5		142	
	Blue clay	16	6	158	6
	Blue clay stone	13	6	172	
	"Marble" limestone	1		173	
Middle Lias	Hard grey rock	3		176	
	Blue clay	58		234	
	Red conglomerate *	8		242	
	Blue lias	4		246	
	Conglomerate *	8		254	
Clay & thin and hard	Blue clay and bands of marl	8		262	

* Probably 16 ft. in depth of beds is correct at 262 ft.

* The conglomerate, but muddy limestone: specimen
 seen in field by J.H.B. 3/2/01

* H.M. Prof. H.L. Hawkins classifies this as follows

Drift	6	6	12	6
Chert	7	6	14	
Gr. oolite	24		58	
U. Lias	57	6	95	6
Northampton sand	24		119	6
Upper lias	114		233	6
middle lias	28		261	6

No good specimens were available either to the B. Soc. or to Prof. Hawkins.
 The survey is now in accord with the American one.

RECORD OF WELL (SHAFT OR BORE)

SP52SE9

BICESTER.

219
122

At _____
Town or Village Bicester. Oxon.
County Oxfordshire. Six-inch quarter sheet _____
For Mr. Air Ministry. Directorate of Works
North. Area, Abingdon, Berks.
Exact site of well Lords Farm,
Mr. Bicester.

Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) _____ feet.

SP52/18

Is well-top at ground level? _____ If not, state how far above _____ feet.
below _____

Pit

Shaft 6 ft., diameter 8" x 8" Details of headings _____

Bore 262 ft.; diameter of bore: at top 18 ins.; at bottom 15 ins.

Lengths, diameters, perforations, etc., of lining tubes _____

33' 6" of 18" top 2' 0" b.s. 89' 1" of 15" top 1' 1" b.s.

Water struck at depths, below well-top, of (feet) 12', 90', 246'

TEST DETAILS Rest-level of water 12' ft. above well-top. Suction at _____ ft. Yield on _____ hours' days' _____
Month April pumping 1,350 gallons per hour (max. capacity of pump _____ g.p.h.)
Year 1941 with depression of 30' feet. Recovery to _____ in _____ mins. hours.

WORKING CONDITIONS Rest-level of water in _____ (month), _____ (year), _____ ft. above below well-top.
Highest _____ (month), _____ (year), _____ ft. above below "
Lowest _____ (month), _____ (year), _____ ft. above below "
Suction at _____ ft. Rate of pumping _____ galls. per _____ hrs. _____ hours per day.
with average depression of _____ ft. Recovery to _____ in _____ mins. hours.

Quality of water (attach copy of analysis if available) _____

Well made by LoGrand Sutcliffe & Gell Ltd. Date of well April 1941
Information from Southall.

ADDITIONAL NOTES.

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7

Date received.	G.S.M. Office File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map.	on 0" Map.

PRINTED AND PUBLISHED BY THE GEOLOGICAL SURVEY

SP52SE9

NATURE OF STRATA

If measurements start below
ground surface, state how far...

THICKNESS

Feet Inches

DEPTH

Feet Inches

Clay and Limestone Flints (very hard)	6	6	6	6
Limestone Rock.	6	6	13	0
Hard Clay.	1	0	14	0
Limestone Rock.	3	0	17	0
Marble Rock Formations.	3	0	20	0
Hard Blue clay and flints	2	0	22	0
Marble Rock Formation.	1	0	23	0
Hard Clay and Flints.	5	6	28	6
Limestone Formation.	4	0	32	6
Grey shale.	3	0	35	6
Grey Rock.	2	0	37	6
Greys shale.	2	6	40	0
Grey Rock.	2	0	42	0
Hard Clay.	1	0	43	0
Grey Shale with hard bands.	4	6	47	6
Grey Rock.	2	0	49	6
Hard Clay.	6	0	55	6
Grey Rock.	2	6	58	0
Grey Shale.	4	0	62	0
Hard Clay.	2	0	64	0
Grey Rock.	1	6	65	6
Grey Shale.	1	0	66	6
Blue Rock.	3	6	70	0
Hard blue Clay with hard bands.	4	0	74	0
Blue rock.	2	0	76	0
Greys shale.	4	6	80	6
Hard clay with hard bands	3	6	84	0
Dark Grey Rock (not too hard)	6	0	90	0
Hard sandstone.	5	6	95	6
Dark Grey Rock.	2	0	97	6
Hard Sandstone.	3	6	101	0
Dark Grey Rock.	3	0	104	0
Sandstone.	5	0	109	0
Dark Grey Rock.	2	0	111	0
Sandstone.	2	0	113	0
Dark Grey Rock.	1	6	114	6
Sandstone.	2	6	117	0
Dark grey Rock.	1	0	118	0
Sandstone.	1	6	119	6
Hard Clay and Flints. (small)	0	6	120	0
Clay and flints.	6	0	126	0
Clay and Claystones.	11	0	137	0
Blue Lias Clay & claystones.	5	0	142	0
Blue lias Clay.	16	6	158	6
Blue lias clay and claystones.	13	6	172	0
Marlstone.	1	0	173	0
Hard Grey Rock.	3	0	176	0
Blue Lias Clay	58	0	234	0
Rock formation.	2	0	235	0
Conglomeration of ironstone, rock & clay.	7	0	242	0
Blue Lias Clay.	4	0	246	0
Conglomerate rock, Ironstone, Marlstone & clay	3	0	249	0
Conglomeration of ironstone, marlstone & clay.	5	0	254	0
Blue lias clay & bands of marlstone about every 3"	8	0	262	0
	262	0	262	0

LeGrand, Sutcliffe & Gell Ltd.,

RECORD OF WELL (SHALLOW BORE)

At Lot's farm 5746 24 24

Town or Village Brierley

County Oxfordshire Six-inch quarter sheet 23 NW

For Use Ministry and M.O.C.

Exact site of well 170 yds. N.E. of Lot's farm, and 20 yds. South of A Lane

Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) 260 (79.24m) feet.

Is well-top at ground level? Yes If not, state how far above below

Shaft ft., diameter ft. Details of headings

Bore ft.; diameter of bore: at top 5 ins.; at bottom 6 ins.

Lengths, diameters, perforations, etc., of lining tubes 157 ft x 1 1/2", from surface

Water struck at depths, below well-top, of (feet)

TEST DETAILS
 Rest-level of water ft. above below well-top. Suction at ft. Yield on hours' days'
 Month pumping gallons per (max. capacity of pump g.p.h.)
 Year with depression of feet. Recovery to in mins. hours.

WORKING CONDITIONS
 Rest-level of water in (month), (year), ft. above below well-top.
 Highest " in (month), (year), ft. above below "
 Lowest " in (month), (year), ft. above below "
 Suction at ft. Rate of pumping galls. per for hours per day.
 with average depression of ft. Recovery to in mins. hours

Quality of water (attach copy of analysis if available)

Well made by Date of well

Information from

ADDITIONAL NOTES.

Yield from Sept 16: 157 ft, 1000 gph.

SP52SE9

SP52SE9

RECORD OF WELL (SHAFT OR BORE)

219
122

BICESTER.

SP52SE9

At _____
Town or Village Bicester. Oxon.
County Oxfordshire. Six-inch quarter sheet.
Air Ministry, Directorate of Works
For No. North, Area, Abingdon, Berks.
Exact site of well Lords Farm,
Nr. Bicester.

Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) _____ feet.

Is well-top at ground level? _____ If not, state how far above _____ feet.
below _____

Pit _____
State, _____ ft., diameter 6' x 6' Details of headings _____

Bore 262 ft.; diameter of bore: at top 18 ins.; at bottom 15 ins.

Lengths, diameters, perforations, etc., of lining tubes
33' 6" of 18" top 2' 0" b.s. 89' 1" of 16" top 1' 1" b.s.

Water struck at depths, below well-top, of (feet) 13', 90', 246'.

TEST DETAILS Rest-level of water 131 ft. 350 ft. above well-top. Suction at _____ ft. Yield on _____ hours' days'
Month April pumping 1,350 gallons per hour (max. capacity of pump _____ g.p.h.),
Year 1941 with depression of 30' feet. Recovery to _____ in _____ mins. hours.

WORKING CONDITIONS Rest-level of water in _____ (month), _____ (year), _____ ft. above well-top.
Highest " in _____ (month), _____ (year), _____ ft. above " below "
Lowest " in _____ (month), _____ (year), _____ ft. above " below "
Suction at _____ ft. Rate of pumping _____ galls. per _____ for _____ hours per day.
with average depression of _____ ft. Recovery to _____ in _____ mins. hours

Quality of water (attach copy of analysis if available) _____

Well made by LeGrand Sutcliffe & Gell Ltd. Date of well April 1941
Information from Southall.

ADDITIONAL NOTES.

LOG OF STRATA QUERIED

pm	Clay and Limestone flints (very hard)	5	6	6	6	1 94
—	Limestone Rock.	6	6	13	0	3 96
	Hard Clay.	1	0	14	0	2 27
	Limestone Rock.	3	0	17	0	5 18
	Marble Rock Formations.	3	0	20	0	8 1
	Hard Blue clay and flints	2	0	22	0	6 7
	Marble Rock Formation.	1	0	23	0	7 0
whl	Hard Clay and Flints.	5	6	28	6	4 67
	Limestone Formation.	4	0	32	6	2 7
	Grey shale.	3	0	35	6	6 72
	Grey Rock.	2	0	37	6	11 23
	Greys shale.	2	6	40	0	1 19
	Grey Rock.	2	0	42	0	12 5
	Hard Clay.	1	0	43	0	13 11
	Grey Shale with hard bands.	4	6	47	6	14 44
—	Grey Rock.	2	0	49	6	15 07
	Hard Clay.	6	0	55	6	16 92
	Grey Rock.	2	6	58	0	17 58
	Grey Shale.	4	0	62	0	18 50
	Hard Clay.	2	0	64	0	19 0
	Grey Rock.	1	6	65	6	19 46
	Grey Shale.	1	0	66	6	20 27
rw	Blue Rock.	3	6	70	0	21 36
	Hard blue Clay with hard bands.	4	0	74	0	22 50
	Blue rock.	2	0	76	0	23 16
	Greys shale.	4	6	80	6	24 54
	Hard clay with hard bands	3	6	84	0	25 52
—	Dark Grey Rock (not too hard)	6	0	90	0	27 03
slr	Hard sandstone.	5	6	95	6	28 11
wh	Dark Grey Rock.	2	0	97	6	28 72
wh	Hard Sandstone.	3	6	101	0	30 70
slr	Dark Grey Rock.	3	0	104	0	31 70
	Sandstone.	5	0	109	0	33 22
	Dark Grey Rock.	2	0	111	0	33 43
	Sandstone.	2	0	113	0	34 44
	Dark Grey Rock.	1	6	114	6	34 5
	Sandstone.	2	6	117	0	35 46
	Dark grey Rock.	1	0	118	0	35 57
—	Sandstone.	1	6	119	6	36 52
—	Hard Clay and Flints. (small)	0	6	120	0	
whr	Clay and flints.	6	0	126	0	
	Clay and Claystones.	11	0	137	0	
	Blue Lias Clay & claystones.	5	0	142	0	
	Blue lias Clay.	16	6	158	6	
—	Blue lias clay and claystones.	13	6	172	0	
mas	Marlstone.	1	0	173	0	
—	Hard Grey Rock.	3	0	176	0	
—	Blue Lias Clay	68	0	234	0	
	Rock formation.	1	0	235	0	71 63
chr	Conglomeration of ironstone, rock & clay.	7	0	242	0	73 76
	Blue Lias Clay.	4	0	246	0	74 85
	Conglomerate rock, Ironstone, Marlstone & clay	3	0	249	0	75 90
	Conglomeration of ironstone, marlstone & clay.	5	0	254	0	77 42
	Blue lias clay & bands of marlstone about every 3"	8	0	262	0	78 56
Thinky differs in measurements from north-western section		262	0	262	0	

LeGrand, Sutcliffe & Gell Ltd..

SP52SE9 [c. 5919 2048] Craven Hill Well (1941) Datum +88 (Ground level)

	<i>Depth ft</i>	<i>Thickness m</i>	<i>Depth m</i>
Oxford Clay Formation	128.00	39.01	39.01
Kellaways Formation	146.00	5.49	44.50
Great Oolite Group and Inferior Oolite Group undifferentiated	281.00	72.24	85.65
Whitby Mudstone Formation	290.00	2.74	88.39

Stratigraphical classification by M G Sumbler, May 1999.

OXFORD TOWN SUPPLY.

Howell Farm, near Bicester, 1½ miles N.W. of Market Place.

Communicated by Mr. Edgar F. WILSON, Surveyor to the Urban District Council.
Height above O.D. 277 feet.

A pit, 8 feet square and 11 feet deep, was lined with brickwork and floored with concrete 1 ft. 6 in. thick. A steel tube 12 inches diam. was taken to 112 ft. 4 in. from surface, with perforation at 77 feet. No water worth mentioning was met with until 92 feet when it rose to the surface. At 105 feet the tube was struck, and overflowed at the rate of 8,000 gallons per hour when not pumping. The water will rise 3 feet above the surface.

				Thickness		Depth.	
				Ft.	In.	Ft.	In.
	Surface soil	...	...	1	6	1	6
	Grn. rock (Cornbrash)	...	...	3	0	4	6
	Sandy marl	...	...	8	0	12	6
Forest Marble 2 ft.	Blue rock (Forest Marble)	...	...	3	4	15	6
	Light shale	...	...	2	6	18	0
	Limestone	...	...	2	0	20	0
	Blue clay or shale	...	...	5	6	25	6
	White rock	...	...	7	0	32	6
	Grey shale with hard beds	...	...	12	6	43	0
	Grey rock	...	...	6	0	49	0
	Dark shale	...	...	1	0	50	0
	Rock	...	...	1	0	50	0
	Blue binds	...	...	2	0	52	6
	Blue shale	...	...	1	6	54	0
Great Oolite 84 ft. 6 in.	Grey rock	...	...	3	0	57	0
	Grey shale	...	...	1	0	58	0
	Grey rock	...	...	1	0	59	0
	Varioluted rock	...	...	3	6	62	6
	Grey rock	...	...	3	0	65	6
	Dark shale	...	...	7	0	72	6
	Rock	...	...	2	0	74	6
	Blue clay	...	...	5	0	79	6
	Blue rock	...	...	2	6	82	0
	Dark shale with hard beds	...	...	3	0	85	0
	Limestone	...	...	1	6	86	6
	Limestone with shaly beds	...	...	1	0	87	6
	Blue shale	...	...	1	0	88	6
	Grey sandy shale with water	...	...	2	0	90	6
	Grey rock	...	...	2	6	95	0
	Dark sandy shale	...	...	2	6	97	6
	Light sandy shale	...	...	2	0	99	6
	Grey rock	...	...	2	6	102	0
	Soft rock, water, bulk here	...	...	6	0	108	0
Estuarine Rocks 4 ft. 4 in. (penetrate 3)	Peat	...	...	1	3	109	3
	Light sand	...	...	0	8	109	11
	Dark clay and sand	...	...	2	4	112	3
	(flood, 1 inch only into it)	...	...	0	1	112	4

Analysis by Mr. W. W. Fisher in "The Salinity of Water from the Oolites"
"The Analyst," February, 1904. See p. 92.

Mr. E. Foster Tanner, Clerk to the Urban District Council, has kindly added the following particulars:—

"The deep well pump has been fixed. Motive power supplied by Crossley's 13-h.p. gas engines in duplicate, either capable of driving the pumping plant, which has the capacity for raising 8,000 gallons per hour. The water is pumped into tanks, constructed of steel, on the top of a tower, immediately adjoining the well. The tanks are in duplicate, i.e., an inner and an outer tank. Their combined holding capacity is about 15,000 gallons. Height from ground to bottom of tanks, 40 feet. There is a 7-inch main from the water tower to the town, and the distribution mains in the town are respectively 6-inch, 5-inch, 4-inch, and 3-inch. The cost of the works was £7,000."

O.D. given as +287 by J.T. Smith Esq. Surveyor to Bicester T.O.C.

near in 1900/78

Box closed in; pump removed

Published in
'The Water Supply
of Oxfordshire',
Page 29, 30

ROCHESTER WATER WORKS.

Well at Gower Farm. Present supply, 1903.

Yield.—145,000 to 212,000 gallons per day. Water reduced by 14 days
 long-pumping to 70 feet from surface, but rose again to surface in two
 hours after cessation of pumping.

Report on analysis of water received 30th September, 1905, at end of pumping
 test. By Mr. W. W. Fisher, F.I.C.

Description.—The sample is slightly cloudy and contains a little sand. The
 residuum left on evaporation is alkaline and contains a little sodium
 carbonate.

Odour.—None.

Appearance in two-foot tube.—Pale-yellowish.

The results of the analysis are stated in grains per gallon.

Total dissolved solid matter	...	...	...	...	26.6
Chlorine in chlorides	...	...	...	...	1.7
Ammonia, free and saline	...	...	...	...	.028
" all combined	...	...	...	...	.003
Nitrogen in nitrates	...	...	...	...	.014
" in nitrites	...	...	...	...	0
Oxygen required to oxidise organic matter (in 3 hours)	...	...	...	...	.007
Hardness in Clark's degree	...	...	...	...	12.5

Remarks.—The total dissolved solid constituents are normal for water from
 the Oolite. The chlorides are not in excess of the natural amount; the nitrates
 are small, and the proportion of organic matter is extremely small. The water
 is of a moderate degree of hardness.

Published in
 'The Transactions
 of the Society
 of Chemical Engineers',
 Pages 92, 93

G. ISLER & Co., Ltd.,
ARTESIAN & CONSULTING WELL ENGINEERS,
SEAR LANE, SOUTHWARK, S.E.1.

Telegraphic Address: "ISLER, LONDON."
Telephone No.: Hop 4450 (3 Lines).

BIRMINGHAM BRANCH: 55 Summer Row.

CHART

Showing the Soils passed through at

M. 2001. The Leicester Waterworks.

Surface Soil	1	6	1	6
Gray Rock.	3		4	6
Sandy silt	8		12	6
Blue Rock.	3		15	6
Light Shale	2	6	18	
Limestone	2		20	
Blue Shale	3	6	23	6
White Rock	7		30	6
Gray Shale with hard beds	12	6	43	
Gray Rock.	6		49	
Dark Shale	1		50	
Rock		6	50	6
Blue Binds	2		52	6
Blue Shale	1	6	54	
Gray Rock.	3		57	
Gray Shale	1		58	
Gray Rock	1		59	
Variagated Shale	3	6	62	6
Gray Rock	3		65	6
Dark Shale	7		72	6
Rock	2		74	6
Blue Clay	5		79	6
Blue Rock.	2	6	82	
Dark Shale with hard ribs	3		85	
Limestone	1	6	86	6
Limestone with Shale beds	3		89	6
Blue Shale.	1		90	6

This must agree with report.

Now.

2194
SP52SE5
A 75

4

2

G. ISLER & Co., Ltd.,
ARTESIAN & CONSULTING WELL ENGINEERS,
GEAR LANE, SOUTHWARK, S.E.1.

SP52SE5

210
75

Telegraphic Address: "ISLER, LONDON."
Telephone No.: Hop 4460 (3 Lines).

BIRMINGHAM BRANCH: 58 SUMMER ROW

CHART

Showing the Boils passed through at

M Bicester Waterworks
Gowell Farm Bicester

Grey Sandy Shale (with water)	2	0	92	6
Grey Rock.	2	6	95	0
Dark Sandy Shale	2	6	97	6
Light " "	2	0	99	6
Grey Rock.	2	6	102	0
Soft Rock	6	0	108	0
Peat	1	3	109	3
Light Sand		8	109	11
Dark clay & sand	2	4	112	4
Rock.				
15' 6" of 15" 8 ft below				
97 ft 11" tubes level with surface				
15 " 10 1/2 " " 97 ft below				
perforated from 77 ft below				
perforations 1/2" on 3/8" pitch covered				
with fine mesh brass wire gauge				
W.L. Overflow				
12,000 g.p.h. at P.W.L. of 70 ft				
Dug Well Pump.				
Bored by T. Thom.				

