

<p><b>Site Walkover Photograph 1</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> West.</p>	
<p><b>Description:</b> Stockpiles and semi-mature trees in the west of the site.</p>	

<p><b>Site Walkover Photograph 2</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> East.</p>	
<p><b>Description:</b> Grass vegetation and the road that runs south of the airfield.</p>	

<p><b>Site Walkover Photograph 3</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> West.</p>	
<p><b>Description:</b> Stockpiles in the west of the site.</p>	

<p><b>Site Walkover Photograph 4</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South-east.</p>	
<p><b>Description:</b> Grass vegetation and mature trees and bushes along the southern boundary.</p>	

<p><b>Site Walkover Photograph 5</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> North-east.</p>	
<p><b>Description:</b> Grass vegetation and the road that runs south of the airfield.</p>	

<p><b>Site Walkover Photograph 6</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South-west.</p>	
<p><b>Description:</b> Car parking area in the west of the site with a visual bund on the southern site boundary.</p>	

<b>Site Walkover Photograph 7</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> West.	
<b>Description:</b> Car parking area in the west of the site.	

<b>Site Walkover Photograph 8</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> North-east.	
<b>Description:</b> Car parking area and stockpile in the west of the site with the road and airfield in the background.	

<p><b>Site Walkover Photograph 9</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South-west.</p>	
<p><b>Description:</b> Car parking area and stockpile in the west of the site.</p>	

<p><b>Site Walkover Photograph 10</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South-west.</p>	
<p><b>Description:</b> Open area of hardstanding material in the centre of the site.</p>	

<b>Site Walkover Photograph 11</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> West.	
<b>Description:</b> Grass vegetation and the access road north of the site.	

<b>Site Walkover Photograph 12</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> East.	
<b>Description:</b> Open area of hardstanding material in the centre of the site and the access road along the northern site boundary.	

<b>Site Walkover Photograph 13</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> North-east.	
<b>Description:</b> Entrance to the open area of hardstanding material in the centre of the site from the access road.	

<b>Site Walkover Photograph 14</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> East.	
<b>Description:</b> Grass and short vegetation.	

<b>Site Walkover Photograph 15</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> South.	
<b>Description:</b> Open area of hardstanding material in the centre of the site.	

<b>Site Walkover Photograph 16</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> South-west.	
<b>Description:</b> Open area of hardstanding material in the centre of the site.	



<p><b>Site Walkover Photograph 17</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South-east.</p>	
<p><b>Description:</b> Uneven ground surface, small shrubs and grass with a mature tree.</p>	

<p><b>Site Walkover Photograph 18</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> East.</p>	
<p><b>Description:</b> Grass vegetation, mature trees, pill boxes and seagull trenches.</p>	

<b>Site Walkover Photograph 19</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> North-east.	
<b>Description:</b> Grass vegetation, mature trees, pill boxes and seagull trenches.	

<b>Site Walkover Photograph 20</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> North.	
<b>Description:</b> Grass vegetation and a vehicle driving experience centre to the north of the site.	

<p><b>Site Walkover Photograph 21</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> West.</p>	
<p><b>Description:</b> Grassed vegetation and recently cut area of vegetation.</p>	

<p><b>Site Walkover Photograph 22</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South.</p>	
<p><b>Description:</b> Grassed vegetation and recently cut area of vegetation and mature trees along the southern site boundary.</p>	

<p><b>Site Walkover Photograph 23</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> East.</p>	
<p><b>Description:</b> Grass vegetation, mature trees, pill boxes and seagull trenches.</p>	

<p><b>Site Walkover Photograph 24</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> East.</p>	
<p><b>Description:</b> Pile of wooden pallets in the east of the site.</p>	

<p><b>Site Walkover Photograph 25</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> North.</p>	
<p><b>Description:</b> Access track in the east of the site.</p>	

<p><b>Site Walkover Photograph 26</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> North-east.</p>	
<p><b>Description:</b> Area of recently cut vegetation and a mature tree in the north-eastern corner of the site.</p>	

<p><b>Site Walkover Photograph 27</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> North-east.</p>	
<p><b>Description:</b> Area of recently cut vegetation and a mature tree in the north-eastern corner of the site.</p>	

<p><b>Site Walkover Photograph 28</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South.</p>	
<p><b>Description:</b> Access road and fenced off stockpile in the east of the site.</p>	

<p><b>Site Walkover Photograph 29</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> West.</p>	
<p><b>Description:</b> Stockpiled material in the south-eastern corner of the site.</p>	

<p><b>Site Walkover Photograph 30</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> South.</p>	
<p><b>Description:</b> Stockpiled material in the south-eastern corner of the site.</p>	

<p><b>Site Walkover Photograph 31</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> East.</p>	
<p><b>Description:</b> Access road and mature trees along the eastern boundary of the site.</p>	

<p><b>Site Walkover Photograph 32</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> East.</p>	
<p><b>Description:</b> Stockpiled material and access road in the south-eastern corner of the site.</p>	



<b>Site Walkover Photograph 33</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> North.	
<b>Description:</b> Pill box and pile of pallets in the east of the site.	

<b>Site Walkover Photograph 34</b>	
<b>Date:</b> 12/10/23	
<b>Direction Photograph Taken:</b> West.	
<b>Description:</b> Seagull trench in the east of the site.	

<p><b>Site Walkover Photograph 35</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> West.</p>	
<p><b>Description:</b> Pill box in the east of the site.</p>	

<p><b>Site Walkover Photograph 36</b></p>	
<p><b>Date:</b> 12/10/23</p>	
<p><b>Direction Photograph Taken:</b> North-east.</p>	
<p><b>Description:</b> Stockpiled material in the north-east of the site.</p>	

# Appendix C Desk study research information

# FELLOWS

The UXO risk management experts

Part of the Optima Group



## Detailed UXO Risk Assessment

FIL Reference: 2979R

Client: Ridge and Partners LLP

Project: Bicester

Site Location: Launton, Bicester, Oxfordshire

Report date: 15 December 2020



[www.fellowsint.com](http://www.fellowsint.com)



## Document Control

Version Date	Version	Author	Reviewer	Comments
15 Dec 20	1.0	Mark Khan	Lee Wasling MIExpE	Original

## Quality Check

Version Date	Version	Checked by	Comments
15 Dec 20	1.0	Emily Osborne	QC / format check

## Document Approval

	Reviewed by	Approved by
Signature		
Print Name	Lee Wasling MIExpE	Michael Jarwood
Date	16 December 2020	16 December 2020

## Distribution

Date	Copy No.	Recipient	Format
16 Dec 20	1	Ridge and Partners LLP	PDF
16 Dec 20	2	Fellows International Office	PDF

## Contents

Acronyms and Abbreviations .....	3
1. Executive Summary .....	4
2. Report Methodology .....	7
3. Requirement for UXO Risk Assessment.....	8
4. Site Description (Current) .....	9
5. Site Military History .....	10
6. Site Environment.....	15
7. Sources of Potential Unexploded Ordnance.....	16
8. Aerial Bombing.....	17
9. UXB Risk at the Site and EOC Tasks/Reports .....	29
10. Other Military Ordnance.....	30
11. Overall UXO Risk Assessment.....	36
12. Summary .....	37
13. Recommendations to Reduce UXO Risk to ALARP.....	39
14. References .....	40