Inland Water Survey for Great Britain

SP52SE5

Name or Description of Authority or Undertaking *Asunder* Bicester Urban District

Postal Address The Causeway,
Bicester, Oxon.

(A) OVER-GROUND WATER.

(I) (a) Do you take systematic records of levels of water in:-

- (1) rivers
- (2) streams
- (3) reservoirs
- (4) lakes
- (5) canals or navigable rivers

(b) If so, please give a short description of the method used.

(c) How often are the readings taken?

(d) Exact points at which the records are taken. (A map or sketch would be helpful.)

(e) Have the levels been related to Ordnance Datum Level or to some other standard? (in the latter case please specify standard?)

(f) Are all the levels (e.g., highest and lowest) covered satisfactorily by the records taken?

(g) Are arrangements made for extra readings during rise and fall of floods, etc.?

(II) What types of systematic records of discharge other than records of levels are kept as regards:-

- (1) rivers
- (2) streams
- (3) reservoirs
- (4) lakes
- (5) canals or navigable waterways

Form K268

(1955) Wk. 21081/G0545 94 2,3A S.F.R. Ltd. Gp. 002.

(III) (a) Have measurements been made from which the data for levels can be converted to records of discharge of:

(1) rivers and streams

(2) reservoirs

(3) lakes

(4) canals or navigable waterways

(b) If so, how have these measurements been made (e.g., by current meters, velocities of floats, surveys of sections, calibration of weirs, records of water used for locking, etc.)?

(IV) (a) Are records kept in the case of springs breaking overground of the amount of water yielded?

(b) If so, what form of recording is used?

(c) How often are readings taken?

(d) Exact location of the spring. (A map or sketch would be helpful.)

(V) Since when have the records under I, II, III and IV been kept?

(VI) Are past records available?

(VII) REMARKS.

(Please indicate here any further information or particulars which may be thought likely to assist in the survey.)

(B) UNDERGROUND WATER--(WELLS AND BORINGS).

(In each case please state whether a well and/or boring is in question.)

SP52SE5

75
17

I. GENERAL.

1. Exact site of well or boring Well and boring at
(A map or sketch showing position would be useful.) Gowell Farm, near
Bicester, Oxon.

2. Surface level of ground above Ordnance Datum 277 ft.

3. Date of construction 1905.

WELLS.

4. Depth of well from surface level of ground (i.e., 2 above). If top of well is below the surface level of the ground (i.e., 2 above) state how much 268.25 ft.

5. Depth of floor of galleries at site of well; also dimension and direction of galleries None. ft.

BORINGS.

6. Depth of boring from surface level of ground (i.e., 2 above). If boring is in bottom of well, state depth of well 164.66 ft.

7. (a) Diameter of top of boring (8'0" b.s. to 97' b.s.) 11 in.

- (b) Diameter of bottom of boring (97' b.s. to 112'0" b.s.) 10 1/2 in.

8. Taped from top of boring to full depth. ft.

9. Lining tubes perforated at depths of 77'0" ft.

10. Water struck during boring at depths of 105 ft.

11. What was test level on completion of boring? 3'0" above surface.

WELLS AND BORINGS.

12. Is the water raised by pump or air lift? Pump.

13. Depth from top of well or boring to bottom of suction pipe 95 ft.

II. If systematic measurements of water levels are made, state whether these include:—

(a) Pumping levels ... 75' 0" ... (b) Rest levels ... overflowed.
Test 70' 0"

(c) Time of recovery to rest level on cessation of pumping: 4 hours. - September, 1934.
Test 2 hours.

(d) Changes in pumping level, if rate of pumping is altered. ... Not altered.

Also state: (e) at what intervals records are taken (i.e., daily, weekly, etc.) ... Daily.

Please furnish a specimen graph of records taken over as long a period as available (up to 1 year).

Taken by hour's pumping.

III. If measurements are made only occasionally, please indicate what is, or has been, done in this respect and furnish examples of any graphs or figures available.

Test taken twice in one day in July last - average per hour 6563 gallons

Test taken twice in one day in March last - 7854 gallons.

IV. Yields.

(1) Number of gallons pumped per hour ... At present, 7854 gallons.

(2) Is pumping continuous? ... No.

(3) If not, how many hours pumping per day? ... Average - 9 hours.

(4) Maximum daily yields available (Test 140,000 to 212,000) in 1905. See above
(With old pump)

Estimated 300,000 gallons per day.

Based on actual tests Further test proposed in near future.

V. If a section or record of strata can be given please attach to this form.

Herewith.

VI. (1) If a chemical analysis can be given please attach.

(2) If not state hardness ... (1920) ... 15.5

(3) For what purpose is the water used? ... Mainly Domestic.

219

SP52SE5

75

Lab. report No 121135/1

13th Nov. 1935

Sample of water from Leicester Water works - No 3 pumping at 6740 gph.

Total solids 31.6 parts/100,000

Chlorine 2.2

Solids consist of Magnesium bicarbonate & sulphate

Traces of sodium & calcium. No calcium salts present.

No 3a pumping at 6740 gph.

Total solids 39.6 parts/100,000

Chlorine 3.2

Solids as above

No 4 pumping at 7020 gph.

Total solids 39.0 parts/100,000

Chlorine 2.1

Solids as above

No 4a pumping at 7020 gph.

Total solids 40.6 parts/100,000

Chlorine 2.3

Solids as above

No 5 pumping at 6420 gph.

Total solids 40.0 parts/100,000

Chlorine 2.2

Solids as above.

(J.P.)
John Bell & Co. Ltd.

44.

50-52 Wagon
W.I.

Laboratory report No 71135/2

Sample of water from Bicester Water Works. 21st Oct. 1935.

Results in Parts per 100,000 (B.H. pump)

Urethra - very slightly opaque

of solids on ignition - white

Total sold 30

Chlorine 1.30

Notes nil

Nitrates 0.002

Total Lockers 21.4

Poisonous metals Copper & lead absent

F. Annularis 0.02

<i>Eggs absorbed</i>	1.56
----------------------	------

Chlorinated Acetic 0.001

Opinion — a perfectly good sample of drinking water

Signed

John Bull & Co.

Bacteriological Examination

4th of organisms capable of growth on gelatin plates at 22°C after 72 hrs. incubation 116 per c.c.

37°C 48 . 40 .

B. coli absent in 100 c.c.

10/10/2024



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Geological Survey

5709 2384

75

Gowell Farm, near Bicester, 1 1/2 miles N.W. of Market Place.

Communicated by Mr. Edgar E. Tanner, Surveyor to the Urban District Council.

Height above O.D. 172 feet (84.42 m)

A pit, 8 feet square and 11 feet deep, was lined with brickwork and floored with concrete 1 ft. 6 in. thick. A steel tube 1 1/2 inches diam. was taken to 112 ft. 1 in. from surface, with perforations at 27 feet. No water worth mentioning was met with until 22 feet, when it rose to the surface. At 115 feet the brick was struck, and overflowed at the rate of 6,000 gallons per hour when not pumping. The water will rise 3 feet above the surface.

		Thickness.		Depth.	
		Feet.	Inches.	Feet.	Inches.
	Surface soil	1	6	1	6
	Grass rock (Coccoliths)	3	0	4	6
	Sandy marl	8	0	12	6
Forest	Blue rock (Forest Marble)	3	0	15	6
Marble	Light shale	2	6	18	0
WHL. 5 in.	Limestone	2	6	20	0
	Blue clay or shale	3	6	23	6
WHL. 6 in.	White rock	7	0	30	6
	Grey shale with hard beds	12	6	43	0
	Grey rock	6	0	49	0
	Dark shale	1	0	50	0
	Rock	0	6	60	6
	Blue bands	2	0	52	6
	Blue shale	1	6	54	0
	Grey rock	3	0	57	0
	Grey shale	2	0	59	0
	Grey rock	1	0	59	0
	Variogated rock	3	6	62	6
	Grey rock	3	0	65	6
	Dark shale	7	0	72	6
	Rock	2	0	74	6
	Blue clay	5	0	79	6
	Blue rock	2	6	82	0
	Dark shale with hard beds	3	6	85	0
	Limestone	1	6	86	6
	Limestone with shale beds	3	0	89	6
	Blue shale	1	6	90	6
	Grey sandy shale with water	2	0	92	6
	Grey rock	2	6	95	0
	Dark sandy shale	2	6	97	6
	Light sandy shale	2	6	99	6
	Grey rock	2	5	102	0
	Soft rock, water, bulk here	6	0	108	0
	Peat	1	3	109	3
	Light sand	0	8	109	11
	Dark clay and sand	2	4	112	3
	Rock, 1 inch only into it	0	1	112	4

Analysis by Mr. W. W. Fisher in "The Salinity of Water from the Oolite"
"The Analyst," February, 1904. See p. 32.

Mr. E. Foster Tanner, Clerk to the Urban District Council, has kindly added the following particulars:—

"The deep well pump has been fixed. Motors power supplied by Cessley's 18-h.p. gas engines in duplicate, either capable of driving the pumping plant, which has the capacity for raising 8,000 gallons per hour. The water is pumped into tanks, constructed of steel, on the top of a tower, immediately adjoining the well. The tanks are in duplicate, i.e., an inner and an outer tank. Their combined holding capacity is about 60,000 gallons. Height from ground to bottom of tanks, 40 feet. There is a 7 inch main from the water tower to the town, and the distribution mains in the town are respectively 6-inch, 5-inch, 4-inch, and 3-inch. The cost of the works was £7,000."

C.D. given as 200? by Mr. Foster Tanner, Surveyor to Bicester U.D.C.

Well is 200? 22

300 feet in. pump removed

Published in

THE GEOLOGICAL SURVEY

G. ISLER & Co., Ltd.
ARTESIAN & CONSULTING WELL ENGINEERS,
BEAN LANE, SOUTHWARK, S.E.1.

Telegraphic Address: "ISLER, LONDON."
Telephone No.: HO 4460 (3 Lines).

BIRMINGHAM BRANCH: 54 Summer Row

CHART

showing the Bolls passed through at

M Bicester Waterworks
Gowell Farm Bicester

Grey Sandy Shale (with water)	2	0	92	6
Grey Rock.	2	4	95	0
Dark Sandy Shale	2	6	97	6
Light " "	2	0	99	6
Grey Rock.	2	6	102	0
Soft Rock	6	0	108	0
Peat	1	3	109	3
Light Sand		8	109	11
Dark clay & Sand	2	4	112	4
Rock.	2			

15' 6" of 15" 8 ft below

97 ft 11" tubes level with surface

15 " 10 1/2 " " 97 ft below

perforated from 77 ft below

perforations 1/2" on 3/4" pitch covered

with fine mesh brass wire gauge

W L Overflow

12,000 g p h. at P.W.L. of 70 ft

Dug Well Pump

Bored by T. Thom.

219

75

Well at Gowan Farm. Fracture aug^{ly}, 1909.

SP 5709 2384

Description.—The sample is slightly cloudy and contains a little sand. The residue left on evaporation is alkaline and contains a little sodium carbonate.

Chow, — Sp. 24

Appearance 14 Aug-25 July.—Pale yellowish.

The results of the analysis are stated in grams per metric

Total dissolved solids matter		
Calcium in chlorides	...	80%
Magnesium free and sulfate	...	17%
" " bicarbonate	...	3%
Nitrogen in nitrates	...	0.61
" " nitrites	...	0.04
Oxygen required to oxidize organic matter (in 3 hours)	...	3
Bacteria in Clark's degree	...	14.5

Remarks.—The total dissolved solid constituents are normal for water from the Gullies. The cations are not in excess of the natural amounts; the sulfates are small, and the percentage of organic matter is extremely small. The water is of a moderate degree of hardness.

Published in
'The Water Supply
of Oxfordshire'.

Page 3 of 3

SP52SE5

210
75-0

Str. No.

1.	0	Surface Soil
2.	0	Grey Rock.
3.	0.	Sandy Marl
4.	0.	Blue Rock
5.	0	Light Shale
6.	0	Limestone.
7.	0	Blue Shale.
8.	0	White Rock.
12.	6	Grey Shale with hard beds.
9.	0	Grey Rock.
11.	0	Dark Shale.
	6	Rock
10.	0	Blue Shale.
1.	6	Blue Shale.
3.	0	Grey Rock.
4.	0	Grey Shale.
1.	0	Grey Rock.
3.	6	Variiegated Shale.
3.	0	Grey Rock.
7.	0	Dark Shale.
2.	0	Rock.
5.	0	Blue Clay.
2.	6	Blue Rock.
3.	0	Blue Shale with hard fine.
1.	6	Limestone.
3.	0	Limestone with Shale beds.
1.	0	Blue Shale.
1.	0	Grey Sandy Shale.
2.	0	Grey Rock.
2.	6	Dark Sandy Shale.
2.	0	Light Sandy Shale.
2.	6	Grey Rock.
5.	0	Soft Rock.
1.	3	Peat.
1.	3	Light Sand.
2.	4	Dark Clay and Sand, Rock.

See SP52SE/5

SP52SE5

SP 52 SE/6 [5851 2319] Bleicester Station Well (19—) Datum +77.7 (Ground level)

	<i>Depth ft</i>	<i>Thickness m</i>	<i>Depth m</i>
Cornbrash Formation	8.50	2.59	2.59
Forest Marble Formation and			
White Limestone Formation: Bladon Member	29.75	6.48	9.07
Ardley Member and Shipton Member	76.00	14.10	23.16
Rutland Formation and			
Taynton Limestone Formation	100.00	7.32	30.48
Shap's Hill Formation, 'White Sands' and			
Northampton Sand Formation	120.00	6.10	36.58

Stratigraphical classification by M G Sumblor, May 1999.

219

5635 2025, 18th 1925

BORLHO E SECTION

SP52NE6

90

BORED & COMMUNICATED BY MR GRANDSUTCLIFF & CELL LTD, SOUTH

BORED FOR : Archibald Nicholson Esq.

Manor Farm,

Bucknell Nr, Bicester,

DISTRICT : Bicester IN THE COUNTY OF : Oxford.

POSITION OF BORING: At Manor Farm just N.W. of Bucknell

In a field about 1 mile N.W. of the farm

MAPS: 6" Ordnance Oxford 17

1" Geo. Old Series 45 N.E. O.D. OF SITE : 320'

N.S. 319

WATER LEVEL BELOW SURFACE: 26' 0" YIELD OF WATER: 360 gallons per hour.

TUBING REMAINING IN BOREHOLE. 25' 0" of 4" top 1' 0" below surface
5' 5" of 5" top 1' 6" "

STRATA	THICKNESS		DEPTH		
	Ft.	In.	Ft.	In.	
Blue Clay.....	5	0	5	9	Hydon Beds?
Grey Clay.....	3	3	9	0	
Blue Clay.....	1	0	10	0	
Blue Rock.....	4	0	14	0	Kemble Beds?
Grey Rock.....	4	6	18	6	
Green Clay.....		6	19	0	
Grey Rock.....	5	0	24	0	White Limestone
Coloured Clays & Rock....	15	6	39	6	
Grey Rock.....	2	6	42	0	
Blue Clay.....	2	0	44	0	Hampden Marly?
Blue Rock.....	3	0	47	0	
Green Clay.....	2	0	49	0	
Blue Rock.....	2	0	51	0	Beds
Clay.....	7	0	58	0	
Rock.....	3	0	59	0	
" Clay.....	5	0	64	0	Taynton Stone
" Rock.....	3	0	67	0	
" Clay (dark).....	4	0	71	0	
" Rock.....	3	0	74	0	Upper Eocene Clay
Whitish Clay.....	1	0	75	0	
White Rock.....	5	0	80	0	
Blue Rock.....	3	0	83	0	Swarthill Beds?
Grey Green Clay.....	6	0	89	0	
" " Stones.....	4	0	93	0	
Black Sandy Clay.....	34	0	127	0	Norton Beds?
Black Rock.....		5	129	0	
Blue Rock.....		5	129	3	
Green Rock.....	1	3	129	6	Upper Lias
Gault Clay.....	23	6	153	0	
Gault.....	26	0	179	0	
Rock.....	2	9	181	9	Middle Lias
Clay & Shale.....	2	3	184	0	
Bands of Rock & Loamy Shale	4	6	188	6	
Rock, Clay & Pebbles.....	5	0	193	6	
Loamy Clay & Shales.....	21	6	215	0	
O/F	215	0	215	0	

10000. 16th 1925

90

BORING SECTION

BORED & COMMUNICATED BY MR GRAND BUTCHIFF & CO. LTD. SOUTHALL

BORED FOR: ¹Wolfgang Nicholson Esq.,
 Manor Farm,
 Bucknell Nr, Bicester.

DISTRICT: Bicester. IN THE COUNTY OF: Oxford.

Great White
 Lias? Cp

STRATA	THICKNESS		DEPTH		
	Ft.	Inch.	Ft.	Inch.	
O/F	215	0	215	0	
Loamy Clay & Shales, hard bands.....	6	0	221	0	Middle
Loamy Clay & Shales.....	6	0	227	0	Lower
White Rock.....		6	227	6	
Loamy Clay & Shales.....	12	6	240	0	Lias
Blue Clay (Gravel).....	7	0	247	0	
Rock.....	1	0	248	0	
Gravel	3	0	251	0	

Total depth of boring.

251 0 251 0

A 1615.
 1. 11. 39

Geological Remarks

Probably not a great deal of water at this site
 W.L. dropped considerably during boring about 190-200 ft.

Based on
 A. 1615. 1. 11. 39
 - 2765 40
 Examination Geo. 11. 39

CRING FINISHED: 26th April 1924.

MR GRAND BUTCHIFF & CO. LTD.,

Signature.....

Our Ref., S.B.4/17.

Our Order No. 1150. 23/1/24.

M/AMP.

The weir is still in use
Yield unknown. 800 ghy per day
when I want it.