## Acronyms and Abbreviations

AAA	Anti-Aircraft Artillery
AP	Armour Piercing
AP	Anti-Personnel
ARP	Air Raid Precaution (Wardens)
BD	Bombing Density
BGL	Below Ground Level
BGS	British Geological Survey (UK)
BH	Borehole
CDM	Construction [Design and Management] Regulations 2015 (UK)
CIRIA	Construction Industry Research and Information Association
CPT	Cone Penetrometer Test
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
ERP	Emergency Response Plan
ERW	Explosive Remnants of War
FFE	Free From Explosives
GI	Ground Investigation
GPS	Global Positioning System
HE	High Explosive
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act 1974
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operations Centre (UK)
LE	Low Explosive
LM	Luftmine (Germany)
LSA	Land Service Ammunition
MOD	Ministry of Defence (UK)
NEQ	Net Explosive Quantity
RAF	Royal Air Force
RN	Royal Navy
ROF	Royal Ordnance Factory
SAA	Small Arms Ammunition
SAP	Semi-Armour-Piercing
SI	Site Investigation
SIP	Self-Igniting Phosphorous
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V1	Vengeance Weapon 1 - Flying bombs or doodlebugs
V2	Vengeance Weapon 2 - Long range rocket
WW	World War

## 1. Executive Summary

### Site details

The site is located at Launton on the former airfield, RAF Bicester in Oxfordshire. The site is centered on the coordinates 459673 E and 223945 N and is approx. 52,000m<sup>2</sup> in size.

### Risk Assessment

Unexploded Ordnance (UXO) risk at the site is assessed as:

UXO	RISK	
Air Service munitions	Medium	Low
British Anti-Air defensive munitions	Low	
Other (Land service Ammunition / Home Guard / Military Training)	Medium	

Full detail of the UXO risk and the risk assessment process is within section 11.

### Summary

The site area has remained undisturbed since being released from military use in 2013. No records are available in the public domain to indicate what levels of EOD clearance work have been carried out prior to the land being released from military use. The southern part of the site is detailed as having featured a bomb fuzing point building. Potential contamination is likely to be higher in the southern part of the site, but the northern part of the site is approximately only 500m away from the bomb store area. Based on the proximity to the bomb store area and the land being undisturbed, potential UXO contamination has to be considered possible across the whole site.

Historical records exist detailing potential levels of UXO exiting on RAF airfield bomb / explosive stores. In 2010 the explosive storage area at the former military airfield at Macrihanish in Scotland was subject to explosive ordnance clearance. Records detail that 1,283 items of ordnance were found of which 85 items were live.

### Air Service Munitions

Available records indicate no German bombing activity on the site. The local area is recorded as having a low density of bombing during WW2. There are records of incendiary bombs being dropped on Bicester on 27/08/1940, HE bombs being dropped on 14/10/1940, HE bombs being dropped on 15<sup>th</sup>/11/1940 and 4 HE bombs being dropped near the airfield on 26/02/1941. The risk of encountering deep buried German aerial UXBs has therefore been assessed as low.



During the Second World War the airfield was in use as an operational training base. Air service ordnance was present at the airfield and would have been used for training and potentially attacking enemy targets. Ordnance and ammunition associated with these operations could include aerial bombs, small arms ammunition (SAA), cannon ammunition and pyrotechnics. The site is located within the western part of the airfield bomb store. The risk of encountering Allied air service ordnance has therefore been assessed as medium.

## British Air Defence Munitions

There were no available records detailing any heavy anti-aircraft defences within 5km of the site. Light anti-aircraft defences would have been present at the airfield. The risk of encountering air defence munitions is assessed as low.

## Other (Land service Ammunition etc.)

The site falls within the bounds of a former WW2 airfield where local airfield defences would have been in place. The site is located within the western part of the airfield bomb store where SAA used in aircraft would have been present. As such, it is considered that there is a medium risk of encountering SAA.

## UXO Risk mitigation recommendations

### For all works within the site area:

#### UXO Awareness Training

A UXO Awareness Brief (UXOAB) be delivered to all site personnel. This can also include a site safety walk-through and provision of a UXO Emergency Response Plan for inclusion into the site H&S documentation.

#### Non-intrusive site survey

Prior to any future site development or shallow excavations, a non-intrusive site survey is recommended. Through the use of electromagnetic pulse induction (EM) or magnetometry, a site survey will identify shallow buried targets within the works area and provide insight to sub-surface risk.

Through using a combination of these techniques, large buried items can be detected to approximately 3m.

#### UXO Engineer (For areas where site survey is not practical)

For excavations and earthworks, a UXO Engineer should be retained on-site in order to detect and safely manage UXO items. The engineer will also immediately confirm or discount UXO that has been discovered by site workers. The UXO Engineer will assist in liaison with the local authorities should UXO be confirmed as explosive hazard, establishing a safety cordon. UXO items deemed safe by the engineer, can be removed allowing the works to continue without delay. The engineer can also safely survey boreholes and trial pits for potential UXO on the site prior to planned works.

#### Emergency Response Plan

A site-specific emergency response plan (ERP) should be produced to provide clear and precise guidance on what to do should UXO be encountered, and / or detonated as part of the site works. It should be accompanied by emergency management team roles and responsibilities.

The ERP should be included in the health and safety plan for the proposed works and communicated to the work force at the operational level, typically as part of a toolbox talk. The ERP should be appropriate to the level of risk identified in this desk study.

Fellows International Limited can provide all of the above services and would be pleased to provide a proposal accordingly.

For further information, or to discuss requirements, please get in touch.

Web – [www.fellowsint.com](http://www.fellowsint.com)

Tel – 08000 424 424

Email – [info@fellowsint.com](mailto:info@fellowsint.com)

## 2. Report Methodology

The aim of this report is to conduct a comprehensive assessment of the potential risk from UXO at the site as described by the client.

Every reasonable effort has been made to ensure that all available historical information has been accessed and checked. Where possible, evidence has been included in the report to enable the client to understand the basis of the risk assessment. Fellows cannot be held responsible for any changes to the assessed level of risk or risk mitigation measures based on documentation or other information that may come to light at a later date. The accuracy of wartime records is frequently difficult to verify. As a result, conclusions as to the exact location, quantity and nature of the ordnance threat can never be definitive but must be based on the accumulation and careful analysis of all accessible evidence. Fellows cannot be held responsible for inaccuracies or gaps in the available historical information. All sources are referenced at Section 12.

The report recommends appropriate site and work-specific risk mitigation measures to reduce the risk from explosive ordnance during the envisaged works to a level that is as low as reasonably practicable (ALARP).

This report follows the guidelines outlined in CIRIA Report C681, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry' and CIRIA C785, 'Unexploded Ordnance (UXO) Risk Management'.

Fellows has been supporting the UK construction industry with UXO Risk Management measures for over two decades and offer the complete UXO risk management process from the preliminary and detailed desk study through to the physical site survey and finally, the identification and removal or disposal of an item, either in house or in liaison with military disposal assets. Our desk top studies enable our clients to accurately assess the UXO risk and take proportionate, cost effective action to manage the risk posed by unexploded aerial bombs and other munitions.