Great Lake

Brick path

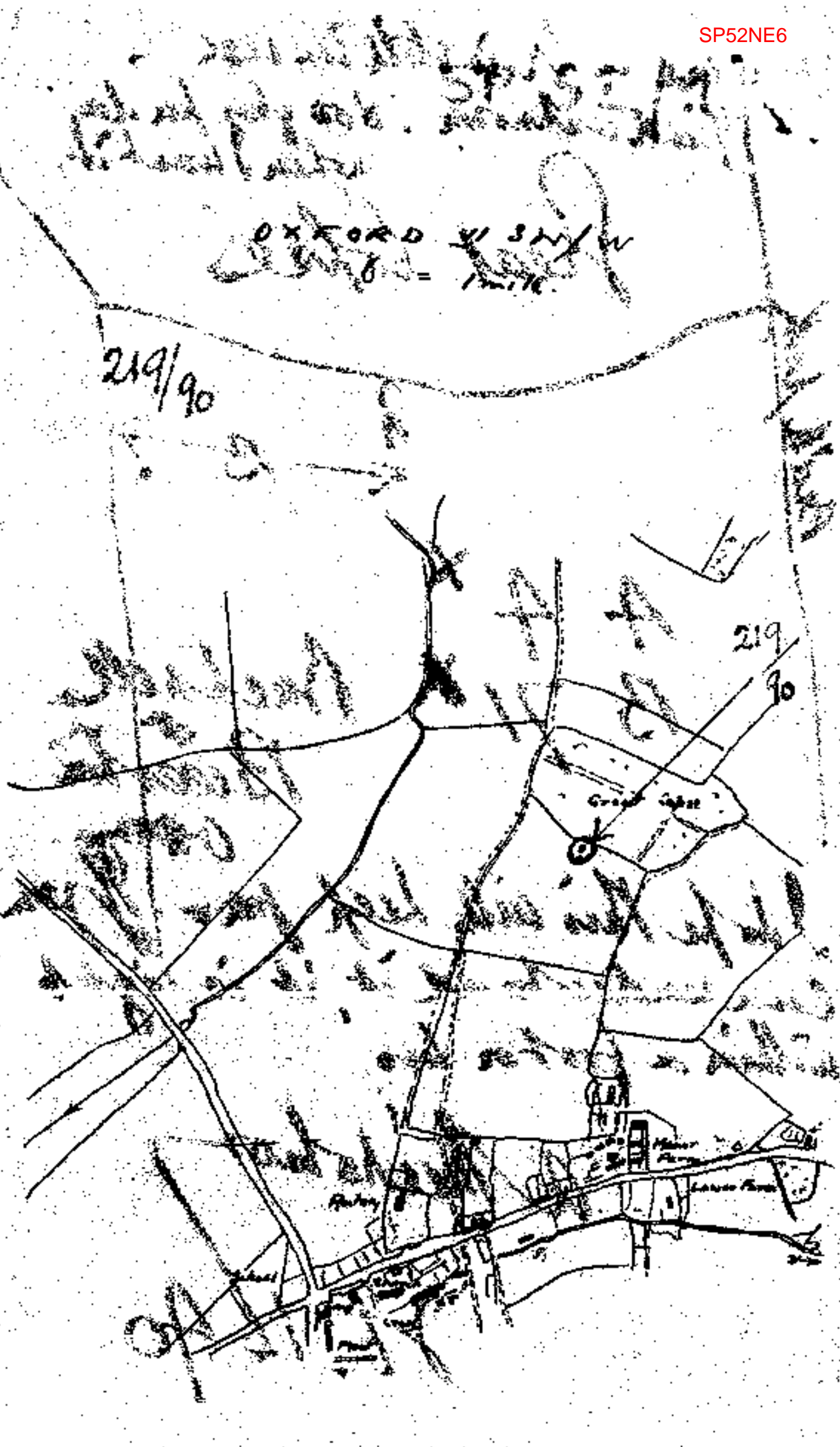
A A^x
B 71^x

Brickwell
Bridges
Gangway

I hope this will help you
can understand it, it is right
within a foot or two

A. Mechohor

21.14.40



BORED & COMPLETED BY THE GRADIENTS OF GELL, LTD., 1901

BORED FOR : Archibald Nicholson Esqr.
 Major Party,
 Bucknell, Nr. Bicester,

SP52NE/6

DISTRICT : Bicester IN THE COUNTY OF Oxford.

POSITION OF BORING: At Major Party, near N.W. of Bucknell
 In a field about 1/2 mile N.W. of the farm

ELEVATION OF BORING: 17

1" Geo. Old Series 45 N.E. O.D. OF SITE : 380' (97.53m)
 N.S. 1/4

WATER LEVEL BELOW SURFACE: 20' 0" YIELD OF WATER: 300 gallons
 per hour.

TESTING & SAMPLING IN BOREHOLE. 25' 0" of 4" top 1' 0" below surface
 5' 5" of 5" top 1' 6"

STRATA	THICKNESS		DEPTH	
	Ft.	Inch.	Ft.	Inch.
Blue Clay.....	5	0	5	0
Grey Clay.....	3	3	8	0
Blue Clay.....	1	0	10	0
Blue Rock.....	4	0	14	0
Grey Rock.....	4	6	18	6
Green Clay.....		8	19	0
Grey Rock.....	5	0	24	0
Coloured Clays & Rock.....	13	0	30	6
Grey Rock.....	2	6	42	0
Blue Clay.....	2	0	44	0
Blue Rock.....	3	0	47	0
Green Clay.....	2	0	49	2
Blue Rock.....	2	0	51	0
Clay.....	3	0	56	0
Rock.....	3	0	59	0
" Clay.....	5	0	64	0
" Rock.....	3	0	67	0
" Clay (dark).....	4	0	71	0
" Rock.....	3	0	74	0
Whitish Clay.....	1	0	75	0
White Rock.....	5	0	80	0
Blue Rock.....	3	0	83	0
Grey Green Clay.....	0	0	89	0
" " " Stones.....	4	0	93	0
Black Sandy Clay.....	34	0	127	0
Black Rock.....		3	120	0
Blue Rock.....		3	128	0
Green Rock.....	1	3	129	3
Gault Clay.....	25	6	153	0
Gault.....	20	0	179	0
Rock.....	2	9	181	0
Clay & Rock.....	2	3	184	0
Black & Grey & Sandy Gault	4	6	188	6
Rock, Clay & Gault.....	5	0	193	6
Grey Clay & Gault.....	21	0	215	0

March 10th 1925

90

BORING SECTION

BORED & COMMUNICATED BY THE GRANGE AUTODRILL & GEOL. LTD. SOUTHALL.

BORED FOR : Heribald Nicholson Esq.,
Manor Farm,
Bucknell Nr. Bicester.

SP52NE 6

DISTRICT : Bicester. IN THE COUNTY OF: Oxford.

	STRATA	THICKNESS		DEPTH		
		Fe.	Inch.	Ft.	Inch.	
	O/F	215	0	215	0	
Great Oolite Series Lias? Gp	Loamy Clay & Shales, hard bands.....	8	0	221	0	Middle
	Loamy Clay & Shales.....	6	0	227	0	
	White Rock.....		6	227	6	
	Loamy Clay & Shales.....	12	6	240	0	Lower Lias
	Blue Clay (concret).....	7	0	247	0	
	Rock.....	1	0	248	0	
	concret	3	0	251	0	

Total depth of boring.

251 0 251 0

A 610.
1. 11. 19Geological Remarks

Probably not a great deal of water at this site
 W.L. dropped considerably during boring about 190-200 ft.

Based on
 Arkell, Int. S.
 1905
 Southern Gt. S.

WORK FINISHED: 26th April 1925.

THE GRANGE AUTODRILL & GEOL. LTD.,

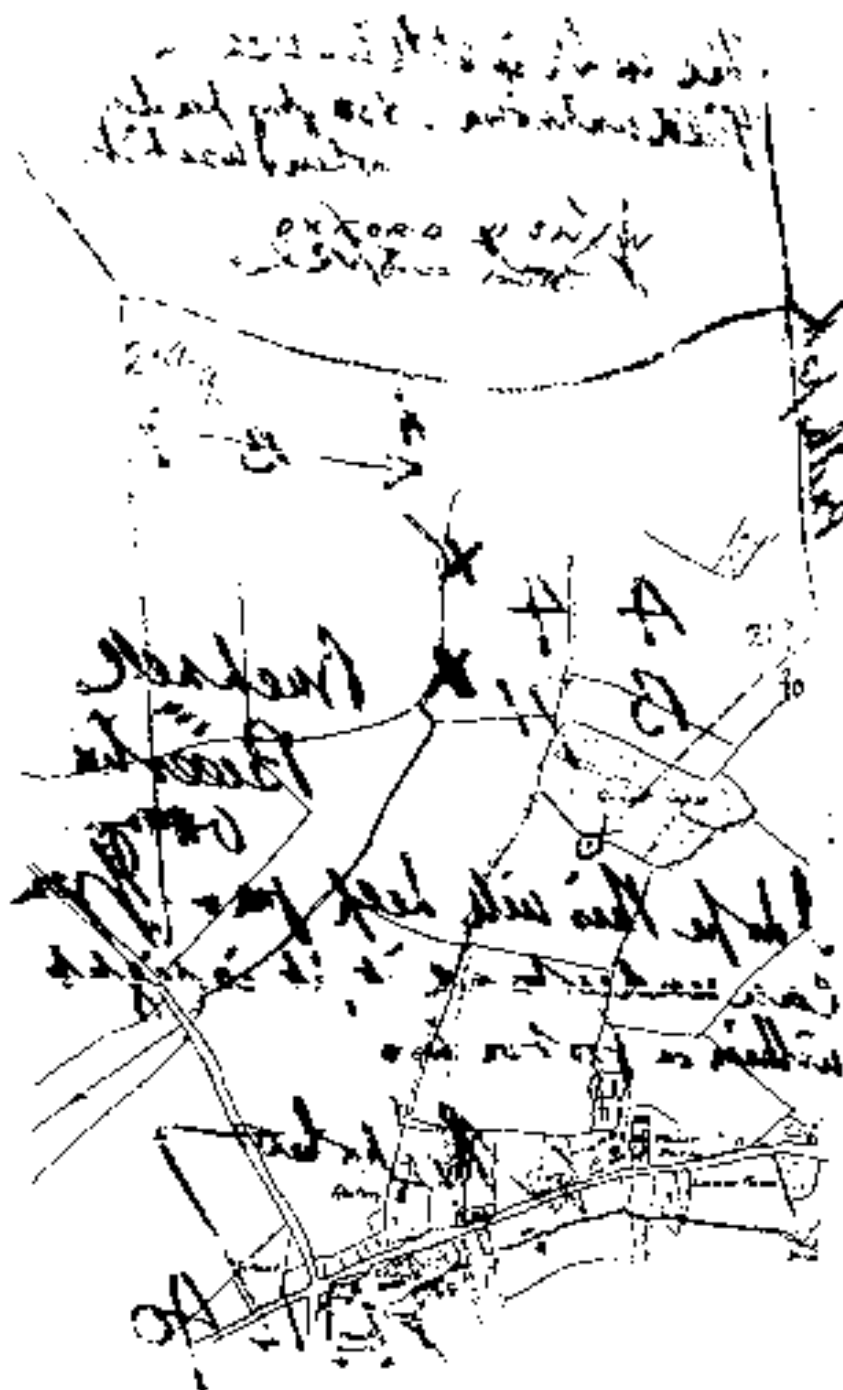
Signature.....

Our Ref. G.B.4/17.

Our Order No. 1150. 23/1/24.

15/1/25.

SP52NE6



BORED & COMPLETION BY THE GRANTBUTCHER & GILL, LTD., SOUTH

BORED FOR: Archibald Nicholson Esqrs.
Tenor Farm,
Bucknoll, W/Dicconter,

SP52NE/6.

DISTRICT: Dicconter IN THE COUNTY OF: Oxford.

POSITION OF BOREHOLE: At Tenor Farm, 1/2 m. N.E. of Bucknoll
In a field about 1/2 m. N.E. of the farm

LAYER: 6" Sandstone Oxford 17

1" Geo. Old Series 45, N.E. O.D. OF SITE: 320' (97.53m)

WATER LEVEL BELOW SURFACE: 26' 0" YIELD OF WATER: 360 gallons
per hour.TUBING REMAINING IN BOREHOLE. 25' 0" of 4" top 1' 0" below surface
5' 5" of 5" top 1' 6" "

	STRATA	THICKNESS		DEPTH		
		Ft.	In.	Ft.	In.	
F.M.B.	Blue Clay.....	5	0	5	0	Hydrated Beds
	Grey Clay.....	3	3	9	0	
	Blue Clay.....	1	0	10	0	
	Blue Rock.....	4	0	14	0	
S. of F.M.B.	Grey Rock.....	4	6	18	0	Kemble Beds
	Green Clay.....		6	19	0	
	Grey Rock.....	5	0	24	0	
	Coloured Clays & Rock....	15	6	39	0	
Rid	Grey Rock.....	2	6	42	0	White Limestone
	Blue Clay.....	2	0	44	0	
	Blue Rock.....	3	0	47	0	
	Green Clay.....	2	0	49	0	
Rid	Blue Rock.....	2	0	51	0	Kempston Beds
	Clay.....	7	0	58	0	
	Rock.....	5	0	59	0	
	Clay.....	5	0	64	0	
Rid	Rock.....	3	0	67	0	Tangerton Shale
	Clay (dark).....	4	0	71	0	
	Rock.....	3	0	74	0	
	Whitish Clay.....	1	0	75	0	
Great Oolite T. 7	White Rock.....	5	0	80	0	Upper Silurian C.
	Blue Rock.....	3	0	83	0	
	Grey Green Clay.....	8	0	89	0	
	" " Stones.....	4	0	93	0	
Skt	Black Sandy Clay.....	34	0	127	0	Sunderland & Hor
	Black Rock.....		3	128	0	
	Blue Rock.....		3	128	3	
	Green Rock.....	1	3	129	0	
N.S.	Gault Clay.....	25	6	153	0	Upper Silurian
	Gault.....	24	0	179	0	
	Rock.....	2	2	181	0	
	Clay & Gault.....	2	3	184	0	
N.S.	Band of Rock & Lumpy Shale	6	3	190	0	Middle Silurian
	Rock, Clay & Pebbles.....	5	0	193	0	
	Lumpy Clay & Shale.....	21	0	215	0	
C/P		215	0	215	0	

219

Bore No. 1048 1924

90

BARRETT'S BORE

BORED & CORRECTIONED BY THE GEOL. SURVEY & CORRECTIONED

BORED FOR: ^TRichard Nicholson Esq.,
 Manor Farm,
 Bucknoll Nr. Bicester.

SP52NE 6

DISTRICT: Bicester. IN THE COUNTY OF: Oxford.

	STRATA	THICKNESS		DEPTH		
		Ft.	Inch.	Ft.	Inch.	
<i>Great Oolite Series</i> <i>Lias? Op</i>	G/P	215	0	215	0	Middle
	Loamy Clay & Shales, hard bands.....	8	0	221	0	
	Loamy Clay & Shales.....	6	0	227	0	Lower
	White Rock.....	6	6	227	6	
	Loamy Clay & Shales.....	12	6	240	0	Lias
	Blue Clay (caudex).....	7	0	247	0	
	Rock.....	1	0	248	0	
	caudex	3	0	251	0	
Total depth of boring.		251	0	251	0	

Also.
 1-11-39.

Based on
 Ashed Twp. Sy.
 1865-90
 Richardson Geol. H.
 190

GENERAL REMARKS

Probably not a great deal of water at this site
 W.L. dropped considerably during boring about 100-200 ft.

CRANK FINISHED: 26th April 1924.

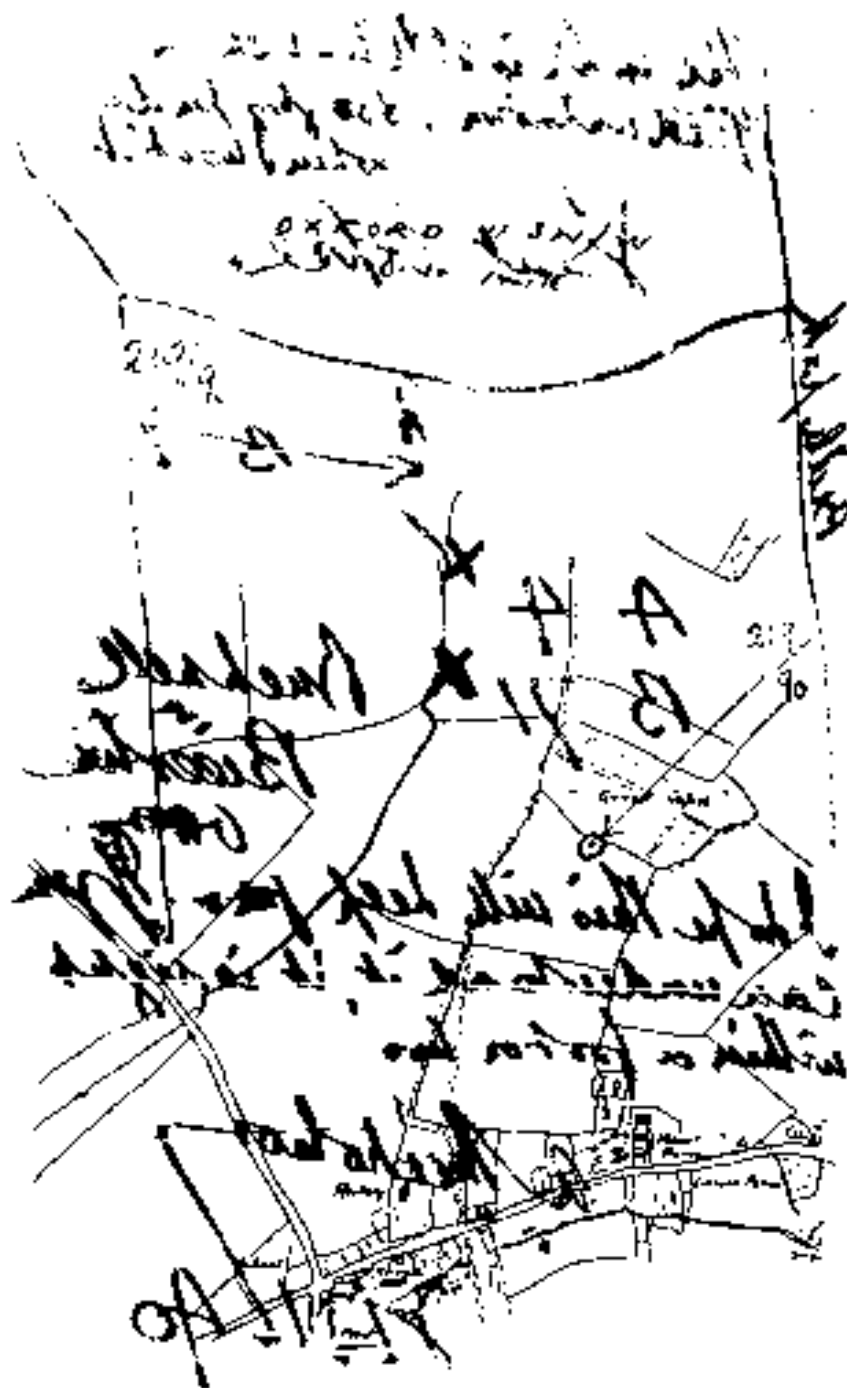
THE GEOL. SURVEY & CORRECTIONED.

Signature.....

Our Ref., G.B.4/17.

Our Order No. 1150. 23/1/24.

12/24.



Geological Assessment - Detailed

Dr Richard Earl
TurfTrax Ground Management Systems
Limited
Unit 1, Highfield Park
Highfield Road
Oakley
Bedfordshire
MK43 7TA

Geological Assessment - Detailed

This report is aimed at customers and clients carrying out preliminary site assessments, who require a detailed assessment of the geology, hydrogeology and any geological hazards around the site.

The report, prepared by BGS geologists, is based on analysis of records and maps held in the National Geoscience Data Centre (NGDC), and includes descriptions of rock types, natural subsidence hazards and mining & quarrying hazard if present. It also contains geological map extracts taken from the BGS Digital Geological Map of Great Britain at the 1:50,000 scale (DiGMapGB-50) and a listing of the key geoscience data sets held in the NGDC for the area around the site. The report also considers radon hazard (in terms of the level of radon protection required in the construction of new dwellings) and the detailed hydrogeology of the site.

Note that for some sites, the latest available records may be quite historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Client's Reference:
NW Bicester

Geological Assessment - Detailed

Section 1: Location and extent of report area

Site Address:

Site A: NW Bicester

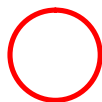
Area centred at: 455853,225060

Radius of site area: 2500 metres

This report is based on the above location details. However, where the client has submitted a site plan, it is used for the assessment in Sections 2, 3 and 4.



Scale: 1:50000 (1cm = 500m)



SITE LOCATION

Geological Assessment - Detailed

Section 2: Geological Factors for the site

This table lists some of the principal geological factors that may affect a site, and is based on interpretation of data available to BGS at the time of compilation; additional information may be available in BGS files. The information is designed to act as a checklist and should not be used in place of a detailed site investigation.

Factor	May be significant within site area (Y/N)?	Comments
Shrink-Swell Clay Hazard	No	
Landslide Hazard	Yes	Mudstone beds in the Bladon Member and Forest Marble Formation may be unstable on steep slopes or in excavations. The Cornbrash may be affected by cambering along valley sides, and valley bulging may affect the Forest Marble mudstones in valley bottoms.
Ground Dissolution Hazard	Yes	The White Limestone Formation , limestone beds in the Forest Marble Formation and the Cornbrash Formation may be prone to dissolution along joints, leading to minor cavity formation.
Compressible Ground Hazard	Yes	Alluvium may include compressible organic-rich layers.
Collapsible Ground Hazard	No	
Running Sand Hazard	Yes	Alluvium may include sandy layers with a low running sand hazard potential.
Shallow mining	No	
Aquifer vulnerability		The alluvium and Cornbrash and Forest Marble Formations beneath the site are classified as Minor Aquifers with high soil leaching potential on the Environment Agency's Groundwater Vulnerability map, Sheet 30, Northern Cotswolds. The underlying White Limestone Formation is a Major Aquifer.
Shallow groundwater		Likely within possibly 0.5 m of the ground surface in the Cornbrash; possible artesian conditions in deep boreholes or excavations.
Artificial ground	Yes	Landfill site.
Natural land gas	No	
Level of Radon Protective Measures	Yes	BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

Geological Assessment - Detailed

Section 3: Description of the Geology & Hydrogeology for the site

Topography and surface drainage (see Section 4):

Site elevation ranges from 75 metres above Ordnance Datum (OD) in the stream valley in the south to 120 m in the north-west of the search area.

The slope and principal drainage direction is to the south-east. The drainage is dendritic in pattern and tributaries run in other directions. Two stream networks traverse the search area.

Artificial Ground (see Section 4):

There is an extensive worked ground site in the north-west of the search area, which has been partially backfilled as a landfill site. Elsewhere, there are other small pits, worked mainly for limestone, that are often backfilled. Main roads and railways have cuttings and embankments.

Superficial Deposits (see Section 4):

The streams are flanked by narrow tracts of **alluvium** of late Quaternary age, comprising sandy silty calcareous clay overlying gravelly sandy silty clay, with limestone clasts. The alluvial deposits are up to 150 m wide, are generally between 1 to 2 m in thickness (rarely exceeding 3 m in thickness). They may locally include highly compressible, organic-rich (peaty) layers.

Locally, hollows in these valley sides are floored by thin deposits of **head**, formed by soil creep or hill wash. Their composition reflects that of the local materials from which they were derived, either the bedrock or other types of superficial deposit, or both in combination. Head deposits typically are poorly stratified and poorly sorted, and can be variable in composition. Locally, they are typically composed of variably stony sandy silty clay. Head deposits may be more extensive than shown on the geological map, but if so, probably only as a layer between 0.3 m and 1 m in thickness, and possibly discontinuous.

Rockhead Depth (see Section 4):

Where covered by alluvium or head, rockhead is at 1 to 3 m depth. Its depth beneath the Artificial Ground (especially under landfill sites) is unknown. Over the remainder of the search area, rockhead is close to the surface.

Bedrock Geology (see Section 4):

The search area is underlain at rockhead by various formations and members of the Great Oolite Group, of Mid-Jurassic age, which are dominated by limestones with subordinate mudstone beds.

The oldest exposed formation is the **White Limestone Formation**, forming a broad plateau in the north-west of the search area, and where complete, comprises 10 to 18 m thickness of white to yellow, bedded, peloidal and bioclastic limestone (see **Additional Geological Considerations** below). There may be less than 5 m thickness of beds present in the extreme north-west. Thin calcareous mudstone beds are present in the basal part and dark, carbonaceous mudstones predominate over limestone in the upper part, which is distinguished on the map extracts (see Section 5) as the **Bladon Member**, up to 3 m thick.

The White Limestone Formation is overlain with an erosive contact by the **Forest Marble Formation**, to the extent that the Bladon Member is locally absent. The Forest Marble Formation forms a narrow outcrop between the White Limestone and Cornbrash Formations, and also crops out on the flanks of the stream valleys. The Formation is composed of 3 to 5 m of grey calcareous mudstone with lenticular beds of bioclastic, ooidal limestone, particularly common at the base, where they are widely distinguished on the map extracts.

Geological Assessment - Detailed

The **Cornbrash Formation** is the youngest bedrock unit within the site area, cropping out over about half the search area, almost all of the site area, and forming a broad south-east sloping plateau. It comprises about 3 m thick grey to brown bioclastic shelly rubbly-bedded limestone with thin subordinate beds of grey mudstone.

Mudstone beds in the Bladon Member and Forest Marble Formation may be unstable on steep slopes or in excavations.

The limestone-dominated units of the White Limestone, Forest Marble and Cornbrash Formations may be affected by dissolution leading to the widening of joints and the formation of linear vertical voids, which are likely to fill with rubble and soil.

Along valley sides, the Cornbrash Formation outcrops may be affected by cambering. Cambering is a widespread phenomenon in the south and east Midlands, although it is not known whether it affects the strata at this site. Cambering takes place where beds of resistant, permeable rocks such as limestone overlie impermeable clay (or mudstone which weathers and softens to clay) along valley sides and escarpments. The superincumbent load coupled with water movement along the interface causes the soft plastic clay material to squeeze or wash out. Intervening sand beds may exacerbate the effect, but even where such permeable beds are absent, large thicknesses of clay may be lost by squeezing. As a result, the vertical thickness of the clay beds reduces, and the limestone strata are lowered as a 'camber', comprising blocks separated by minor faults parallel to the valley axis. The cambered strata may themselves undergo brittle fracture, so forming blocks separated by vertical joints normal to the direction of movement, on which minor vertical displacements may take place (forming 'dip-and-fault' structures). The displacements on the faults associated with cambering is usually quite small (up to 3 m), and they may be undetectable at the surface other than in excavations. In addition, the spacing may be too close (tens of metres) for them to be distinguishable at 1:10 560 or 1:10 000-scale. Cambering is thought to have been initiated during Pleistocene periglacial conditions. It is probably not an ongoing process here, but may merge into landslide movement downslope and must be considered a potential engineering hazard.

In narrow valleys a consequence of squeezing of the clay strata may be valley bulging, in which the softer material is forced upwards in the floor of the valley, above its normal position, becoming folded and possibly faulted. This may also cause the downslope ends of cambers to be disrupted.

Downhill (lateral) movement of the blocks may cause wide fissures (known as 'gulls') to form. The gulls are likely to fill with loose rock and soil, and in some cases with clay, but can remain as voids. Gulls may also result from the collapse of cavities in limestone formed by dissolution along joints. Such an origin may be evident from a regular pattern or orientation of gulls parallel to local joint sets or not at right angles to the inferred direction of extension. Many gulls develop by a combination of these causes.

Geological Assessment - Detailed

Additional Geological Considerations (see Section 4):

The White Limestone Formation is underlain by four further formations of the Great Oolite Group: in ascending order the Horsehay Sand, the mudstone-dominated Sharp's Hill, the Taynton Limestone and the mudstone-dominated Rutland formations, totalling about 20 m in thickness. These are underlain by the 2 to 6 m of the ferruginous sandstones of the Northampton Sand Formation. Beneath these are over 100m of the mudstone-dominated Lias Group.

The bedrock strata dip very gently (less than 0.5°) to the south-east. Faults have been mapped to the north-east of Bucknell, with displacements of up to about 5 m. It is important to understand the nature of geological faults, and the uncertainties which attend their mapped position at the surface. Faults are planes of movement, along which, adjacent blocks of rock strata have moved relative to each other. They commonly consist of zones, perhaps up to several tens of metres wide, containing several to many fractures. The portrayal of such faults as a single line on the geological map is therefore a generalisation. Geological faults in this area are of ancient origin, are today mainly inactive, and are thought to present no threat to property.

Hydrogeology and groundwater vulnerability:

The areas of worked ground, although not within the site area, may contain groundwater that may have an effect on groundwater beneath the site, albeit at depth. The areas of worked ground occur within the White Limestone Formation (see below).

There are small patches of alluvium, and possibly head, within the site area in the floors and flanks of some of the valleys. These deposits are of variable permeability. Groundwater may be present in limited quantities in the less permeable deposits, otherwise it is likely to be in hydraulic conductivity with the Forest Marble Formation bedrock if the bedrock is relatively permeable, or will be perched and drain out if it is more permeable than the bedrock. The deposits are very small in area and thickness and there is no borehole water level information relating to them. However, the water is likely to be in hydraulic continuity with, and at a similar level to, surface water.

The Great Oolite Group limestones transmit water via fractures that can be enhanced by dissolution; water movement through them can therefore be rapid.

With the exception of the Forest Marble Formation cropping out in the floors and sides of the valleys, the whole of the site area is underlain by Cornbrash Formation bedrock. This is a local aquifer and several water strikes have been recorded in shallow, site-investigation boreholes drilled within the site area. The rest water levels are generally slightly higher than the strike levels; both are generally between about 0.5 and 4.0 m below the ground surface.

The Forest Marble Formation, where present beneath the area, may hold small quantities of water in any limestone bands present, but the upper part generally acts as an aquiclude between the Cornbrash Formation and the underlying White Limestone Formation. There are no boreholes drilled through the Forest Marble Formation in the site area that record water strikes within it.

Geological Assessment - Detailed

The White Limestone Formation constitutes a major aquifer in the area, with some sources of public supply. There are several boreholes in the wider area, some within the site area, that penetrate this formation. A 34 m deep borehole at Gowell Farm (SP52/19 at SP 5709 2384), drilled pre-1909 to supply Bicester with water, penetrated the complete 25 m thickness of the White Limestone Formation, underlying about 7.2 m of Forest Marble Formation and terminating in the underlying Rutland Formation. Water was struck at 28 m and 32 m below the ground level in the White Limestone Formation. The rest water level rose to the surface after the first strike, and was artesian, with a rest water level about 1 m above ground level (about 88 m above OD) after the second strike. The yield was over 7 l/s. An 80 m deep borehole at Lords Farm (SP52/18 at SP 5746 2424), drilled in 1941, was drilled through a similar sequence and terminated in the Lias. It struck water in the Cornbrash Formation, which was cased out, and at two levels below the White Limestone Formation. The rest water level was at 11 m below ground level (about 68 m above OD) and it yielded 1.7 l/s. Other records of water levels at Lords Farm (SP52/17A, B and C at about SP 569 245) show that the water level was at within 3.6 m below ground level (about 76 m above OD).

There are no water analyses from the Cornbrash and Forest Marble Formations, but anticipate that water from the limestones will be similar to that from the White Limestone Formation. All of the boreholes in the area that have analyses are deeper ones drilled into, and abstracting water from, the White Limestone Formation. A typical analysis, one from 1905 of the water from the Gowell Farm borehole, records total dissolved solids of 380 mg/l, a chloride ion concentration of 16 mg/l, a hardness of 207 mg/l (as CaCO_3), and nitrates of 0.2 mg/l. A 1935 analysis of several samples, taken under pumping conditions, record total dissolved solids of about 300-400 mg/l and a chloride ion concentration of 13-32 mg/l. The outcrop, and thus recharge area, of the White Limestone Formation lies to the north-west of the site area, within the search area. There are areas of worked ground in this formation in the search area. Depending upon the unknown depth of the worked ground areas, the water level in the White Limestone Formation may lie above the floor of any quarry or similar excavation. If any such worked ground has been backfilled and it is unlined, it is possible that the backfill material may affect groundwater flow beneath the site and may be in contact with the water within the White Limestone Formation. It is possible that under these conditions, the water in this formation may be, or become, contaminated and may eventually be transmitted down hydraulic gradient to the water in the formation beneath this site.

There are insufficient data to determine a groundwater flow direction, but locally it will probably be towards the nearest stream and regionally, down-dip towards the south-east.

The alluvium, and Cornbrash and Forest Marble Formations beneath the site are classified as Minor Aquifers with high soil leaching potential on the Environment Agency's Groundwater Vulnerability map, Sheet 30, Northern Cotswolds.

Individual sites will always require more detailed assessments to determine the specific impact on groundwater resources. The maps only represent conditions at the surface and where the soil and/or underlying formations have been disturbed or removed, the vulnerability class may have been changed and site specific data will be required.

Natural Land Gas

Section 2 indicates whether or not there is any potential susceptibility of the report area to surface or near-surface emissions of methane and/or carbon dioxide from natural sources or mining. Where methane and carbon dioxide emissions do occur at the surface most appear to be derived from abandoned shallow coal mines although a number of recorded incidences originate from peat and other natural deposits of organic materials, such as in buried ponds or river channels. It should be noted that the exact extent of potential sources of natural land gas, particularly that of peat and other organic deposits, can be difficult to predict.

Geological Assessment - Detailed

An indication of potential for gas emissions does not necessarily indicate that there is a problem. That would depend on (1) the quantity of gases in the source rocks or superficial deposits, (2) whether they have been released and (3) whether there are pathways for transmission and locations for accumulation.

The relatively small number of gas emission incidents from coal mining and natural sources recorded in most areas of the UK suggests that the hazard is relatively minor and of local significance compared, for example, with the extensive problems associated with mining related subsidence or gas problems associated with landfill sites. However, in some parts of the coal fields, such as in parts of Northumberland, a relatively high number of gas emission sites have been identified, so the gas hazard is correspondingly greater. Whereas specific problems with methane and carbon dioxide from natural sources and mining can cause severe and, sometimes, expensive or dangerous problems, most gas emissions from natural sources and mining can usually be dealt with readily if they do arise.

A Residential Property or Non-Residential Property, Commercial or Development Site (maximum of 25 hectares) coal mining search from the Coal Authority (http://www.ppsearches.co.uk/coal_mining_searches.htm) will indicate whether any shafts or adits, which may act as pathways for gas, are located within 20 m of the boundary of the property or site. Where the Coal Authority is aware that a property or site being the subject of a search has been affected by mine gas, this information will be included in the Coal Mining Search Report.

If the report area is potentially susceptible to surface or near-surface emissions of methane and/or carbon dioxide from natural sources or mining, (1) caution should be exercised in forward planning on the basis that hazards from natural methane and carbon dioxide impose a constraint on development by virtue of public health or safety implications; (2) developers need to be aware that potential problems may be associated with gas emissions; (3) employers at some places of work may have responsibilities under the Health and Safety at Work etc Act 1974 to monitor gas levels; and (4) there may be a need to consult an appropriate specialist or to seek further information through desk studies and/or site investigations.

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

Radon

Section 2 describes the level of Radon Protective Measures required during the construction of new buildings or extensions to existing buildings, at the site. This determination complies with information set out in *BR211 Radon: Guidance on protective measures for new dwellings (2007 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required (please see BRE Website for more details: www.bre.co.uk/radon). This assessment is based on the Radon Potential Dataset produced jointly by the BGS and the Health Protection Agency (for more information please see the BGS website at www.bgs.ac.uk/radon).

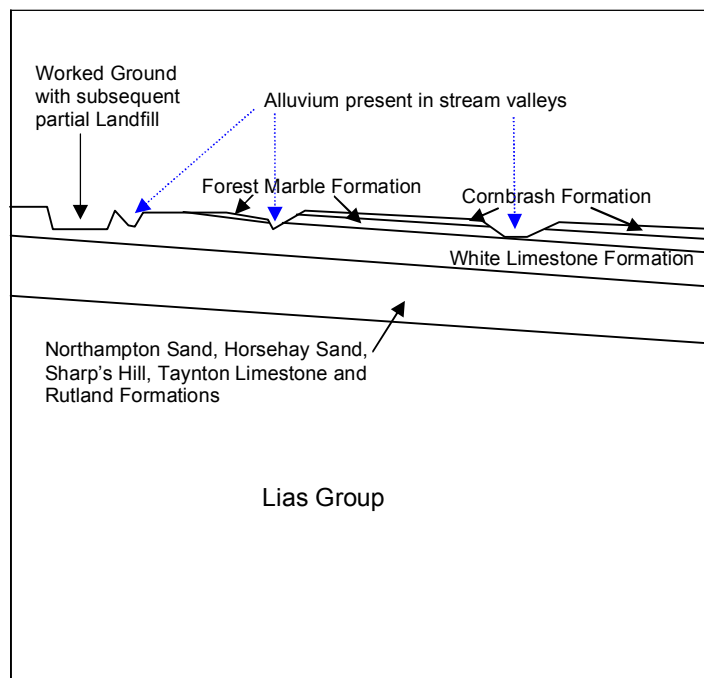
Geological Assessment - Detailed

Section 4: Schematic Geological Cross-Section of the Site

Not to scale

grid ref of north-west side of site
45385 22653

grid ref of south-east side of site
45775 22335



This sketch represents an interpretation of the geometrical relationships of the main rock units described in the text. Not to scale.

Geological Assessment - Detailed

Section 5: Geological maps

Extracts of geology maps around your site are provided in this section, taken from the BGS Digital Geological Map of Great Britain at the 1:50,000 scale (DiGMapGB-50). The first four maps show separately the four main layers of geology that may be present in an area – **artificial (man-made) deposits**, **landslip deposits**, **superficial deposits** and **bedrock**. The fifth 'combined geology' map shows all four rock layers superimposed on the same map, to show the rocks that occur at the surface just beneath the soil.

More information on DiGMapGB-50 and how the various rock layers are classified can be found on the BGS website (www.bgs.ac.uk), under the DiGMap and BGS Rock Classification Scheme areas. Further descriptions of the rocks listed in the map keys can also be obtained by searching against the Computer Code on the *BGS Lexicon of named Rock Units*, which is also on the BGS Website at by following the 'GeoData' link. The computer codes are labelled on the maps to try and help in their interpretation (with a dot at the bottom left hand corner of each label). However, please treat this with caution in areas of complex geology, where some of the labels may overlap several geological formations. If in doubt, please contact BGS enquiries.

The geological formations are listed broadly in order of age in the map keys (youngest first) but only to the formation level (a formation is a package of related rocks). Within formations, please be aware that individual members may not be ordered by age.

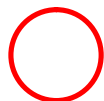
Geological Assessment - Detailed

Artificial deposits

These include deposits moved and disturbed by man.