As one of the first companies to offer this service in the UK, Fellows have unrivalled experience delivering the UXO Risk Management process and are proud of our reputation for quality and cost-effective delivery, gained from our years of experience. Fellows can support you through the whole risk management process from project start to final delivery. While Fellows is mainly active in the UK, we also have a long history of operating overseas on projects all over the globe. We are proud to support both the construction and offshore industries with the right experience, people, qualifications and equipment to best identify, quantify and mitigate the UXO risk wherever it may be.

## 3. Requirement for UXO Risk Assessment

### Background

There is no formal obligation requiring a UXO risk assessment to be undertaken for construction or development projects in the UK, nor is there any specific legislation stipulating the management or mitigation of UXO risk. However, the legislation outlined below makes very clear that those responsible for intrusive works (archaeology, site investigation, drilling, piling, excavation etc.) should undertake a comprehensive and robust assessment of the potential risks to employees and that mitigation measures are implemented to address any identified hazards.

### CDM Regulations 2015

The Construction [Design and Management] Regulations 2015 [CDM 2015] defines the responsibilities of parties involved in the construction of temporary or permanent structures. CDM 2015 establishes a duty of care extending from clients, principle co-ordinators, designers, and contractors to those working on, or affected by, a project. Those responsible for construction projects may therefore be accountable for the personal or proprietary loss of third parties if correct health and safety procedure has not been applied.

Although CDM 2015 does not specifically reference UXO, the risk presented by such items is both within the scope and purpose of the legislation. It is therefore implied that there is an obligation on parties to:

- Provide or obtain an appropriate assessment of potential UXO risks at the site
- Emplace appropriate risk mitigation measures if necessary
- Supply all parties with relevant risk information
- Prepare a suitably robust emergency response plan.

### Other legislation

#### The 1974 Health and Safety at Work etc. Act

All employers have a responsibility under the Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations 1999, to ensure the health and safety of their employees and third parties, so far as is reasonably practicable.

## 4. Site Description (Current)

### Site location

The site is located at Launton on the former airfield, RAF Bicester in Oxfordshire. The site is centered on the coordinates 459673 E and 223945 N and is approx. 52,000m<sup>2</sup> in size.

### Mapping / Satellite Imagery

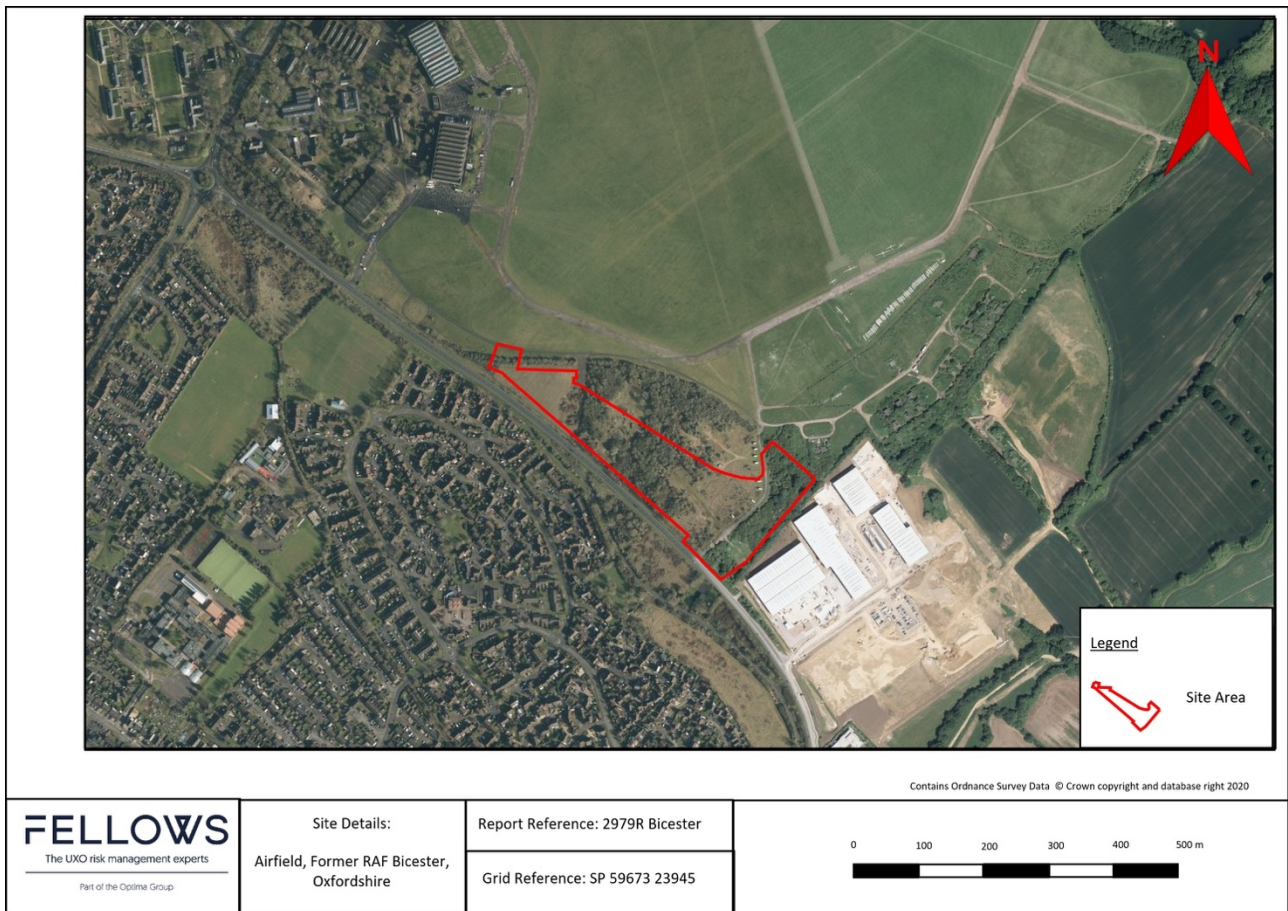


Figure 1. Showing Satellite Imagery of the site area. (Google, 2020)

## 5. Site Military History

The military use of RAF BICESTER dates back to 1916 with the creation of a training depot, which was part of Southern Command. Royal Flying Corps training units were based here from 1917 to 1920.

The airfield came back into use in 1924. Airfield facilities were considerably improved, particularly during the expansion period in the 1930's. Operational squadrons were based at the airfield during this period and up to the start of the Second World War.

During the Second World War, the airfield was used as a base for operational training units. A large number of aircrews were trained and went on to serve in operational squadrons. Many different types of aircraft were operated from the airfield including Bristol Blenheim light bombers, Douglas Boston medium bombers and North American Mitchell medium bombers. Training aircraft such as the Avro Anson, Miles Master and Airspeed Oxford also operated from the airfield. During the latter part of the Second World War, the airfield became a maintenance and despatch base and was also used as a depot for vehicles.

After the war, various units were also based at the airfield including a beam approach calibration unit, parachute packing and servicing unit, a civilian supplies technical school, a bomb disposal unit, a light anti-aircraft wing, and a historic aircraft exhibition flight.

The airfield closed as an active RAF station on May 20th, 1960, subsequently being used by the Army. It was briefly reinstated in 1978 being additionally used by US Forces and was used as a medical facility during the First Gulf War in 1991. The base was deactivated in 1991. The technical site was disposed of by the MOD in 2013 and sold to Bicester Heritage Limited.

## Bombing activity near the site

Fellows has reviewed Air Raid Precaution (ARP) records, Bombing Density Records, aerial photography, bomb damage maps, historical images of bomb damage held by The National Archives and internal Fellows documents related to the site area.

It is worth noting historical records and Air Raid Precaution (ARP) reports cannot establish a full description of air raids that may have occurred during WW2 as the accuracy of wartime records are frequently difficult to verify.

During WW2 the site was located within the Administrative area of the Rural District of Ploughly.

The local area is recorded as having a low density of bombing during WW2. There are records of incendiary bombs being dropped on Bicester on 27/08/1940, HE bombs being dropped on 14/10/1940, HE bombs being dropped on 15<sup>th</sup>/11/1940 and 4 HE bombs being dropped near the airport on 26/02/1941.

It is worth noting historic records and maps of bomb strike locations cannot establish a full description of air raids that may have occurred during WW2 as the accuracy of wartime records are frequently difficult to verify.

The map and tables below show recorded bombing activity, and severity of bomb strikes in the vicinity of the site.

Administrative Area (Rural District)	Land Area		Numbers of items of Ordnance Recorded							Ordnance Density		
	Acres	Hectares	High Explosive Bombs	Parachute Mines	Oil Bombs	Phosphorus Bombs	Fire Pots	V1	V2	Total	Per 1,000 Acres	Per 100ha
Ploughly	79,910	132,364	275	0	0	3	0	0	0	278	3.5	0.9

Table 1. Ministry of Home security record of German Ordnance dropped within the Rural District of Ploughly during WW2.

## Historical developments

The table below depicts in chronological order the changes that the site has undergone from 1888 to 2020. Historical analysis of the site area was carried out employing historic Ordnance Survey mapping and historic aerial photography.

The site resides within the boundary of the ex-RAF airfield - RAF BICESTER. The site is adjacent to the airfield bomb store. The southern part of the site is within the bomb store boundary and includes a bomb fuzing point building.

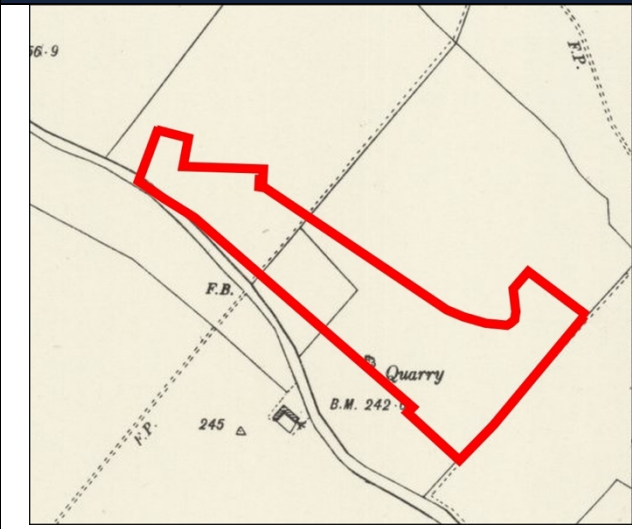
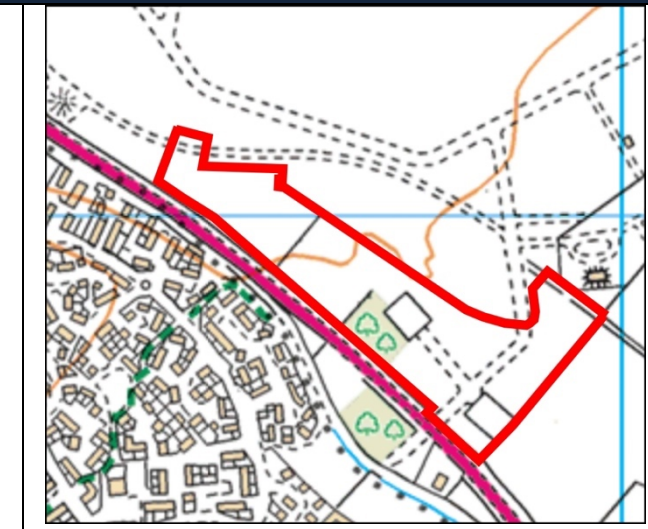
OS Map	
	
<p>Showing a section of 1896 OS mapping. Showing the site as farmland, with a small quarry.</p>	<p>Showing a section of the 2020 revision of OS mapping. The airfield construction can be seen.</p>

Table 2. Summary table showing development of the site [Ordnance Survey Maps, 1898 – 2020]

The site area has remained undisturbed since being released from military use in 2013. No records are available in the public domain to indicate what levels of EOD clearance work have been carried out prior to the land being released from military use. The southern part of the site is detailed as having featured a bomb fuzing point building. Potential contamination is likely to be higher in the southern part of the site, but the northern part of the site is approximately only 500m away from the bomb store area. The proximity to the bomb store area and based on the land being undisturbed, potential UXO contamination has to be considered possible across the whole site.

Historical records exist detailing levels of UXO on RAF airfield bomb/explosive stores. In 2010 the Explosive storage area at the former military airfield at Macrihanish in Scotland was subject to explosive ordnance clearance. Records in detail that 1,283 items or ordnance were found of which 85 items were live.





Figure 2. Showing Satellite Imagery with airfield map overlaid



Figure 3. Showing LIDAR (light detection and ranging) imagery of the site area



Contains Ordnance Survey Data © Crown copyright and database right 2020

**FELLOWS**  
The UXO risk management experts  
Part of the Optima Group

Site Details:  
Airfield, Former RAF Bicester,  
Oxfordshire

Report Reference: 2979R Bicester  
Grid Reference: SP 59673 23945



Figure 4 - Showing details of the airfield bomb store overlain in context with the site.

## 6. Site Environment

### Proposed scope of works

No detailed scope of works has been received for this site it is therefore assumed that there will be a range of shallow and potentially deep excavation across the site.

### Ground conditions

The area comprises unmade ground, trackways, hard standings and some airfield buildings.

### Site geological conditions

The local geology comprises of Cornbrash Formation – Limestone. This is consistent across the entire site.

## 7. Sources of Potential Unexploded Ordnance

UXO found at construction and development sites in the UK originates from three principal sources:

➤ **Munitions deposited as part of military training or exercises.**

In the UK, this can be historical from both World Wars and before but also more recent, especially as land reserved for military use is released for development.

➤ **Dumping**

Munitions abandoned or dumped, either deliberately post war, accidentally lost in transit or due to ineffective working practices during manufacture, storage and transportation.

➤ **Wartime activity (including aerial bombing)**

This includes ordnance resulting from wartime activities including enemy bombing, long range shelling, area or site denial weapons (mine fields or airfield pipe mines) and munitions from defensive activity such as anti-aircraft batteries or pre-invasion measures.

### Other factors which may increase UXO risk

Transportation of aggregates containing munitions to an area that was previously free of UXO has led to small munitions contaminating a previously low risk site. This is usually related to construction activities employing material dredged from a contaminated offshore borrow site although the use of explosive contaminated soil or fill from higher risk areas should also be considered.

## 8. Aerial Bombing

### General

During WW1 and WW2, many towns and cities across the UK were subjected to bombing which often resulted in extensive damage to city centres, docks, rail infrastructure and industrial areas. In addition to raids which concentrated on specific targets, indiscriminate bombing of large areas also took place, notably the London 'Blitz'. Bombing also affected many other towns and cities including Birmingham, Portsmouth and Bristol.