Scale: 1:50000 (1cm = 500m)



SITE LOCATION

Key to Artificial deposits:

Map colour	Computer Code	Rock name	Rock type
	LSGR	LANDSCAPED GROUND (UNDIVIDED)	UNKNOWN/UNCLASSIFIED ENTRY
	MGR	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
	WGR	WORKED GROUND (UNDIVIDED)	VOID
	WMGR	INFILLED GROUND	ARTIFICIAL DEPOSIT

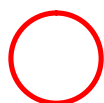
Geological Assessment - Detailed

Landslip deposits

These include natural deposits formed by sliding and mass-movement of soils and rocks on hill slopes (an alternative term for Landslip deposits is 'Mass Movement Deposits')



Scale: 1:50000 (1cm = 500m)



SITE LOCATION

Key to Landslip deposits:

No deposits are mapped in the search area

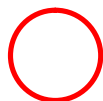
Geological Assessment - Detailed

Superficial deposits

These include fairly recent geological deposits, such as river sands and gravels, or glacial deposits, which lie on the bedrock in many areas (an alternative term for Superficial deposits is 'Drift Deposits')





Scale: 1:50000 (1cm = 500m)



SITE LOCATION

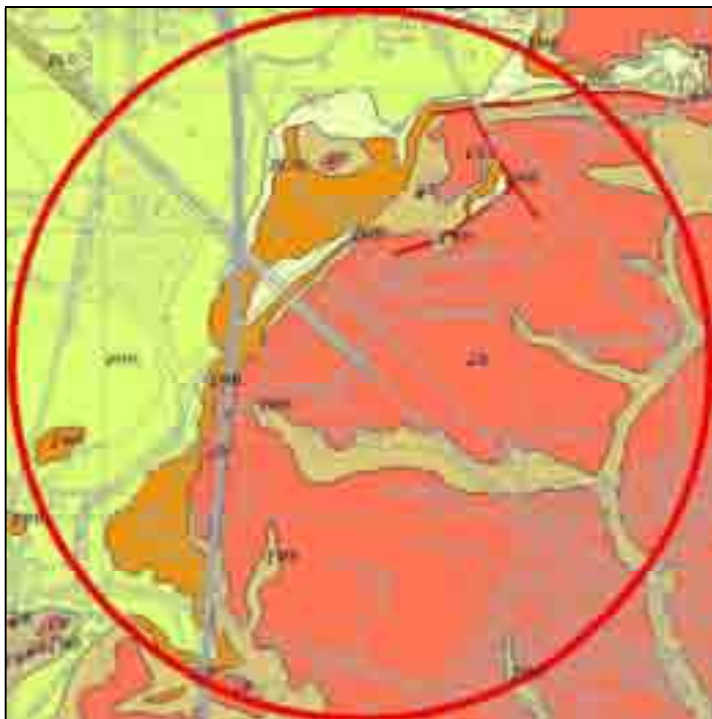
Key to Superficial deposits:

Map colour	Computer Code	Rock name	Rock type
	ALV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
	HEAD	HEAD	CLAY, SILT, SAND AND GRAVEL

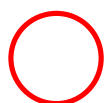
Geological Assessment - Detailed

Bedrock

Bedrock forms the ground underlying the whole of an area, upon which the other geological layers listed above may lie (an alternative term for Bedrock is 'Solid Geology')



Scale: 1:50000 (1cm = 500m)



SITE LOCATION



Fault



Coal, ironstone or other mineral vein

Note: Faults and Coals, ironstone & mineral veins are shown for illustration and to aid interpretation of the map. Not all such features are shown and their absence on the map face does not necessarily mean that none are present

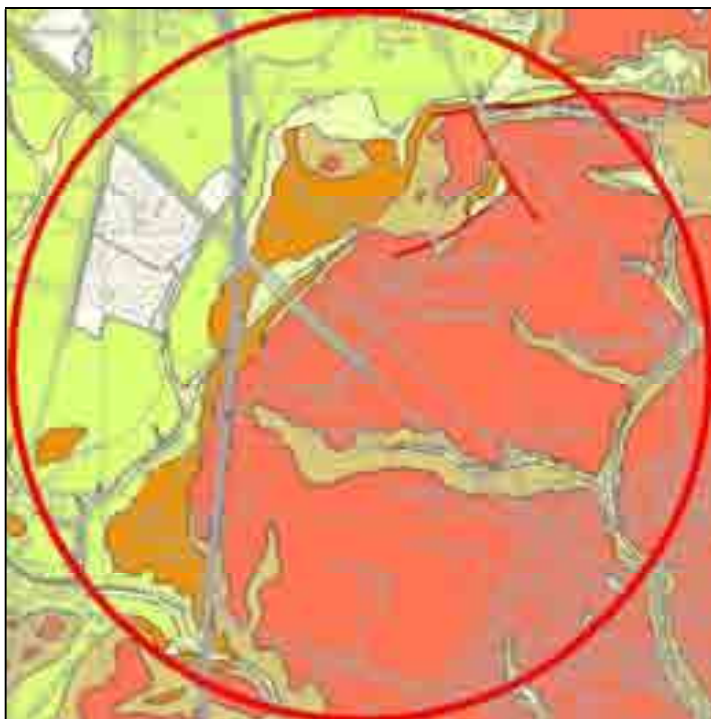
Key to Bedrock geology:

Map colour	Computer Code	Rock name	Rock type
	CB	CORNBRASH FORMATION	LIMESTONE
	FMB	FOREST MARBLE FORMATION	LIMESTONE
	FMB	FOREST MARBLE FORMATION	LIMESTONE AND MUDSTONE, INTERBEDDED
	WHL	WHITE LIMESTONE FORMATION	LIMESTONE
	BLAD	BLADON MEMBER	MUDSTONE AND LIMESTONE, INTERBEDDED
	RLD	RUTLAND FORMATION	MUDSTONE

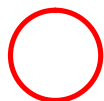
Geological Assessment - Detailed

Combined 'Surface Geology' Map

This map shows all four rock layers overlaid from the previous maps.



Scale: 1:50000 (1cm = 500m)



SITE LOCATION

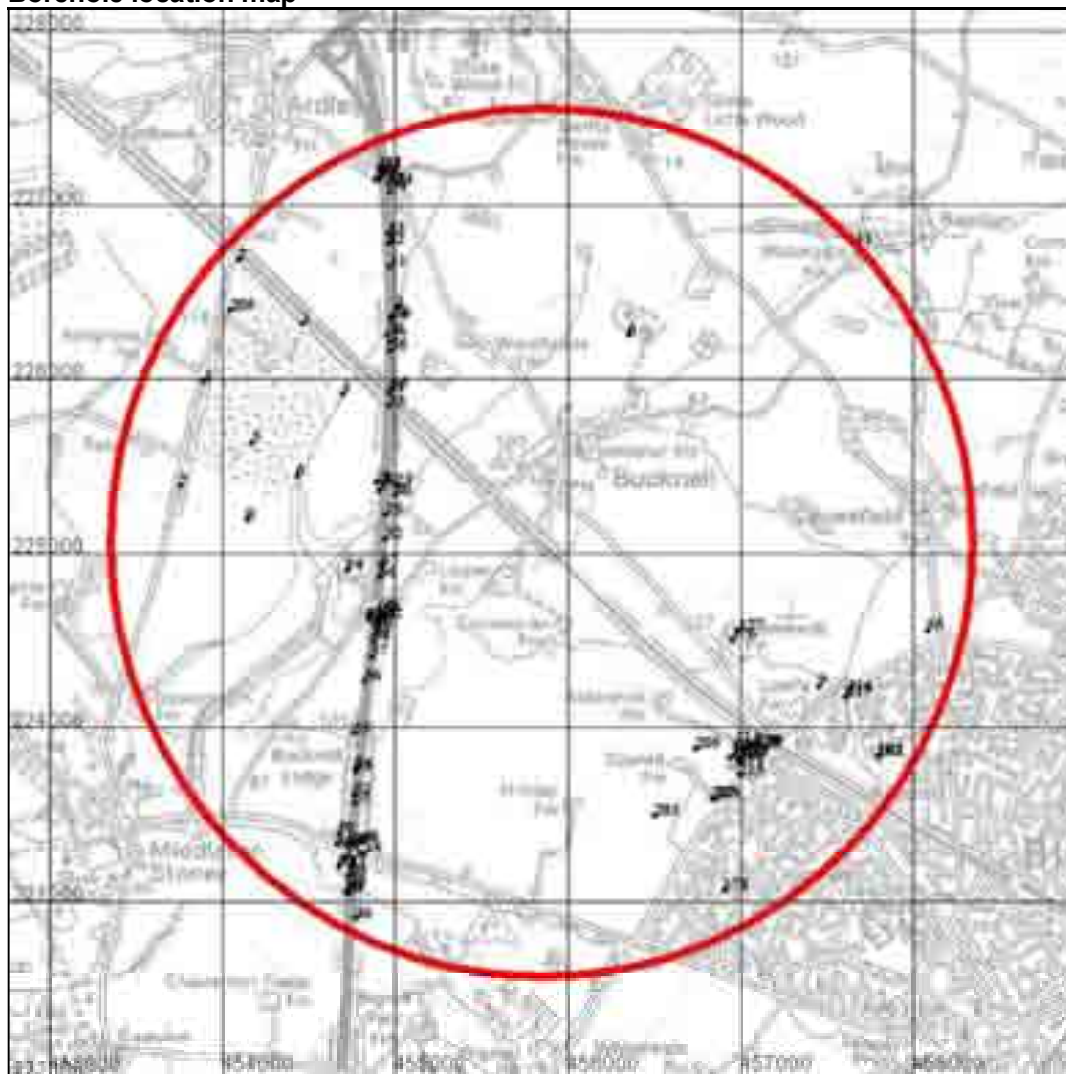
Please see the Keys to the Artificial, Landslip, Superficial and Bedrock geology maps.

Geological Assessment - Detailed

Section 6: List of geological data available around the site

This section lists the principal data sets held in the National Geoscience Records Centre that are relevant to the site. Descriptions of the data sets and how to obtain copies of records from them are given in Sections 7 and 8. Users with access to computing facilities can make their own index searches using the BGS Internet Geoscience Data Index, accessible through the BGS website at www.bgs.ac.uk

Borehole location map



Geological Assessment - Detailed

Borehole records

(A blank Length field indicates the borehole is confidential or no depth has been recorded digitally.)

Total number of records: 98

The 'Office' column shows the office at which the records are held and from where copies can be obtained (see contact details later in the report). KW=Keyworth, MH & MW=Murchison House, WL=Wallingford, EX=Exeter

Regno	Grid reference	Name	Length	Office	SIR
SP52NE1	SP 55010 26410	ARDLEY FIELDS NO.10		KW	
SP52NE6	SP 56350 26250	MANOR FARM BUCKNELL	76.50	WLKW	
SP52NE11	SP 57670 26770	LODGE FARM BAINTON	40.84	WLKW	
SP52NE23	SP 55000 25381	OXFORD-BANBURY SECTION 529	1.00	KW	
SP52NE24	SP 55004 27117	OXFORD-BANBURY SECTION 547	1.00	KW	
SP52NW1	SP 54460 26310	ARDLEY FIELDS NO.1		KW	
SP52NW2	SP 54090 26680	ARDLEY FIELDS NO.2		KW	
SP52NW3	SP 54690 25910	ARDLEY FIELDS NO.3		KW	
SP52NW4	SP 53890 25980	ARDLEY FIELDS NO.4		KW	
SP52NW5	SP 54170 25630	ARDLEY FIELDS NO.5		KW	
SP52NW6	SP 54430 25440	ARDLEY FIELDS NO.6		KW	
SP52NW7	SP 53750 25380	ARDLEY FIELDS NO.7		KW	
SP52NW8	SP 54140 25190	ARDLEY FIELDS NO.8		KW	
SP52NW12	SP 54930 27200	M40 ARDLEY 274P	4.00	KW	
SP52NW26	SP 54940 25220	BUCKNELL EMBKMENT E11 24000-24570 TP527	2.30	KW	313
SP52NW27	SP 54900 25350	BUCKNELL EMBKMENT E11 24000-24570 TP525	2.90	KW	313
SP52NW28	SP 54890 25400	BUCKNELL EMBKMENT E11 24000-24570 TP528	3.40	KW	313
SP52NW30	SP 54996 25329	BUCKNELL EMBKMENT E11 24000-24570 TP526	1.00	KW	313
SP52NW31	SP 54930 25390	BUCKNELL EMBKMENT E11 24000-24570 BHY2	20.00	KW	313
SP52NW32	SP 54940 25080	BUCKNELL EMBKMENT E11 24000-24570 TP524	1.00	KW	313
SP52NW33	SP 54960 25840	BUCKNELL EMBKMENT E11 24000-24570 TP531	4.00	KW	313
SP52NW34	SP 54960 25920	BUCKNELL EMBKMENT E11 24000-24570 BHY3	19.00	KW	313
SP52NW35	SP 54980 25940	BUCKNELL EMBKMENT E11 24000-24570 TP534	1.00	KW	313
SP52NW36	SP 54970 26160	BUCKNELL EMBKMENT E11 24000-24570 BH069	20.00	KW	313
SP52NW37	SP 54970 26210	BUCKNELL EMBKMENT E11 24000-24570 TP537	1.00	KW	313
SP52NW38	SP 54950 26250	BUCKNELL EMBKMENT E11 24000-24570 TP536	1.00	KW	313
SP52NW39	SP 54990 26340	BUCKNELL EMBKMENT E11 24000-24570 TP540	1.00	KW	313
SP52NW40	SP 54970 26350	BUCKNELL EMBKMENT E11 24000-24570 TP538	1.00	KW	313
SP52NW41	SP 54970 26640	BUCKNELL EMBKMENT E11 24000-24570 TP541	1.00	KW	313
SP52NW42	SP 54960 26770	ARDLEY CUTTING C10 25780-27040 TP542	1.00	KW	313
SP52NW43	SP 54960 26830	ARDLEY CUTTING C10 25780-27040 TP543	1.00	KW	313
SP52NW44	SP 54970 27070	ARDLEY CUTTING C10 25780-27040 TP545	2.00	KW	313
SP52NW45	SP 54880 27140	ARDLEY CUTTING C10 25780-27040 TP544	1.00	KW	313
SP52NW46	SP 54920 27180	ARDLEY CUTTING C10 25780-27040 TP546	1.00	KW	313
SP52NW48	SP 54960 27120	ARDLEY CUTTING C10 25780-27040 BH070	25.00	KW	313
SP52NW49	SP 54910 27140	ARDLEY CUTTING C10 25780-27040 BH070A	15.00	KW	313
SP52NW111	SP 54903 27210	M40 OXFORD-BIRMINGHAM M/W BH075	12.00	KW	3322
SP52NW205	SP 54040 26390	ARDLEY FIELDS	10.20	WLKW	
SP52SE5	SP 57090 23840	GOWELL FARM BICESTER	43.28	WLKW	
SP52SE9	SP 57450 24230	BICESTER	79.85	WLKW	
SP52SE29	SP 57150 23880	GOWELL FARM 2	43.00	WLKW	
SP52SE55	SP 58080 24550	CAVERSFIELD SEWER BICESTER BH370/5	6.00	KW	
SP52SE176	SP 56950 24500	LORDS FARM		WL	
SP52SE177	SP 56990 24550	LORDS FARM		WL	
SP52SE178	SP 56900 23060	KINGS END FARM BICESTER		WL	
SP52SE182	SP 57800 23830	SLADE FARM CAVERSFIELD	28.96	WL	
SP52SE183	SP 57790 23830	WRETCHWICK FARM BICESTER		WL	
SP52SE203	SP 56500 23490	GOWELL FARM BICESTER 1	2.25	KW	37679
SP52SE204	SP 56850 23590	GOWELL FARM BICESTER 2	1.75	KW	37679
SP52SE205	SP 56740 23870	GOWELL FARM BICESTER 3	1.37	KW	37679
SP52SE206	SP 56970 23850	GOWELL FARM BICESTER 4	1.75	KW	37679
SP52SE207	SP 56830 23590	GOWELL FARM BICESTER TP 2	1.65	KW	37679
SP52SE208	SP 57080 23890	GOWELL FARM BICESTER TP 4	1.61	KW	37679
SP52SE209	SP 56980 23860	GOWELL FARM BICESTER 2	4.22	KW	37680
SP52SE210	SP 56940 23820	GOWELL FARM BICESTER 3	4.06	KW	37680
SP52SE211	SP 56980 23810	GOWELL FARM BICESTER 4	3.49	KW	37680
SP52SE212	SP 56990 23790	GOWELL FARM BICESTER 5	4.10	KW	37680
SP52SE213	SP 57010 23820	GOWELL FARM BICESTER 6	3.66	KW	37680
SP52SE214	SP 56970 23900	GOWELL FARM BICESTER 7	3.56	KW	37680

Geological Assessment - Detailed

Regno	Grid reference	Name	Length	Office	SIR
SP52SE215	SP 56990 23720	GOWELL FARM BICESTER TP 1	0.88	KW	37680
SP52SE216	SP 57620 24200	LORDS LANE BICESTER OXFORDSHIRE 1	2.95	KW	37773
SP52SE217	SP 57610 24170	LORDS LANE BICESTER OXFORDSHIRE 2	2.80	KW	37773
SP52SW1	SP 54880 24600	M40 CARDINGTON 248P	6.00	KW	
SP52SW5	SP 54730 23310	M40 BUCKNELL LODGE 235P	8.00	KW	
SP52SW14	SP 54720 24900	TROWPOOL WELL BICESTER	7.62	WLKW	
SP52SW36	SP 54770 22900	MIDDLETON STONEY SOUTH CUTTING C8 TP495	1.00	KW	313
SP52SW37	SP 54730 23040	EAGLE BROOK EMBANKMENT E10 TP496	3.00	KW	313
SP52SW38	SP 54710 23050	EAGLE BROOK EMBANKMENT E10 BHY5	10.20	KW	313
SP52SW39	SP 54730 23080	EAGLE BROOK EMBANKMENT E10 TP498	2.00	KW	313
SP52SW40	SP 54730 23140	EAGLE BROOK EMBANKMENT E10 TP499	1.00	KW	313
SP52SW41	SP 54740 23190	EAGLE BROOK EMBANKMENT E10 TP500	2.00	KW	313
SP52SW42	SP 54670 23200	EAGLE BROOK EMBANKMENT E10 TP501	2.00	KW	313
SP52SW43	SP 54710 23240	MIDDLETON STONEY NORTH CUTTING C9 TP502	2.00	KW	313
SP52SW44	SP 54660 23330	MIDDLETON STONEY NORTH CUTTING C9 TP503	1.00	KW	313
SP52SW45	SP 54820 23270	MIDDLETON STONEY NORTH CUTTING C9 TP504	0.00	KW	313
SP52SW46	SP 54740 23330	MIDDLETON STONEY NORTH CUTTING C9 TP505	3.00	KW	313
SP52SW47	SP 54770 23320	MIDDLETON STONEY NORTH CUTTING C9 BH066	19.00	KW	313
SP52SW48	SP 54810 23340	MIDDLETON STONEY NORTH CUTTING C9 TP507	1.00	KW	313
SP52SW49	SP 54710 23330	MIDDLETON STONEY NORTH CUTTING C9 BH065	14.00	KW	313
SP52SW50	SP 54670 23390	MIDDLETON STONEY NORTH CUTTING C9 TP506	2.00	KW	313
SP52SW51	SP 54760 23560	MIDDLETON STONEY NORTH CUTTING C9 TP508	2.00	KW	313
SP52SW52	SP 54760 23610	MIDDLETON STONEY NORTH CUTTING C9 TP509	3.00	KW	313
SP52SW53	SP 54770 23740	MIDDLETON STONEY NORTH CUTTING C9 TP510	2.00	KW	313
SP52SW54	SP 54770 23760	MIDDLETON STONEY NORTH CUTTING C9 BHY1	2.00	KW	313
SP52SW55	SP 54760 23960	MIDDLETON STONEY NORTH CUTTING C9 TP511	3.00	KW	313
SP52SW56	SP 54820 24260	BUCKNELL EMBANKMENT E11 TP513	3.00	KW	313
SP52SW57	SP 54860 24400	BUCKNELL EMBANKMENT E11 TP514	3.00	KW	313
SP52SW58	SP 54870 24490	BUCKNELL EMBANKMENT E11 TP515	3.00	KW	313
SP52SW59	SP 54880 24530	BUCKNELL EMBANKMENT E11 TP516	3.00	KW	313
SP52SW60	SP 54890 24570	BUCKNELL EMBANKMENT E11 TP517	2.00	KW	313
SP52SW61	SP 54840 24630	BUCKNELL EMBANKMENT E11 TP518	3.00	KW	313
SP52SW62	SP 54940 24620	BUCKNELL EMBANKMENT E11 TP519	2.00	KW	313
SP52SW63	SP 54850 24610	BUCKNELL EMBANKMENT E11 BH067	10.00	KW	313
SP52SW64	SP 54910 24620	BUCKNELL EMBANKMENT E11 BH068	20.00	KW	313
SP52SW65	SP 54900 24670	BUCKNELL EMBANKMENT E11 TP520	1.00	KW	313
SP52SW66	SP 54910 24860	BUCKNELL EMBANKMENT E11 TP522	0.00	KW	313
SP52SW67	SP 54920 24930	BUCKNELL EMBANKMENT E11 TP523	0.00	KW	313
SP52SW68	SP 54928 24655	M40 OXFORD-BRMHAM OXFORD-BANBURY BH0685	10.00	KW	3322

Scale: 1:40000 (1cm = 400m)

Geological Assessment - Detailed

Water Well Records

Total number of records: 12

All these records are registered in the main Borehole Records collections (see Borehole Records Table and map above), and duplicate, or partial duplicate copies may be held at other sites (at Keyworth KW, Exeter EX or Murchison House MH). These represent records that are held in the National Well Record Archive of water wells and boreholes held at Wallingford (WF) or Murchison House (MW). The Well Registration number is used to index records in the National Well Record Archive please quote this if applying for copies of water wells (see contact details later in the report).