Approximately 10% of the bombs dropped on the UK did not detonate as designed. Although extensive efforts were made to locate and deal with these UXBs at the time, many still remain buried and can present a potential risk to construction projects.

Although the main focus of historical UXO research generally concerns German air-delivered ordnance dropped during WW2, all other forms of explosive contamination will also be considered.

One of the most common type of UXO discovered today is the aircraft delivered high explosive (HE) bomb. These are comparatively thick-skinned and dropped from enemy aircraft. If the bomb did not detonate when it was dropped, the force of impact enabled the bomb to penetrate the ground, often leaving behind it an entry hole. These entry holes were not always apparent, and some went unreported, leaving the bomb buried and unrecorded. The bomb then became an Unexploded Bomb or UXB.

Additional forms of German aerial UXO will be considered including WW2 'Vengeance' weapons (V1 and V2 rockets), small Incendiary Bombs (IBs), and Anti-personnel (AP) bomblets.

### World War One aerial bombing

WW1 bombs were generally smaller than those used in WW2 and were dropped from a lower altitude, resulting in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress.

There is no recorded evidence of bombing during WW1 in the Bicester area, therefore, the threat from WW1 German UXBs will not be considered any further in this report.

## World War Two aerial bombing

### Targeting

Although the Luftwaffe had designated primary bombing targets across the UK, their high-altitude night-time bombing was not accurate. As a result, thousands of buildings were damaged and civilian fatalities were common. Bombs were also jettisoned over opportunistic targets and residential areas were often struck.

When Luftwaffe aircraft wished to escape due to interception by fighter aircraft or anti-aircraft fire, they would jettison their bomb-load to increase speed and manoeuvrability. This is commonly referred to as tip and run and it has resulted in bombs being found in unexpected locations.

### Decoy sites

RAF and Royal Navy decoy sites were constructed in the vicinity of legitimate targets to deceive and decoy enemy bombers. For obvious reasons, such sites were often built in remote and uninhabited areas. Some were more successful than others and received relatively high bombing rates.

There are no records of decoy site within 5km of the site,


### Aerial bombs


The most commonly dropped German aerial weapon was the SC50 (50kg). The next largest weapon is the SC250 (250kg) HE bomb. These were dropped primarily against soft targets such as gas and electricity installations, factories, housing and transport infrastructure.


Although the Luftwaffe deployed larger bombs in the area, their deployment was infrequent, the majority of bombs dropped were SC50 (50kg) and SC250 (250kg) HE bombs.

UXB risk of encounter has been assessed by using the SC50 and SC250 as the primary risk weapon.

## WW2 German Aerial Ordnance


Type	Description	
High Explosive (HE) Bombs		<p>The SC series of HE Bombs were a thin cased general-purpose bomb used as general demolition bombs.</p>
	<p>German SC250 (recovered casing)</p>  <p>German SC50 (London 2015)</p>	<p>Most bombs were 50kg, 250kg or 500kg, although larger bombs of up to 1,800kg were also used. About half the weight of these HE bombs comprised of explosive fill.</p> <p>The SC50 had a one-piece drawn steel body and its total weight was 48 to 55kg.[1] It was dropped on targets across the UK.</p> <p>The SD series of bombs were thicker cased, with a lower charge weight used against hardened targets.</p>

Type		Description
Incendiary bombs	 <p>1Kg Incendiary Bomb</p>	<p>The 1 kg BIE incendiary bomb consisted of a cylinder of magnesium alloy, with an incendiary filling of thermite. Rivetted to the body was a steel tail with three fins. These bombs did not explode but were ignited by a small percussion charge, fired upon impact. They were dropped in a variety of containers. Later an explosive head was incorporated into the IB.</p>


Type		Description
Anti-Personnel (AP) bombs	 <p>SD2 'Butterfly' Bomb [Armed status]</p>	<p>A Butterfly Bomb (or <i>Sprengbombe Dickwandig</i> 2kg or SD2) was a German 2-kilogram anti-personnel submunition used by the Luftwaffe during the Second World War. It was so named because the thin cylindrical metal outer shell which hinged open when the bomblet deployed gave it the superficial appearance of a large butterfly. The design was very distinctive and easy to recognise. SD2 bomblets were not dropped individually but were packed into containers holding between 6 and 108 submunitions. These broke open in air and scattered the sub-munitions.</p>



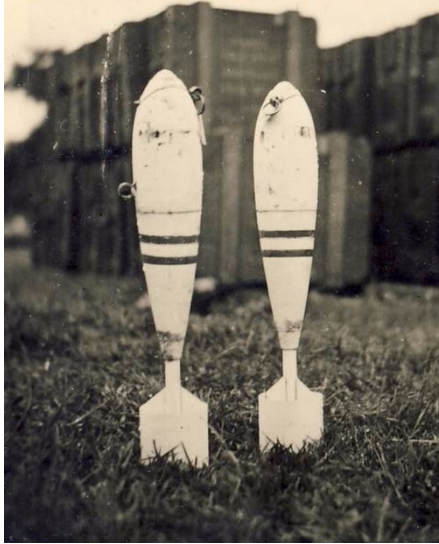


## WW2 Allied Aerial Ordnance


Type		Description
<p>High Explosive (HE) Bombs</p>	 <p>Allied 500 lb bombs, Broadbridge Heath, 2019</p>	<p>Allied HE Bombs were usually thin cased general-purpose bombs for use against non-hardened targets.</p> <p>Most allied bombs were produced as 250lb or 500lb, although bombs up to 22,000lb were produced for specific use against hardened military targets.</p> <p>Fill tended to be either TNT or Amatol.</p> <p>The British also produced semi-armour piercing bombs for hardened and military targets, designed to penetrate concrete and buildings. These tended to be tear drop shaped to aid penetration, as seen in the image to the left.</p>

## WW2 Allied Air Service Ordnance

Type		Description
<p>Flares &amp; Pyrotechnics</p>	 <p>WW2 Smoke Floats, Dunsfold Airfield 2019</p>	<p>Pyrotechnics and flares are used in a variety of target acquisition roles ranging from marking sites for bombers to search and rescue.</p> <p>All pyrotechnics contain a flash element, although some are designed to disperse in operation.</p> <p>Fill can be varied depending on use, but common fill for the period was white phosphorous, used in a variety of smoke, illumination and tracer munitions.</p>

## WW2 Allied Aerial Ordnance/Ammunition

Type			Description
British Practice Bombs	  <p data-bbox="379 987 1027 1099">Left: two complete practice bombs. Right top: The front part of a practice bomb. Bottom Right: the tail of a practice bomb.</p>		<p data-bbox="1042 412 1441 775">Practice bombs came in different sizes, but the most commonly used were the smaller versions. They were used for practice bombing purposes and are often found within airfield boundaries where areas were sometimes utilised for practice bombing.</p> <p data-bbox="1042 831 1441 972">A Bomb. 8.5lb. Practice, MK 1, Weighed: 3855g and had dimensions of 76mm x 406mm.</p> <p data-bbox="1042 983 1441 1196">The standard practice bombs contained no HE fill but featured a smoke emission or flash capability to indicate bombing accuracy.</p>
Aircraft Ammunition			<p data-bbox="1042 1279 1441 1682">British and Allied aircraft were fitted with different types of offensive and defence weapons. The most common ammunition associated with British aircraft is .303" calibre for use in turret machine guns. Pictured left is a belt of .303 ammunition recovered from a UK airfield site.</p>

Type		Description
<p>Pyrotechnics (Flare Pistol Cartridges)</p>	 <p>Examples of flare cartridges. Left &amp; centre 1" signal pistol cartridges. Right: a 1.5" signal pistol cartridge. Below are examples of brass cartridge bases which is often all that remains if they have been buried in the ground for a long period of time.</p>	<p>Flare cartridges are used in signal pistols. They are used both on the ground as well as in aircraft. When fired, a pyrotechnic flare is launched. These can be used to convey a message from the ground to an aircraft or vice versa. The type of message could be a warning for an aircraft not to land or if fired from an aircraft, indicating an emergency and needing a priority landing. Mostly they comprise of a brass base with a cardboard body. The cardboard body will decay over time often just leaving the brass cartridge base.</p>



RAF Airfield Dump Images	Description
	<p>RAF sites commonly disposed of rubbish by burial on site. These rubbish sites often contain ordnance related materiel. The left image shows large quantity of small arms ammunition and bomb fuze (pistols) A large quantity of small arms ammunition and bomb fuze (pistols) components discovered at a former RAF airfield in Northampton.</p>
	<p>Cleaned items recovered from an airfield dump. These comprise of more bomb fuzes (pistols)</p>

Figure 5 - Details of ordnance related items discovered from RAF airfields in the UK.

## UXB Initiation

Unexploded ordnance does not normally spontaneously explode. Military high explosive is generally reasonably stable and requires significant energy, normally via a fuze and initiation system for detonation to occur. In the case of unexploded German bombs discovered within the construction site environment, there are a number of other potential initiation mechanisms.

### Direct impact

Unless the fuze or fuze pocket is struck, there needs to be a significant impact e.g. from piling machinery or large and violent mechanical excavation, onto the main body of the weapon to initiate a buried iron bomb. Although it is unlikely, such violent action could cause a bomb to detonate.

### Fuzes

Most German bomb and mine fuzes were electric and were highly engineered compared to their British equivalents. A small proportion of German WW2 bombs employed clockwork fuzes. It is probable that clockwork or mechanical fuze mechanisms would have corroded since WW2 and this will generally prevent them from functioning.

### Friction impact

Impact from construction machinery or processes could initiate the shock-sensitive fuze explosive. The effects of chemical breakdown of explosive fill and general degradation over time can cause explosive compounds to crystallise and extrude out from the main body of the bomb. It may only require a limited amount of energy to initiate the extruded explosive around the fuze pocket which could detonate the main charge.

## Consequence of interaction

When considering the potential consequences of a detonation, it is necessary to identify who may be affected. These will vary depending on the site-specific conditions but can be summarised as:

- People – site workers, local residents and general public.
- Plant and equipment – construction plant on site.
- Services – subsurface gas, electricity, telecommunications.
- Structures – not only visible damage to above ground buildings, but potentially damage to foundations and the weakening of support structures.
- Environment – introduction of potentially contaminating materials.

## Failure Rate of German air-delivered ordnance

It has been estimated that 10% of the German HE bombs dropped during WW2 failed to explode as designed. There are a number of reasons why an air-delivered weapon might fail to function as designed:

- Malfunction of the fuze or initiation mechanism (either electric or clockwork)
- Failure of the bomber aircraft to arm bombs correctly
- Jettisoning of the bomb before it was armed or from a very low altitude. Likely if the bomber was under attack or attempting a forced landing due to damage.

Unexploded ordnance is still regularly encountered across the UK and is dealt with on a routine basis by military and commercial Bomb Disposal teams.

## Bomb penetration

An important consideration when assessing the risk from a UXB is the likely maximum depth of penetration. There are several factors which determine the depth that an unexploded bomb will penetrate to:

- Size and shape of bomb
- Height of release
- Velocity and angle of bomb
- Nature of the ground cover
- Underlying geology

Geology is perhaps the most important variable. If the ground is soft, there is a greater potential of deeper penetration. For example, peat and alluvial deposits are easier to penetrate than gravel and sand. Layers of hard strata will significantly retard and may stop the trajectory of a UXB.

## Impact angle and velocity

It is assumed that bombs struck at an angle 80-85° from vertical and at c. 270 metres per second. These are standard figures used for bomb release from an aircraft at normal altitude. Other factors such as low speed or altitude of the bombing aircraft may alter these figures, but no records are available to suggest any low-level raids or incidents.

## Buried bombs

When bombs strike but do not detonate, they can easily remain undetected. Note that the entry hole of an SC50 (the most commonly deployed German HE bomb) could have been as small as 20cm in diameter and therefore easily obscured within dense crops, or unmaintained vegetation, rough soil or rubble from previous damage.

## The J-Curve Effect

J-curve is the term used to describe the characteristic curve commonly followed by an air-delivered bomb dropped from height after it penetrates the ground. Typically, as the bomb is slowed by its passage through underlying soils, its trajectory curves towards the surface.

Many UXBs are found with their nose cone pointing upwards as a result of this effect. More importantly however is the resulting horizontal offset from the point of entry. This is typically a distance of about one third of the bomb's penetration depth but can be up to 15m leading to bombs settling underneath undamaged buildings.