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

KEY:

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

Well Reg No.	BH Reg No.	Name	Grid Easting	Grid Northing	Depth (m)	Date	Aquifer	G	C	W	Ch
SP52/74	SP52NW205/BJ	ARDLEY FIELDS (LAND FILL SITE)	454040	226390	10.20		GREAT OOLITE GROUP	Yes	Yes	Yes	No
SP52/9	SP52NE6/BJ	MANOR FARM BUCKNELL	456350	226250	76.50	1924	UNKNOWN	Yes	Yes	Yes	No
SP52/10	SP52NE11/BJ	LODGE FARM BAINTON	457670	226770	41.00	1949	UNKNOWN	Yes	Yes	Yes	No
SP52/16	SP52SW14/BJ	BUCKNELL P.S.	454720	224900	7.60		GREAT OOLITE GROUP	Yes	Yes	Yes	Yes
SP52/19A	SP52SE5/BJ	BICESTER P.S.	457090	223840	34.20	1905	GREAT OOLITE GROUP	Yes	Yes	Yes	Yes
SP52/17A	SP52SE176/BJ	LORDS FARM, BICESTER	456950	224500	3.70		GREAT OOLITE GROUP	No	Yes	No	No
SP52/67	SP52SE183/BJ	WRETCHWICK FARM BICESTER	457790	223830			UNKNOWN	No	Yes	No	No
SP52/17B	SP52SE177/BJ	LORDS FARM, BICESTER	456990	224550	3.70		GREAT OOLITE GROUP	No	Yes	No	No
SP52/45	SP52SE178/BJ	KINGS END FARM BICESTER	456900	223060			UNKNOWN	No	Yes	No	No
SP52/66	SP52SE182/BJ	SLADE FARM CAVERSFIELD	457800	223830	29.00	1909	GREAT OOLITE GROUP	Yes	Yes	Yes	No
SP52/18	SP52SE9/BJ	LORDS FARM BICESTER	457460	224240	79.90		UNKNOWN	Yes	Yes	Yes	No
SP52/19B	SP52SE29/BJ	BICESTER P.S.	457150	223880	42.80	1936	UNKNOWN	Yes	Yes	Yes	Yes

Geological Assessment - Detailed

Boreholes with water level readings

Total number of records: 1

Reference	Easting	Northing	Location	Start_date	End_date	Readings
SP52/19	457130	223870	EX BICESTER P.S.			

There are no records for Locations with aquifer properties in the selected area

Site investigation reports

Total number of records: 26

Number	Office	Title
313	KW	OXFORD TO BIRMINGHAM NEW ROUTE WENDLEBURY TO SOULDERN SECTION
1440	KW	BICESTER RAF PROJECT NRS 84-0177 AND 87-0234 REPLACEMENT OF WATER MAINS
2438	KW	UPPER HEYFORD RAF CONSOLIDATED SUPPORT CENTRE
3310	KW	M40 OXFORD TO BIRMINGHAM MOTORWAY BANBURY BY PASS
3322	KW	M40 OXFORD TO BIRMINGHAM MOTORWAY OXFORD TO BANBURY SECTION
6285	KW	OXFORD TO BIRMINGHAM M40 MOTORWAY
6292	KW	BICESTER SOUTHERN BYPASS INTERPRETATIVE REPORT EMBANKMENT DESIGN
		SUPPLEMENT LONDON-BIRMINGHAM-BIRKEHEAD TRUNK ROAD A41
6293	KW	BICESTER SOUTHERN BYPASS INTERPRETATIVE REPORT EMBANKMENT DESIGN
		SUPPLEMENT LONDON-BIRMINGHAM-BIRKEHEAD TRUNK ROAD A41
6812	KW	A43: M40 TO B4031 IMPROVEMENT
7811	KW	RAF UPPER HEYFORD BASE THEATR
17835	KW	A43:M40 TP B4031 IMPROVEMENT
17836	KW	A43:M40 TO B4031 IMPROVEMENT
17838	KW	A43:M40 TO B4031 IMPROVEMENT SUPPLEMENTARY GROUND INVESTIGATION
19905	KW	BICESTER SOUTHERN BY-PASS
27597	KW	LANGFORD VILLAGE BICESTER
35484	KW	FEWCOTT ROAD FRITWELL
37469	KW	LAUNTON ROAD BICESTER OXFORD
37552	KW	TELFORD ROAD BICESTER
37595	KW	RAF UPPER HEYFORD OXFORDSHIRE
37679	KW	GOWELL FARM BICESTER OXFORDSHIRE
37680	KW	GOWELL FARM BICESTER OXFORDSHIRE
37773	KW	LORDS LANE BICESTER OXFORDSHIRE
37835	KW	MAIN STREET STOKE LYNE
37884	KW	EURO 5 DISTRIBUTION CENTRE ARDLEY OXFORDSHIRE
37988	KW	ROYAL ORDNANCE BICESTER OXFORDSHIRE
43801	KW	RAF BASE UPPER HEYFORD

National Grid geological maps (1:10,000 and 1:10,560 scale)

Total number of records: 4

Map	Type	Survey	Published	Revision
SP52NE	C	2000	2000	
SP52NW	C	2000	2000	2000
SP52SE	C	1999	2000	
SP52SW	C	1999	2000	

There are no records for County Series geological maps (1:10,560 scale) in the selected area

New Series medium scale geological maps (1:50,000 and 1:63360 scale)

Total number of records: 1

Sheet	Title	Type	Survey	Published	Revision
219	Buckingham	C	2000	2002	

Geological Assessment - Detailed

Old Series one inch geological maps (1:63360 scale)

Total number of records: 3

Sheet	Title	Type	Survey	Published	Revision
45NE	Buckingham	D		1873	
45NE	Buckingham	S		1871	
45SE	Bicester	S		1863	

There are no records for Hydrogeological maps (various scales) in the selected area

Geological Memoirs

Total number of records: 1

Title	Date
Buckingham	2002

There are no records for Technical reports in the selected area

There are no records for Waste sites in the selected area

Mining plans

Total number of records: 3

Record Type	Plan No.	Title
KP	12374	OXFORDSHIRE/BANBURY PROSPECT 1984-1985 VIBROSEIS PLANING MAP
KP	12375	OXFORDSHIRE/BANBURY PROSPECT NCB & OIL COMPANY DATA TRADED & UNTRADED 1984
KP	18191	WESTPHALIAN A & B OF THE COALFIELDS OF ENGLAND & WALES (INCLUDING CANONBIE)

Geological Assessment - Detailed

Section 7: Descriptions of BGS databases

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

Borehole Records and Water Wells

Records of boreholes, shafts and wells from all forms of drilling and site investigation work. Some 900,000 records dating back over 200 years and ranging from one to several thousand metres deep. Currently some 50,000 new records are being added to the collection each year.

A small percentage of the borehole records are held commercial-in-confidence for various reasons and cannot be released without the written permission of the originator. If any of the records you need are listed as confidential apply in the normal way. BGS Enquiry Service staff will release the data where this is possible or provide you with the information needed to contact the originator.

Where records are held in more than one office, the contents may differ. Enquiries principally requiring water related information should contact the Wallingford or Edinburgh office.

Water levels

These represent a subset of records within the National Well Record Archive of water wells and boreholes where there are either digital or analogue time series of water levels, or where available water level data span multiple years. Time series data are held for approximately 1500 boreholes distributed nationally. Other water level data is available where records have been inspected and digitised. Record's, are identified by the Well Registration number used for water wells (see above). Please contact our Wallingford office to discuss your specific requirements and to obtain costs.

Aquifer properties

These are locations where data on aquifer physical properties (transmissivity, specific yield, storage, porosity or hydraulic conductivity) are held. The data include raw data from field and laboratory investigations, and site-specific summaries of the data. Coverage is limited to aquifers in England and Wales. Records are identified by an aquifer property identifier, which should be quoted when ordering data. This data should be ordered separately, but will normally be provided and charged for as part of the relevant borehole records.

Site investigation reports

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

Geological maps

- **National Grid maps (1:10,000 and 1:10560 scale)** - Since the 1960s the standard large-scale map for recording geological information has been the Ordnance Survey (OS) quarter sheet covering a 5km square area. The maps are supplied in different formats depending on their age and the method of reproduction used. Only the latest most up-to-date version is listed.
- **County Series map sheets (1:10,560 scale)** - Maps produced on OS County Series sheets between approximately 1860 and 1960. The list indicates distinct examples of maps from separate surveys or revisions. It is advisable to discuss your requirements before ordering or travelling to view these maps.
- **New Series medium scale maps (1:50,000 and 1:63360 scale)** - Maps at either scale covering the OS New Series one-inch map sheet areas used by BGS. Please note that the sheet numbering is not the same as used for current OS 1:50,000 topographic maps.
- **Old Series medium scale one-inch maps (1:63,360 scale)** - Early geological mapping covering the OS Old Series one-inch map sheet areas. Applies to England and Wales only.

While there may be information relevant to your enquiry on older maps, you will generally want the latest

Geological Assessment - Detailed

edition, and National Grid maps will be preferred to County Series maps, and New Series to Old Series.

Memoirs

Explanatory sheet memoirs describing the geology of the areas covered by either the medium scale (1:50,000 and 1:63,360) map series.

Technical reports

The open file reports listed are mainly from the Onshore Geology Series. These include descriptions of the geology for the National Grid series geological sheets. Please note that the location details in the database are not yet complete so it is possible that not all the relevant reports available will be listed.

Waste sites

Listing of some 3500 waste sites for England and Wales identified by BGS as part of a survey carried out on behalf of the Department of the Environment in 1973. Later information is available from the Environment Agency.

Mine Plans

Plans of various types, principally relating to mining activity and including abandonment plans. For mine plans, the coverage is not comprehensive, but that for Scotland is the most complete. The search includes the collection of Plans of Abandoned Mines (Other than Coal & Oil Shale) for Scotland and the non-coal plans in the BGS Land Survey Plans collection, (mainly Scotland). Microfilm copies of the Plans of Abandoned Mines (Coal & Oil Shale) for Scotland and the Coal Authority's catalogues are available for consultation by prior appointment.

The mine plans listed for the rest of England and Wales (excluding SW England, which is not covered) include working copies, compilations and interpretations, which may be copyright or confidential and therefore not be available for purchase. The general nature of some of the plans means that they may not be applicable to a specific site. However, the presence of mining data could indicate that further specialist advice or interpretation is required. Large-scale plans produced for site investigations or other purposes are also included for completeness.

Section 8: How to access or inspect data

Borehole Records – contact BGS Enquiry Service (see end of section)

Copies of borehole records can be supplied (order form enclosed) at the flat rate of £13 (+VAT) per log with a minimum charge £26 (+VAT). Normal first class postage within the UK is included. Next day recorded delivery or express parcel dispatch is available on request and charged at cost. Copies of documents can be forwarded by facsimile transmission at an additional charge of £0.50 (+VAT) per A4 sheet. Records with additional detailed geological information derived from BGS examination of borehole material may be charged at the current 'value-added' rate. If you have a need for data with particular geological characteristics, then please contact the enquiries office to discuss your requirements (additional charges may apply).

Alternatively you can make an appointment to visit the relevant enquiry office and examine the records yourself. The Commercial User Ticket (see below) covers inspection of the borehole logs and includes access to a set of relevant documents for one unit area (typically a 5 km x 5 km area). A further charge of £19 (+ VAT) is due for each additional set examined. Data can be freely extracted from the records but any copies requested will be charged as above.

Water wells – contact BGS Enquiry Service

Copies of records can be supplied (order form enclosed) at the flat rate of £13 (+VAT) per log with a minimum charge £26 (+VAT). Normal first class postage within the UK is included. Next day recorded delivery or express parcel dispatch is available on request and charged at cost. Copies of documents can be forwarded by facsimile transmission at an additional charge of £0.50 (+VAT) per A4 sheet. If you have a need for data with particular hydrogeological characteristics, then please contact the relevant enquiries office (England and Wales =Wallingford, Scotland=Edinburgh) to discuss your

Geological Assessment - Detailed

requirements (additional charges may apply).

Alternatively you can make an appointment to visit the relevant enquiry office and examine the records yourself.

Records for England and Wales are held at Wallingford where the visitor charge is £9.50/hour (+VAT, with a minimum charge of £19 (+VAT).

Records for Scotland are held with the borehole records at our Edinburgh office the above Borehole Record charges cover them and apply.

BGS Memoirs, maps and open file reports – *contact BGS Sales (details below)*

BGS Memoirs, maps and open file reports relevant to your area can be examined in the appropriate BGS Library. Copies can be ordered from our main Sales Desk: Sales Desk, British Geological Survey, Keyworth, Nottingham NG12 5GG Tel: 0115 936 3241, Fax: 0115 936 3488, E-mail: sales@bgs.ac.uk.

Sales Desks are also located in Edinburgh; Tel: 0131 650 0358, Fax: 0131 667 2785, E-mail: scotsales@bgs.ac.uk, and London; Tel: 020 7589 4090, Fax: 020 7584 8270, E-mail: bgs london@bgs.ac.uk. BGS London also maintains a reference collection of all BGS publications.

Please check price and P&P before ordering.

Waste Sites – *contact BGS Enquiry Service*

Copies of register entries, containing a variety of levels of data recording, can be obtained from the BGS Enquiry Service (price on application). The registers can also be inspected by visit (see above)

Mine Plans – *contact BGS Enquiry Service*

Mine Plans are available for consultation by prior appointment. Copies can also be obtained - price on application.

Commercial User Ticket – *contact BGS Enquiry Service*

A combined day ticket for commercial visitors to the National Geological Data Centre and the Library is £55 (+VAT) and there is a £33 (+VAT) day ticket for visitors who only wish to use the Library. Frequent visitors can purchase an annual subscription at £275 (+VAT) for access to the NGDC and the Library or £155 (+VAT) for use of the Library only. Further details can be provided on request.

Geological Assessment - Detailed

BGS ENQUIRY SERVICE Contact Details:

Keyworth (KW) Office

For Borehole and other records (excluding water well records & hydrogeological data) in England & Wales (excluding Northern England, and Devon & Cornwall):

Records & Data Enquiries
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Tel: 0115 9363143
Fax: 01159 363276

Exeter (EX) Office

For Borehole and other records (excluding water well records & hydrogeological data) in Devon & Cornwall:

Records & Data Enquiries
BGS Exeter Business Centre
Forde House
Park Five Business Centre
Harrier Way
Sowton
Exeter
Devon
EX2 7HU
Tel: 01392 445271
Fax: 01392 445371

Wallingford (WL) Office

For water well records and hydrogeological data (water levels, water chemistry and aquifer properties) in England & Wales:

Records & Data Enquiries
British Geological Survey,
Maclean Building,
Wallingford,
Oxford
OX10 8BB.
United Kingdom
Tel: 01491 838800
Fax: 01491 692345
Email: hydroenq@bgs.ac.uk

Murchison House (MH or MW) Office:

For water well records and hydrogeological data for Scotland, and all other records in Scotland & Northern England:

Records & Data Enquiries
Murchison House
West Mains Road
Edinburgh
EH9 3LA
Tel: 0131 650 0282
Fax: 0131 650 0252
Email: boreholesnorth@bgs.ac.uk

Geological Assessment - Detailed

Section 9: More detailed geological reports available from BGS

This report forms part of the GeoReports range offered by the BGS Enquiry Service, including reports describing site geology, hydrogeology and geological hazards. For details on these please contact:

BGS Central Enquiries Desk
British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Tel: 0115 936 3143
Fax: 0115 936 3276
Email: enquiries@bgs.ac.uk

Or visit the GeoReports online shop at www.bgs.ac.uk/georeports

Section 10: Supporting Information

- The geological map extracts in Section 5 of this report are extracted from the BGS 1:50,000 scale Digital Geological Map of Great Britain (DiGMapGB-50). More information on DiGMapGB-50 can be found on the BGS website at http://www.bgs.ac.uk/products/digitalmaps/digmapgb_50.html
- Further descriptions of the rocks listed in the map keys in Section 4 can be obtained by searching against the Computer Code (in the map Key) on the *BGS Lexicon of named Rock Units*, which can be found on the BGS Website at www.bgs.ac.uk by following the 'GeoData' link
- Descriptions of how the various rock layers identified on the maps are classified can be found in the [BGS Rock Classification Scheme](#).

Section 11: Terms and Conditions

General Terms & Conditions

This report is supplied in accordance with the GeoReports Terms & Conditions available on the BGS website at www.bgs.ac.uk/georeports and also available from the BGS Central Enquiries Desk at the above address.

Important notes about this report

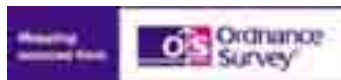
- The data, information and related records supplied in this report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.

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Report issued by:

BGS Enquiry Service

Appendix G

TurfTrax Report



A report to Bicester Town Council on a Tier 1 hydrological risk assessment of an area of land identified for development as a new cemetery on the NW outskirts of Bicester.

6th March 2008

Bicester Town Council

**A report to Bicester Town Council
on a Tier 1 hydrological risk assessment of an area of land
identified for development as a new cemetery
on the NW outskirts of Bicester.**

Table of Contents

1	Executive summary	1
2	Introduction	3
3	Site location and description	5
4	Site geology and hydrogeology	6
5	Boreholes	11
6	Water wells	12
7	Indicative flood plains	13
8	Groundwater source protection zones (SPZs)	14
9	Risk assessment	15
10	Discussion and conclusions	17
11	Recommendations	18
12	Contact details	19
13	Appendices	20
	BGS Report No. GR 118 892_1 (2008)	21
	Publications on drainage and soil management	49
	TurfTrax terms and conditions	53

1 Executive summary

Peter Mitchell Associates, on behalf of TurfTrax Ground Management Systems Limited, have completed a Tier 1 hydrological risk assessment of land being considered for development as a new cemetery for Bicester. The key issues that have been identified are summarised below.

The Council has identified broad areas of land on the outskirts of the town. This report is an initial assessment of the identified site to the NW to establish its suitability for use as a cemetery. In order to study independent data concerning the site, a Detailed Geological Assessment report was commissioned from the British Geological Survey (BGS). This Assessment is attached as an appendix to this report and extracts from it have been incorporated into the text below.

The vulnerability ranking assigned to this site is 'Moderate', and the numbers of anticipated annual burials gives a Risk Rating of 'High'.

The site characteristics that raised the vulnerability score were:

- Absence of superficial deposits
- High water table
- Aquifer – the area is underlain by a minor aquifer

Subject to appropriate site investigations and agreement with the EA, it may be possible to either adjust the risk rating of the site or to design measures, such as drainage or specifications for burials, to mitigate risk to groundwater.

It is recommended that this report and the accompanying BGS report be sent to the EA, and dialogue should be established with the EA, to ascertain its requirements for further assessment of this site's suitability for development as a cemetery.

Subject to the outcome of this dialogue, if detailed site investigations were thought desirable, it is proposed that a specific area for development is identified and that this should be subject to the following site investigative works:

1. A topographic survey to provide a basis for designing the cemetery and any necessary drainage infrastructure.
2. An electro-magnetic induction (EMI) survey to provide a basis for establishing the most appropriate locations for excavating test pits down to a maximum depth of 3.5 m and installing a minimum of three dip wells (up to 10 m deep) to monitor ground water depth. The EMI data would be shown on the site plan to two different depths (200 mm and 1.2 m).
3. Assessment of the soil profile pits, and to 'window sample' material removed during the boring of the dip wells, in terms of the type, condition and physical properties of the soil exposed. The results will be used to determine factors that may influence the appropriateness of the site for burial purposes and the vulnerability of the environment to contamination from the proposed development.
4. Monitor the groundwater levels in the dip wells over a winter period, i.e. during the period of highest rainfall.