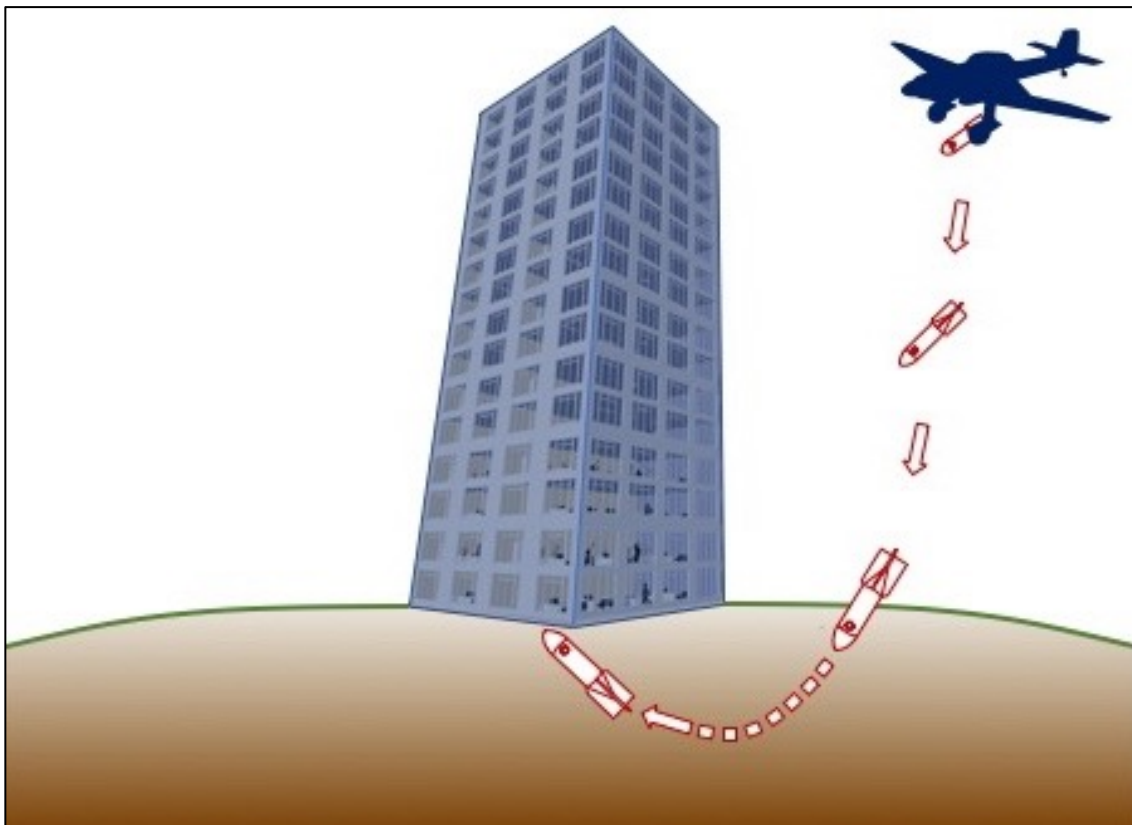


Figure 6. Demonstrating the J-Curve.



## 9. UXB Risk at the Site and EOC Tasks/Reports

### Abandoned bombs and EOC Tasks/Reports

Research did not indicate the presence of any abandoned bombs within or in close proximity to the site boundary.

There are two EOC tasks/reports recorded within 5km of the site.

### Bombing density at site

The local area is recorded as having a low density of bombing during WW2. There are records of incendiary bombs being dropped on Bicester on 27/08/1940, HE bombs being dropped on 14/10/1940, HE bombs being dropped on 15<sup>th</sup>/11/1940 and 4 HE bombs being dropped near the airport on 26/02/1941.

### Post war / previous works

No major post war development is evident within the site boundary since WW2.

### Bomb penetration depth at this site

Due to the local geology, the previous land usage and the history of the area, maximum bomb penetration depth of a SC50 (50kg) bomb is assessed to be 6m bgl. The SC250 (250kg) bomb is considered to have a maximum bomb penetration depth of 10m bgl.

## 10. Other Military Ordnance

In addition to aerial bombs, there may also be a risk from other items including discarded or forgotten land munitions from both wartime and peacetime military use. Typical military activities may include:

- Former minefields; often on beaches on the South and East coasts of England
- Home Guard weapons and munitions
- Anti-Aircraft sites
- Training & firing ranges
- Military bases
- Munitions manufacture and storage sites

During the early years of WW2 huge preparations were underway to defend the UK against German attack. This often included the hiding or caching of defensive ordnance at or near to strategically or tactically important locations.


Items may include small arms ammunition, mortar bombs and hand grenades or even crudely manufactured defensive weapons designed for Home Guard use such as the No.76 SIP (Self Igniting Phosphorus) grenades. These items, resembling a milk bottle are frequently found in original crates during shallow excavations or building demolition and although small in size can inflict life-changing injuries if not dealt with correctly. The potential risk of encountering allied ordnance on construction sites is particularly elevated in areas previously associated with military activity. This includes munitions deposited by military training exercises, dumped as a result of poor working practices, or deliberately placed to prevent adversary occupation.

## Anti-Aircraft Artillery

Urban areas can be at risk from shallow buried unexploded Anti-Aircraft projectiles fired during WW2.

At the onset of WW2 two types of Anti-Aircraft Artillery (AAA) guns were deployed:

- Heavy Anti-Aircraft Artillery (HAA), using large calibre weapons, such as the 3.7” QF [Quick Firing] gun. Normally fixed batteries.
- Light Anti-Aircraft Artillery (LAA) using smaller calibre weapons, such as 40mm Bofors gun. Often mobile, vehicle mounted batteries.

Type	Description
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>Anti-Aircraft Shells</p> </div> <div style="flex: 2;">  <p>40mm AA Shells found at W Sussex site</p> </div> </div>	<p>Fixed (Heavy) Anti-Aircraft batteries were set up all around the country to defend potential targets from aerial attack. Size of guns and shells ranged from small, quick-firing 40mm Bofors guns to larger 3.7 or 4.5inch guns.</p> <p>3.7 Inch = 12.7kg 94mm x 438mm            40mm = 0.9kg 40mm x 311mm            4.5 Inch = 24.7kg 114mm x 578mm</p>

LAA batteries were intended to engage fast, low flying aircraft and were typically deployed around military bases, RAF airfields or important installations. These batteries were mobile and could be moved to new positions with relative ease when required. The most numerous of these were the 40mm Bofors gun, which could fire up to 120 x 40mm HE shells per minute to over 1,800m.

HAA projectiles were high explosive shells, usually fitted with a time delay or a barometric pressure fuze to make them explode at a pre-determined height. If they failed to explode or strike an aircraft, they would eventually descend back to earth.

Dependent on site conditions, larger AAA projectiles can be encountered beyond a depth of 2m.

The smaller 40mm projectiles are similar in appearance and effect to SAA and, although still dangerous, present a lower hazard due to its decreased explosive content.

Numerous unexploded AAA shells were recovered during and following WW2 and are still occasionally encountered on sites today.






## AAA Emplacements

There were no permanent HAA emplacements recorded within 5km of the site.

Light anti-aircraft defences are recorded as having been present as part of the local airfield defences.



**Legend**

-  Site Location
-  5km Radius From site
-  Military airfield
-  EOC Task or Report
-  Military Camp

Contains Ordnance Survey Data © Crown copyright and database right 2020

<p><b>FELLOWS</b> The UXO risk management experts Part of the Optima Group</p>	<p>Site Details: Airfield, Former RAF Bicester, Oxfordshire</p>	<p>Report Reference: 2979R Bicester</p>	
		<p>Grid Reference: SP 59673 23945</p>	

Figure 7 - Showing military activity within a 5km radius.

## Other defensive munitions

As the threat of invasion lingered over Britain during WW2, large areas of land were requisitioned for military training and exercises. Thousands of tonnes of munitions including HE bombs, artillery projectiles, Naval shells, bulk explosives and infantry weapons such as grenades and small arms ammunition were used in weapon testing and military training. It has been estimated that at least 20 per cent of the UK's land has been used for military training at some point.

Type		Description
No.76 SIP Grenade		<p>No.76 SIP (Self Igniting Phosphorus) grenades. These items, resembling a milk bottle are frequently found during shallow excavations or building demolition and although small in size can inflict life-changing injuries if not dealt with correctly.</p> <p>Found in wooden crates of 24 items.</p>

Type		Description
Hand Grenades	 <p style="text-align: center;">British Mills No.36 Grenade</p>	<p>Contains a small amount of High Explosive and a rudimentary time delay fuze.</p> <p>The absence of a pin and fly-off handle indicate the item is potentially live.</p> <p>The distinctive segmented (Pineapple) casing gives the fragmentation effect on detonation.</p>

## Small Arms Ammunition

The most common type of ordnance encountered on land formerly used by the military are items of Small Arms Ammunition (SAA). SAA refers to the complete round or cartridge designed to be used with hand-held infantry weapons such as rifles, machine guns and pistols. SAA can include bullets, cartridge cases and primers/caps. Items of SAA can be accidentally initiated by striking the casing or coming into contact with fire. SAA presents only minimal risk although it must be disposed of correctly if found on-site.