5. Determine any appropriate options for mitigating risk to ground and surface water by improving the surface and subsurface drainage status.

Depending upon the results of this sampling and analysis, it may be possible to use the site as a cemetery subject to certain restrictions such as the installation of an appropriate drainage scheme.

2 Introduction

This report is an initial assessment of a broad area of land on the NW outskirts of Bicester with respect to its suitability for use as a cemetery.

Whilst definitive data regarding the pollution from cemeteries is scarce, any planning application for a new cemetery will be assessed by the local Environment Agency (EA) team against their Research and Development Technical Report P223 published in 1999 entitled 'Pollution Potential of Cemeteries – Draft Guidance'. The approach to risk assessment adopted by the report can be summarised by the following excerpt:

*"in order to be able to provide guidance which will enable Environment Agency staff to adopt a consistent approach when assessing the risks associated with the development of human or animal burial grounds. The guidance is directed principally at the potential threats to groundwater resources, but account is taken also of possible risks to surface waters, soils and the atmosphere"*¹

The report provides a framework for assessing the risks associated with cemeteries. The first stage is a 'Tier One' preliminary site assessment that provides an initial review of the potential pathways for contamination and receptors in proximity to the site.

The P233 report sets out the likely types and quantities of pollutants released by the burial of human bodies. The key to whether a site would be considered suitable is the rate at which such pollutants would be transported through the ground to enter water supplies:

"Pathways which pose the greatest threat to groundwaters from dissolved and particulate contaminants are those where hydrogeological factors allow rapid movement of pollutants from the source to the groundwater..."

*Consequently, coarse granular or heavily fractured sub-soils, fissured aquifer materials, or those of restricted mineralogy, are unlikely to offer significant opportunities for attenuation by many of the processes...By contrast, aquifers composed of sediments or rocks of mixed mineralogy and in which groundwater flows are irregular, provide more effective protection of groundwater from surface derived pollution."*²

The EA's Technical Report P223 identifies that the number of burials in a proposed cemetery will affect the overall assessment of the environmental risk. Thus a site considered low risk in terms of groundwater vulnerability, automatically becomes a high risk proposal if more than 100 burials are anticipated each year. This relationship between vulnerability class, burial rates and level of risk is shown schematically in Figure 5.2 of P223, featured later in this report.

¹ P223 page 1

² P223 page 30

The first step in considering any proposed cemetery site at Bicester should therefore be to assess it against a groundwater vulnerability ranking chart (Table 1):

Table 1. Groundwater Vulnerability Ranking Chart (Table 5.1 in P223)

Ranking	Very Low	Low	Moderate	High	Very High
Drift type	Clay	Silt	Silty sand	Sand / gravel	Absent
Drift thickness	>5m	>3 – 5m	3m	0 – 3m	Absent
Depth to water table	>25m	11 – 25m	10m	5 – 9m	< 5m
Flow mechanism	Intergranular				Fissured
Aquifer	Non-aquifer		Minor aquifer		Major aquifer
Abstraction and Source Protection Zone	Outside Zone 111	Within Zone 111	Close to boundary of Zones 11 & 111	Within Zone 11	Within Zone 1 or <250m from private source
Watercourses and springs	>100m	>70 <100m	>50 <70m	>30m <50m	<30m
Drains	>100m	>40 <100m	30 – 40m	>10 <30m	<10m

A scoring scheme (Table 2) is used to provide a comparison mechanism:

Table 2. Scoring scheme for Tier 1 risk assessments

Vulnerability	Element score	Total score (Range)
Very low	2 – 1	16 – 8
Low	4 – 3	32 – 24
Moderate	6 – 5	48 – 40
High	8 – 7	64 – 56
Very high	10 – 9	80 – 72

Using this system, a total score (range) for vulnerability class can be obtained for each site:

Table 3. Vulnerability class for Tier 1 risk assessments

Low vulnerability	8 – 32
Moderate vulnerability	32 – 56
High Vulnerability	56 – 80

The vulnerability class is then considered in the light of burial rates and an overall level of risk projected. In order to study independent data concerning the site, a Detailed Geological Assessment report was commissioned from the British Geological Survey (BGS). This Assessment is attached as an appendix to this report and diagrams and text extracts from it have been incorporated into the text below.

3 Site location and description

There are two potential sites located on the NW outskirts of Bicester as shown below:



Figure 1. Site location plan.



Figure 2. Site aerial view.

The land is predominantly under agricultural use with a relatively small area occupied by buildings. It is traversed by a stream and a railway line. The slope and principal drainage direction is to the south-east. The drainage is dendritic in pattern and tributaries run in other directions.

Site elevation ranges from 75 metres above Ordnance Datum (OD) in the stream valley in the south to 120 m in the north-west of the search area.

4 Site geology and hydrogeology

The geology of the site is summarised in Figures 3 and 4.

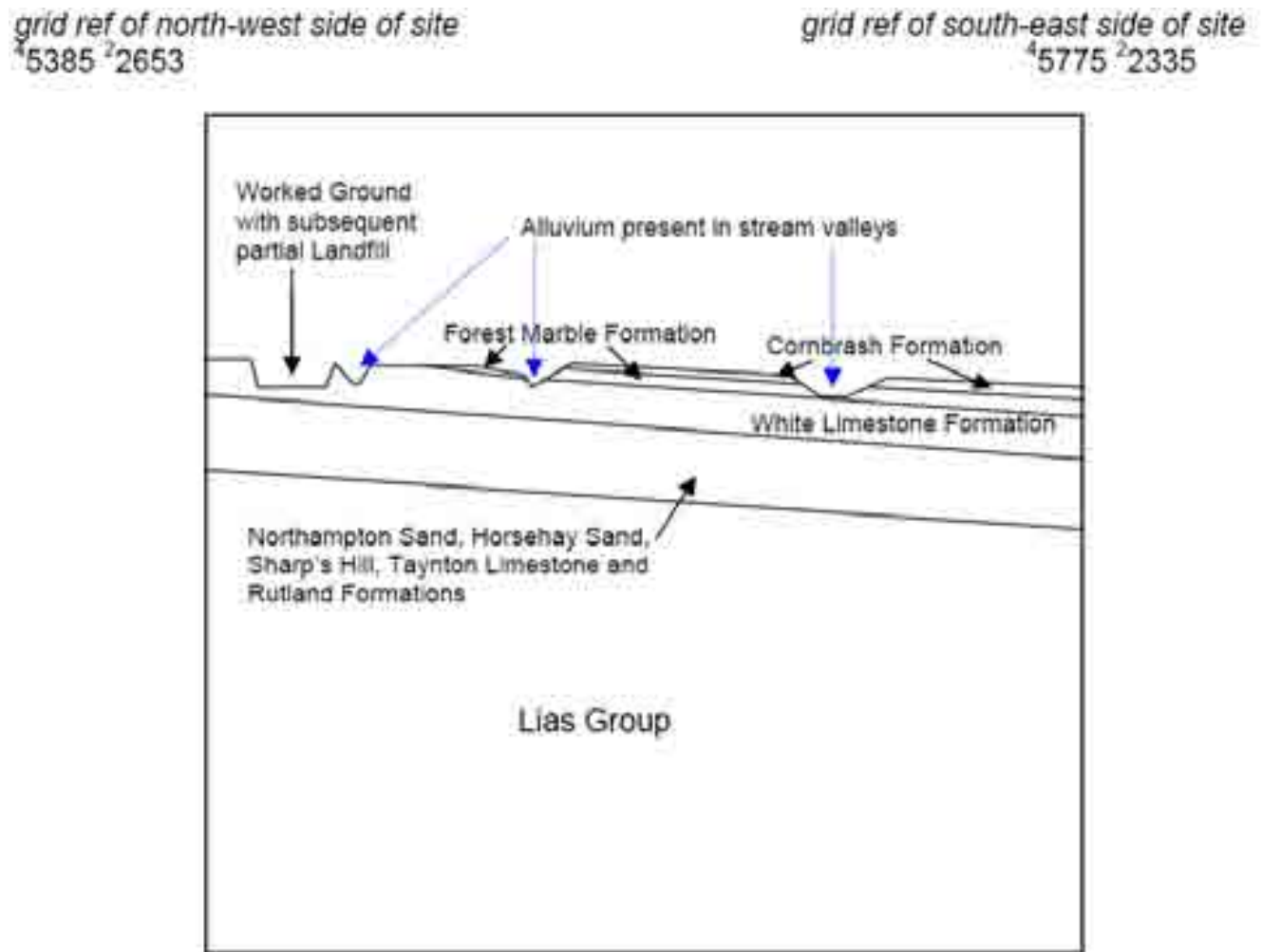




Figure 3. Schematic diagram of NW site geology.

The site identified for potential cemetery development only occupies approximately the middle third of the surface, i.e. situated on the Forest Marble Formation.

4.1 Superficial deposits (Drift)



Figure 4a. Superficial geology in the NW area.

Map colour	Computer Code	Rock name	Rock type
	ALV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
	HEAD	HEAD	CLAY, SILT, SAND AND GRAVEL

The BGS report covers a wider area than that for the proposed cemetery development and includes land to the west of the M40 motorway and the built up area to the east of the site, hence its reference to two streams.

The streams are flanked by narrow tracts of **alluvium** of late Quaternary age, comprising sandy silty calcareous clay overlying gravelly sandy silty clay, with limestone clasts. The alluvial deposits are up to 150 m wide, are generally between 1 to 2 m in thickness (rarely exceeding 3 m in thickness). They may locally include highly compressible, organic-rich (peaty) layers.

Locally, hollows in these valley sides are floored by thin deposits of **head**, formed by soil creep or hill wash. Their composition reflects that of the local materials from which they were derived, either the bedrock or other types of superficial deposit, or both in combination. Head deposits typically are poorly stratified and poorly sorted, and can be variable in composition. Locally, they are typically composed of variably stony sandy silty clay. Head deposits may be more extensive than shown on the geological map, but if so, probably only as a layer between 0.3 m and 1 m in thickness, and possibly discontinuous.

It can be appreciated that the location of any cemetery development would not include either stream. There are thus effectively no superficial deposits within the search area.

4.2 Rockhead depth







Rockhead is close to the surface.

4.3 Bedrock geology:



Figure 4. Bedrock geology in the NW area.

Key to bedrock geology maps:

Map colour	Computer Code	Rock name	Rock type
	CB	CORNBRASH FORMATION	LIMESTONE
	FMB	FOREST MARBLE FORMATION	LIMESTONE
	FMD	FOREST MARBLE FORMATION	LIMESTONE AND MUDSTONE, INTERBEDDED
	WL	WHITE LIMESTONE FORMATION	LIMESTONE
	SLAD	SLADON MEMBER	MUDSTONE AND LIMESTONE, INTERBEDDED
	RLD	RUTLAND FORMATION	MUDSTONE

The search area is underlain at rockhead by various formations and members of the Great Oolite Group, of Mid-Jurassic age, which are dominated by limestones with subordinate mudstone beds.

The **White Limestone Formation**, forms a broad plateau to the north-west of the proposed cemetery. This comprises 10 to 18 m thickness of white to yellow, bedded, peloidal and bioclastic limestone (see **Additional Geological Considerations** below).

The White Limestone Formation is overlain with an erosive contact by the **Forest Marble Formation**. The Forest Marble Formation forms a narrow outcrop between the White Limestone and Cornbrash Formations, and also crops out on the flanks of the stream valleys. The Formation is composed of 3 to 5 m of grey calcareous mudstone with lenticular beds of bioclastic, ooidal limestone, particularly common at the base, where they are widely distinguished on the map extracts.

The **Cornbrash Formation** is the youngest bedrock unit within the site area, cropping out over most of the area proposed as cemetery and forming a broad south-east sloping plateau. It

comprises about 3 m thick grey to brown bioclastic shelly rubbly-bedded limestone with thin subordinate beds of grey mudstone.

Mudstone beds in the Forest Marble Formation may be unstable on steep slopes or in excavations.

The limestone-dominated units of the White Limestone, Forest Marble and Cornbrash Formations may be affected by dissolution leading to the widening of joints and the formation of linear vertical voids, which are likely to fill with rubble and soil.

Additional geological considerations:

The White Limestone Formation is underlain by four further formations of the Great Oolite Group: in ascending order the Horsehay Sand, the mudstone-dominated Sharp's Hill, the Taynton Limestone and the mudstone-dominated Rutland formations, totalling about 20 m in thickness. These are underlain by the 2 to 6 m of the ferruginous sandstones of the Northampton Sand Formation. Beneath these are over 100 m of the mudstone-dominated Lias Group.

The bedrock strata dip very gently (less than 0.5°) to the south-east. Faults have been mapped to the north-east of Bucknell, beyond the proposed cemetery development, with displacements of up to about 5 m. It is important to understand the nature of geological faults, and the uncertainties which attend their mapped position at the surface. Faults are planes of movement, along which, adjacent blocks of rock strata have moved relative to each other. They commonly consist of zones, perhaps up to several tens of metres wide, containing several to many fractures. The portrayal of such faults as a single line on the geological map is therefore a generalisation. Geological faults in this area are of ancient origin, are today mainly inactive, and are thought to present no threat to property.

4.4 Hydrogeology:

With the exception of the Forest Marble Formation cropping out in the floors and sides of the valleys, the whole of the site area is underlain by Cornbrash Formation bedrock. This is a local aquifer and several water strikes have been recorded in shallow, site-investigation boreholes drilled within the site area. The rest water levels are generally slightly higher than the strike levels; both are generally between about 0.5 and 4.0 m below the ground surface.

The Forest Marble Formation, where present beneath the area, may hold small quantities of water in any limestone bands present, but the upper part generally acts as an aquiclude between the Cornbrash Formation and the underlying White Limestone Formation. There are no boreholes drilled through the Forest Marble Formation in the site area that record water strikes within it.

The White Limestone Formation constitutes a major aquifer in the area, with some sources of public supply. There are several boreholes in the wider area, some within the site area, that penetrate this formation:

- A 34 m deep borehole at Gowell Farm (SP52/19 at SP 5709 2384), drilled pre-1909 to supply Bicester with water, penetrated the complete 25 m thickness of the White Limestone Formation, underlying about 7.2 m of Forest Marble Formation and terminating in the underlying Rutland Formation. Water was struck at 28 m and 32 m below the ground level in the White Limestone Formation. The rest water level rose to the surface after the first strike, and was artesian, with a rest water level about 1 m above ground level (about 88 m above OD) after the second strike. The yield was over 7 l/s.
- An 80 m deep borehole at Lords Farm (SP52/18 at SP 5746 2424), drilled in 1941, was drilled through a similar sequence and terminated in the Lias. It struck water in the Cornbrash Formation, which was cased out, and at two levels below the White Limestone Formation. The rest water level was at 11 m below ground level (about 68 m above OD) and it yielded 1.7 l/s.
- Other records of water levels at Lords Farm (SP52/17A, B and C at about SP 569 245) show that the water level was at within 3.6 m below ground level (about 76 m above OD).

There are insufficient data to determine a groundwater flow direction, but locally it will probably be towards the nearest stream and regionally, down-dip towards the south-east.

The alluvium, and Cornbrash and Forest Marble Formations beneath the site are classified as Minor Aquifers with high soil leaching potential on the Environment Agency's Groundwater Vulnerability Map, Sheet 30, Northern Cotswolds.

5 Boreholes

The plan below shows the location of boreholes relative to the proposed cemetery development:

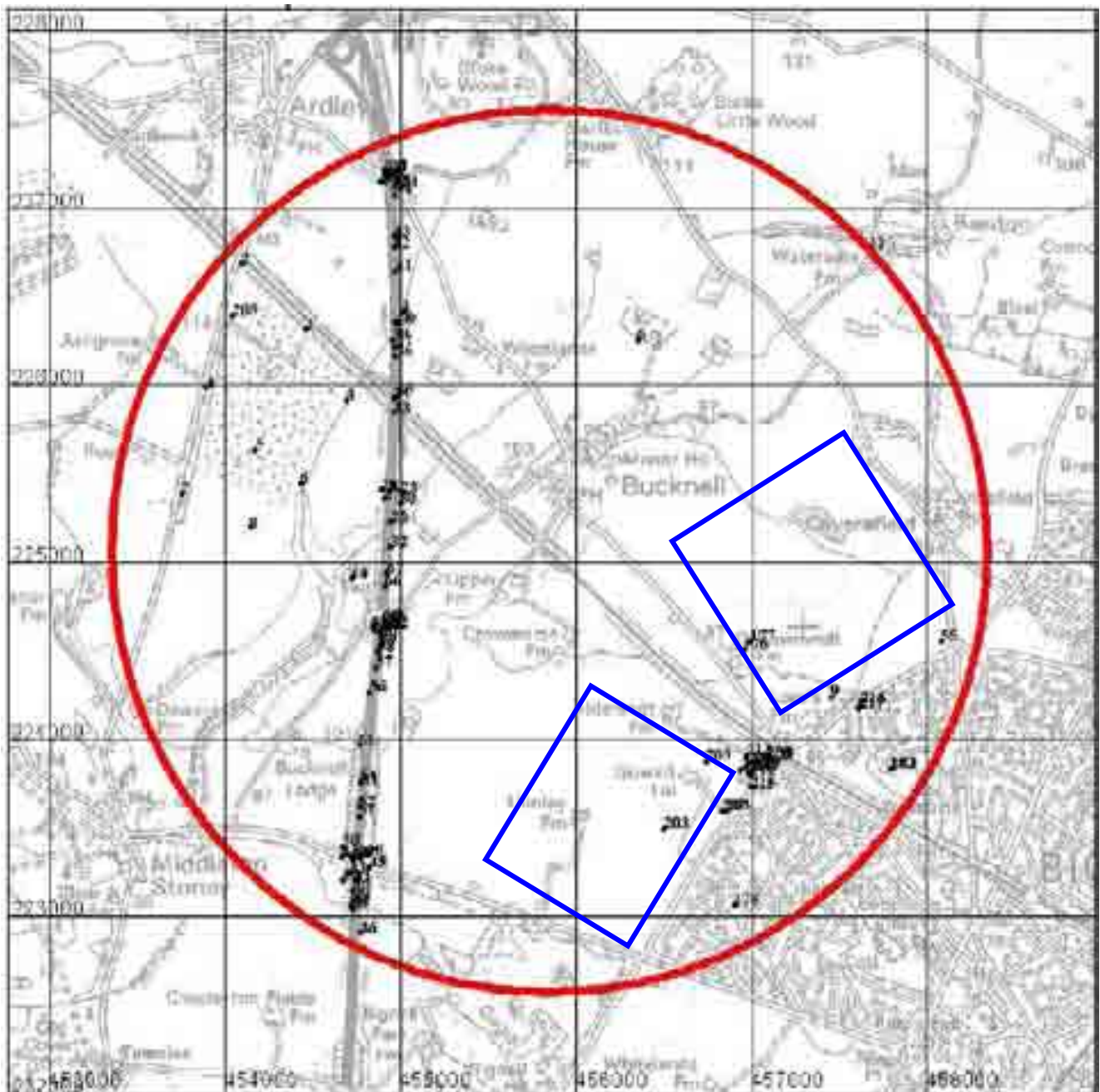


Figure 5. Site location, boreholes and watercourses.

The BGS report includes an extensive table referring to these boreholes.

6 Water wells

The plan below shows the location of water wells relative to the proposed cemetery development:

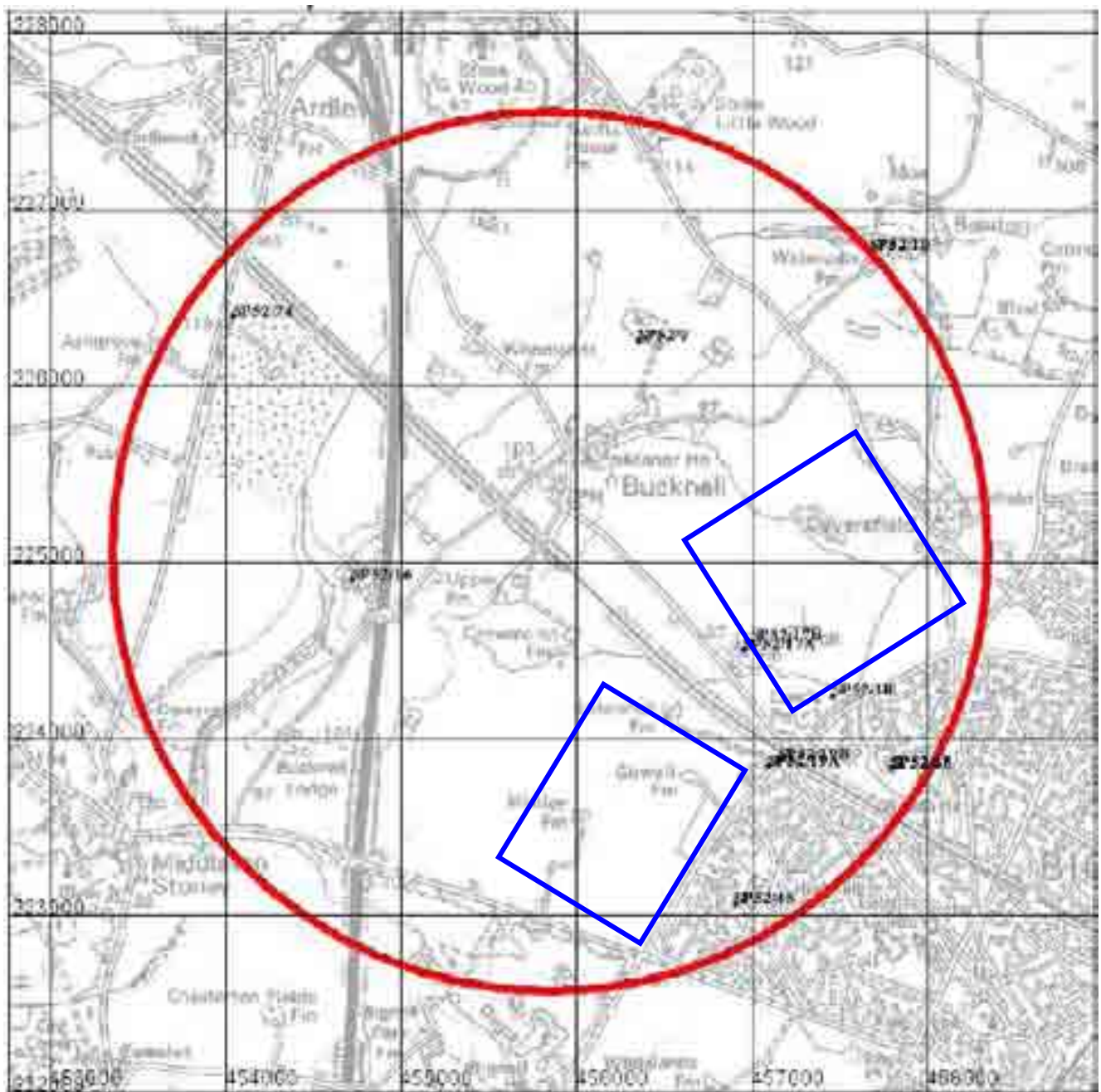


Figure 6. Site location, water wells.

The BGS report includes an extensive table referring to these water wells.

7 Indicative flood plains

According to the EA's website, the NW of Bicester lies outside any indicative flood plain (Figure 6).



Figure 6. Environment Agency website flood risk map.

8 Groundwater source protection zones (SPZs)

The Environment Agency (EA) has defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk.

Zone 1 (Inner protection zone)

Any pollution that can travel to the borehole within 50 days from any point within the zone is classified as being inside zone 1. This applies at and below the water table. This zone also has a minimum 50 metre protection radius around the borehole. These criteria are designed to protect against the transmission of toxic chemicals and water-borne disease.

Zone 2 (Outer protection zone)

The outer zone covers pollution that takes up to 400 days to travel to the borehole, or 25% of the total catchment area – whichever area is the greatest. This travel time is the minimum amount of time that we think pollutants need to be diluted, reduced in strength or delayed by the time they reach the borehole.

Zone 3 (Total catchment)

The total catchment is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.

According to the EA's website, the Bicester area lies outside Zone 3 (Figures 7a & 7b):

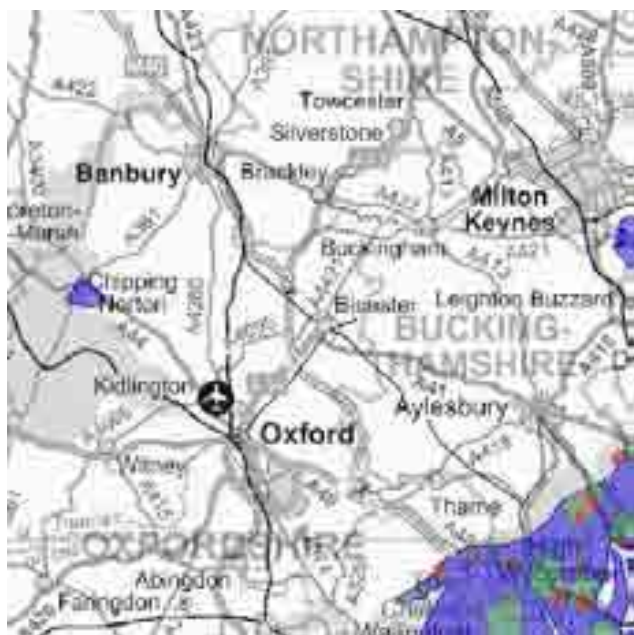


Figure 7a. Ground Water Source Protection Zones
Key: Purple = Total catchment, Green = Outer Zone, Red = Inner Zone. Taken from Environment Agency website SPZ map.



Figure 7b. Ground Water Source Protection Zones
Taken from Environment Agency website SPZ map.

9 Risk assessment

9.1 Site Vulnerability Assessment

Pertinent criteria, associated comment and assigned score are presented in Tables 4 and 5.

Table 4. Site vulnerability criteria and comment

Criteria	Comment
Drift Type	Absent
Drift Thickness	N/A
Depth to Water Table	0.5m to 4m
Flow Mechanism	Fracture Flow
Aquifer	Minor aquifer
Abstraction and SPZ	Outside SPZ 3
Watercourses and springs	>100 (subject to precise location within the identified area)
Drains	None known to be present

Table 5. Site vulnerability assessment score sheet

Factor	Site Characteristics	Ranking	Score		
Drift type	Absent	Very High	10	.	9
Drift thickness	N/A	Very High	10	.	9
Depth to water table	0.5m to 4m	Very High	10	.	9
Flow mechanism	Fracture Flow	Very High	10	.	9
Aquifer	Minor aquifer	Moderate	6	.	5
Abstraction and Source Protection Zone	Outside SPZ 3	Very Low	2	.	1
Watercourses and springs	>100m	Very Low	2	.	1
Land Drains	None known to be present	Very Low	2	.	1
Total (range)			52	.	44

Vulnerability	Range	Actual
Low vulnerability	8 – 32	
Moderate vulnerability	32 – 56	44 · 52
High Vulnerability	56 – 80	

9.2 Vulnerability Class

Based upon the total ranking score indicated, the site may be classified with a vulnerability class of:

Low: ☐ Moderate: ☒ High: ☐

9.3 Scale of Development

The anticipated number of annual full earth burials, as opposed to cremated remains, is 50.

9.4 Level of Risk

The EA level of risk to the number of anticipated burial rates and groundwater vulnerability using a nomograph reproduced in Figure 8.

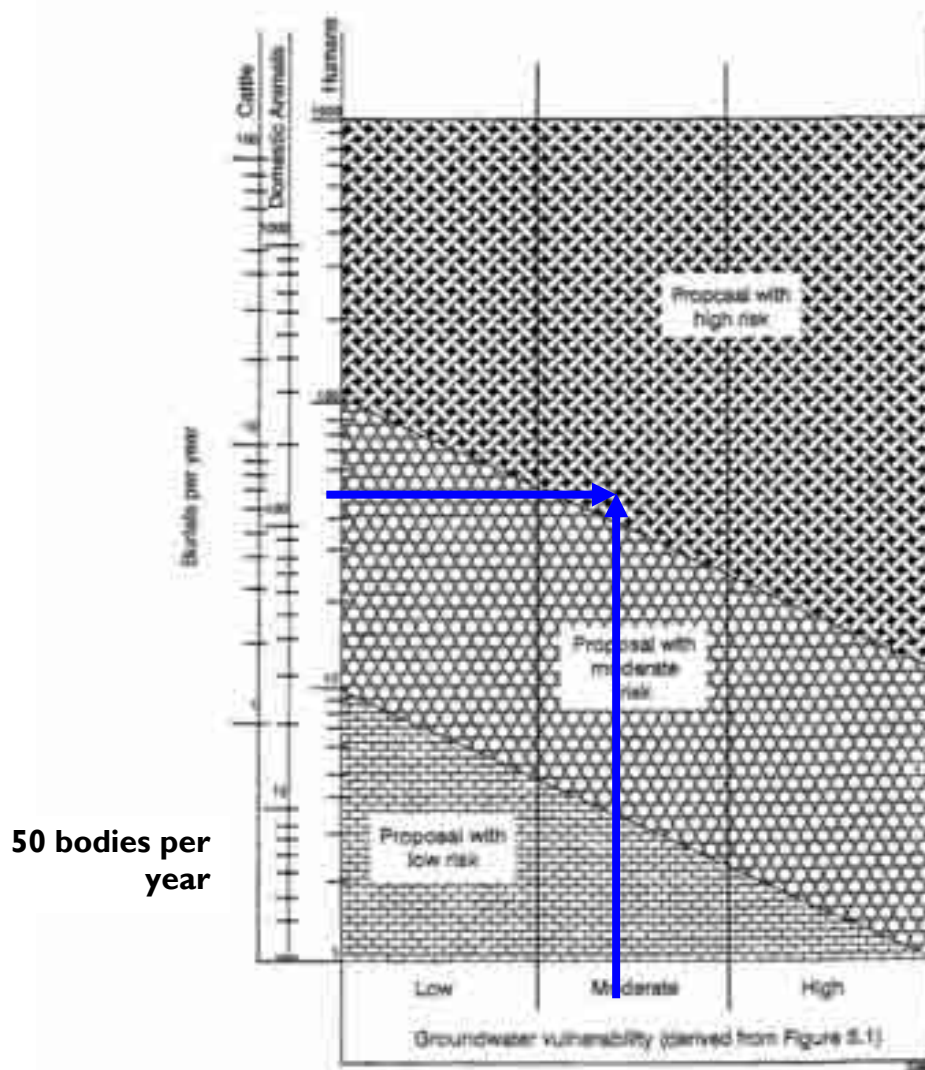


Figure 5.2 Schematic relationship between burial rates, vulnerability class and level of risk

R&D Technical Report P223

37

Figure 8. Schematic relationship between burial rates, vulnerability class and level of risk (from EA R & D Technical Report P223 (1999).

With reference to Figure 8, the level of risk at this site is considered to be 'High'.

10 Discussion and conclusions

The vulnerability ranking assigned to this site is 'Moderate', however the numbers of anticipated annual burials gives rise to a Risk Rating of 'High'.

The site characteristics that raised the vulnerability score were:

- Absence of superficial deposits
- High water table
- Aquifer – the site is underlain by a minor aquifer

Applied Geotechnical Engineering excavated a number of trial pits around the Bicester ring road during June 2006. Two trial pits were located near Lords Farm and revealed rubbly, very thinly bedded limestone with a clayey, sandy matrix down to 1.2 m with a stronger limestone beneath to 1.9 m (grave depth). Groundwater was not encountered in either trial pit.

There may be significant seasonal fluctuation in groundwater levels as the BGS report indicates that the watertable may be encountered between 0.5 m and 4 m. It would therefore be appropriate to install dipwells within the chosen area and monitor groundwater levels through a winter period to monitor levels and possibly reduce the risk rating of the site.

Subject to appropriate site investigations and agreement with the EA, it may be possible to either adjust the risk rating of the site or to design measures, such as drainage or specifications for burials, to mitigate any risk to groundwaters.

11 Recommendations

It is recommended that this report and the accompanying BGS report be circulated to the EA and dialogue established to ascertain requirements for further assessment of this site's suitability for development as a cemetery.

Subject to the outcome of this dialogue, if detailed site investigations were thought desirable, it is proposed that the site investigation should consist of the following:

1. A topographic survey to provide a basis for designing the cemetery and any necessary drainage infrastructure.
2. An electro-magnetic induction (EMI) survey to provide a basis for establishing the most appropriate locations for excavating soil profile pits down to a maximum depth of 3.5 m and installing a minimum of three dip wells (up to 10 m deep) to monitor ground water depth. The EMI data would be shown on the site plan to two different depths (200 mm and 1.2 m).
3. Assessment of the soil profile pits, and to 'window sample' material removed during the boring of the dip wells, in terms of the type, condition and physical properties of the soil exposed. The results will be used to determine factors that may influence the appropriateness of the site for burial purposes and the vulnerability of the environment to contamination from the proposed development.
4. Monitor the groundwater levels in the dip wells over a winter period, i.e. during the period of highest rainfall.
5. Determine any appropriate options for mitigating risk to ground and surface water by improving the surface and subsurface drainage status.

Depending upon the results of this sampling and analysis, it may be possible to use the site as a cemetery subject to certain restrictions such as the installation of an appropriate drainage scheme.

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13 Appendices

Publications by key staff

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Either party may (without limiting any other remedy) at any time terminate the Contract by giving written notice to the other if the other commits any breach of these Conditions and (if capable of remedy) fails to remedy the breach within 30 days after being required by written notice to do so.
Insolvency of Client
This clause applies if:
the Client makes any voluntary arrangement with its creditors or (being an individual or firm) becomes bankrupt or (being a company) becomes subject to an administration order or goes into liquidation (otherwise than for the purposes of amalgamation or reconstruction); or
an encumbrance takes possession, or a receiver is appointed, of any of the property or assets of the Client; or
the Client ceases, or threatens to cease, to carry on business; or
TurfTrax reasonably apprehends that any of the events mentioned above is about to occur in relation to the Client and notifies the Client accordingly.
If this clause applies then, without prejudice to any other right or remedy available to TurfTrax, TurfTrax shall be entitled to cancel the Contract or suspend any further provision of services under the Contract without any liability to the Client, and if the Services have been provided but not paid for the price shall become immediately due and payable notwithstanding any previous agreement or arrangement to the contrary.
General
These Conditions (together with the terms, if any, set out in the Specification Sheet) constitute the entire agreement between the parties, supersede any previous agreement or understanding and may not be varied except in writing between the parties. All other terms and conditions, express or implied by statute or otherwise, are excluded to the fullest extent permitted by law.
Any notice required or permitted to be given by either party to the other under these Conditions shall be in writing addressed to the other party at its registered office or principal place of business or such other address as may at the relevant time have been notified pursuant to this provision to the party giving the notice.
No failure or delay by either party in exercising any of its rights under the Contract shall be deemed to be a waiver of that right, and no waiver by either party of any breach of the Contract by the other shall be considered as a waiver of any subsequent breach of the same or any other provision.
If any provision of these Conditions is held by any competent authority to be invalid or unenforceable in whole or in part, the validity of the other provisions of these Conditions and the remainder of the provision in question shall not be affected.
Any dispute arising under or in connection with these Conditions or the provision of the Specified Service shall be referred to arbitration by a single arbitrator appointed by agreement or (in default) nominated on the application of either party by the President for the time being of Institute of Arbitrators.
English law shall apply to the Contract, and the parties agree to submit to the non-exclusive jurisdiction of the English courts.

Author: Peter Mitchell
Dr Richard Earl
Released by: Dr James Welsh
Signed: 
Date: 6th March 2008

Appendix H

BGS BR211 Radon Report



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

GeoReports

**Dylan Thomas
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BR211 Radon Report:

Advisory report on the requirement for radon protective measures in new buildings and extensions.

Report Id: *GR_200946/1*

Client reference:

This report describes a site located at National Grid Reference 456358, 224534. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.



Scale: 1:50 000 (1cm = 500 m)

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BR211 Radon Report

This is an advisory report on the requirement for radon protective measures in new buildings and extensions.

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2007 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

The BGS is not able to provide advice on the technical specifications of 'basic' and 'full' radon protective measures. This information is detailed in **BRE Report BR211 :Radon: Protective measures for new buildings** which may be purchased from **brebookshop.com**. BR211 offers guidance on the technical solutions that are required to satisfy Building Regulations requirements. Summary guidance is available on the web at: <http://www.bre.co.uk/radon/protect.html>.

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Contact 020 7944 5758 or Email: partsac.br@communities.gsi.gov.uk for advice on the interpretation of guidance contained in BRE Report BR211 (2007).

What is radon ?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace**. BRE publications may be obtained from The BRE Bookshop, I H S Technical Indexes Ltd., Willoughby Road, Bracknell, Berkshire RG12 8DW. Tel: 01344 404407, Fax: 01344 714440, website: www.brebookshop.com

Radon in existing buildings

Useful information is given in the following free publications which can be obtained by writing to:

Radon Studies, Radiation Protection Division, Health Protection Agency, Chilton,
Didcot, Oxfordshire OX11 0RQ

Radon - A Householder's Guide

Radon - You Can Test for it

Radon - A Guide for Homebuyers and Sellers

Radon - A Guide to Reducing Levels in Your Home

Information in the booklets is also available on the DEFRA website at:

<http://www.defra.gov.uk/environment/radioactivity/background/radon.htm>

Householders are recommended to follow advice in **Radon - a householder's guide**. The guide outlines simple solutions for dealing with the radon problem depending on whether or not the home has been tested for radon. In radon affected homes, the problem of radon can usually be tackled with simple, effective and relatively inexpensive measures. These measures are comparable in cost to work such as damp-proofing and timber treatment. You can get practical advice about construction work to reduce radon levels from the Building Control Officer at your local council.

Is this property in a radon affected area – **YES**

The answer to the standard enquiry on house purchase known as **CON29 Standard Enquiry of Local Authority 3.13 Radon Gas: Location of the Property in a radon Affected Area** is **YES** this property is in a Radon Affected Area as defined by the Health Protection Agency (HPA).

The estimated probability of the property being above the Action Level for radon is: **3-5%.**

In addition to the search area, the radon data includes a 75 metre zone around the site to allow for uncertainties in location data and geological line work.

The result informs you of the estimated probability that this particular property is above the Action Level for radon. This does not necessarily mean there is a radon problem in the property. The only way to determine whether it is above or below the Action Level is to carry out a radon measurement within the existing property.

Radon Affected Areas are designated by the HPA. They advise that radon gas should be measured in all properties within Radon Affected Areas.

If you are buying a currently occupied property in a Radon Affected Area you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the Radon Action Level and if so whether remedial measures were installed, radon levels were retested, and the that the results of re-testing confirmed the effectiveness of the measures.

For further information, advice about radon, its health risks and details of how to order the radon test, please contact the HPA Radon Helpline on 01235 822622 or go online at www.ukradon.org or write to Radon Studies at the Health Protection Agency, address above. You can obtain an information pack from the HPA free Radon answer phone on 0800 614529.

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