Type		Description
Small Arms Ammunition	 <p style="text-align: center; font-size: small;">Small Arms Ammunition</p>	<p>Small arms of various sizes from 4 or 5mm calibre (diameter) up to 12 to 13mm.</p> <p>Generally, the head is inert and made of lead or similar dense material.</p> <p>Brass cases without the head pose no risk.</p>

## 11. Overall UXO Risk Assessment

In establishing the UXO risk at this site, Fellows take the following factors into account:

- The amount and nature of WW1 and WW2 German aerial bombing
- The nature and conditions of the site during at the time
- Other military use of the site i.e. AA Gun sites, storage, training
- The extent of post-war development and UXO clearance operations on site
- The scope and nature of the proposed works and assessed bomb penetration depth
- The nature of non-aerial ordnance that may have contaminated the site area

### Risk Assessment

The risk assessment matrix below is based upon the chance of encountering items of ordnance and the consequence of interaction with them. This can range from the detonation by design [via fuzing and explosive training] of a large aerial bomb to the accidental breakage of old Home Guard glass bottle grenades.

In accordance with standard UK risk assessment methodologies, the overall risk is gained by multiplying the likelihood [chance of encounter] with the consequence [consequence of interaction] and is graded from negligible to Very High risk.

### Descriptors

#### Chance of encounter

1	2	3	4	5
Not at all likely	Unlikely	Possible	Likely	Almost certain

#### Consequence of interaction with munition

1	2	3	4	5
First aid incident	Minor injuries	Severe injuries	Fatalities	Multiple fatalities

#### Overall risk calculation [Chance of Encounter X Consequence of interaction]

1-5	6-10	11-15	16-20	21-25
Negligible	Low Risk	Medium Risk	High Risk	Very High Risk



## 12. Summary

The site area has remained undisturbed since being released from military use in 2013. No records are available in the public domain to indicate what levels of EOD clearance work have been carried out prior to the land being released from military use. The southern part of the site is detailed as having featured a bomb fuzing point building. Potential contamination is likely to be higher in the southern part of the site, but the northern part of the site is approximately only 500m away from the bomb store area. The proximity to the bomb store area and based on the land being undisturbed, potential UXO contamination has to be considered possible across the whole site.

Historical records exist detailing potential levels of UXO existing on RAF airfield bomb/explosive stores. In 2010 the explosive storage area at the former military airfield at Macrihanish in Scotland was subject to explosive ordnance clearance. Records detail that 1,283 items of ordnance were found of which 85 items were live.

### Air Service Munitions

Available records indicate no German bombing activity on the site. The local area is recorded as having a low density of bombing during WW2. There are records of incendiary bombs being dropped on Bicester on 27/08/1940, HE bombs being dropped on 14/10/1940, HE bombs being dropped on 15<sup>th</sup>/11/1940 and 4 HE bombs being dropped near the airfield on 26/02/1941. The risk of encountering deep buried German aerial UXBs has therefore been assessed as low.

During the Second World War the airfield was in use as an operational training base. Air service ordnance was present at the airfield and would have been used for training and potentially operations attacking enemy targets. Ordnance and ammunition associated with these operations could include aerial bombs, small arms ammunition (SAA), cannon ammunition and pyrotechnics. The site is located within the western part of the airfield bomb Store. The risk of encountering Allied air service ordnance has therefore been assessed as medium.

### British Air Defence Munitions

There were no available records detailing any heavy anti-aircraft defences within 5km of the site. Light anti-aircraft defences would have been present at the airfield. The risk of encountering air defence munitions is assessed as low.

### Other (Land service Ammunition etc.)

The site falls within the bounds of a former WW2 airfield where local airfield defences would have been in place. The site is located within western part of the airfield bomb Store where SAA used in aircraft would have been present. As such, it is considered there is a medium risk of encountering SAA.

## Overall Risk Assessment

Activity	Threat Item	Chance of encounter	Consequence of interaction	Risk
Shallow excavation (<2m)	HE Bombs	3	5	15
	AAA Shells/IBs	2	4	8
	Other Munitions	4	3	12
Window Sampling / Shallow Boreholes	HE Bombs	3	5	15
	AAA Shells/IBs	2	4	8
	Other Munitions	4	3	12
Deeper excavations (>2m)	HE Bombs	2	5	10
	AAA Shells/IBs	2	4	8
	Other Munitions	4	3	12
Piling / deep boreholes	HE Bombs	2	5	10
	AAA Shells/IBs	2	4	8
	Other Munitions	4	3	12

## 13. Recommendations to Reduce UXO Risk to ALARP

### For all works within the site area:

#### UXO Awareness Training

A UXO Awareness Brief (UXOAB) be delivered to all site personnel. This can also include a site safety walk-through and provision of a UXO Emergency Response Plan for inclusion into the site H&S documentation.

#### Non-intrusive site survey

Prior to any future site development or shallow excavations, a non-intrusive site survey is recommended. Through the use of electromagnetic pulse induction (EM) or magnetometry, a site survey will identify shallow buried targets within the works area and provide insight to sub-surface risk.

Through using a combination of these techniques, large buried items can be detected to approximately 3m.

#### UXO Engineer (For areas where site survey is not practical)

For excavations and earthworks, a UXO Engineer should be retained on-site in order to detect and safely manage UXO items. The engineer will also immediately confirm or discount UXO that has been discovered by site workers. The UXO Engineer will assist in liaison with the local authorities should UXO be confirmed as explosive hazard, establishing a safety cordon. UXO items deemed safe by the engineer, can be removed allowing the works to continue without delay. The engineer can also safely survey boreholes and trial pits for potential UXO on the site prior to planned works.

#### Emergency Response Plan

A site-specific emergency response plan (ERP) should be produced to provide clear and precise guidance on what to do should UXO be encountered, and / or detonated as part of the site works. It should be accompanied by emergency management team roles and responsibilities.

The ERP should be included in the health and safety plan for the proposed works and communicated to the work force at the operational level, typically as part of a toolbox talk. The ERP should be appropriate to the level of risk identified in this desk study.

Fellows International Limited can provide all of the above services and would be pleased to provide a proposal accordingly.

For further information, or to discuss requirements, please get in touch.

Web – [www.fellowsint.com](http://www.fellowsint.com)

Tel – 08000 424 424

Email – [info@fellowsint.com](mailto:info@fellowsint.com)

## 14. References

The following sources of information were consulted in putting together this report:

BRITISH GEOLOGICAL SURVEY, 2020. *GeoIndex* Available from:  
<http://mapapps2.bgs.ac.uk/geoindex/home.html>

FELLOWS INTERNATIONAL ARCHIVES

GRACES GUIDE TO INDUSTRIAL HISTORY: <https://gracesguide.co.uk>

HERITAGE GATEWAY. Available from <https://www.heritagegateway.org.uk/Gateway/>

Michael J.F. Bowyer, 1981, *Action Stations 6. Military Airfields of the Cotswolds and the Central Midlands*, Patrick Stephens, Cambridge

NATIONAL LIBRARY OF SCOTLAND, 2020. *OS MAPS*. Available from: <https://maps.nls.uk>

OS MAPS, 2020. Available from: <https://osmaps.ordnancesurvey.co.uk>

RAF Bicester Heritage Impact Report, July 2018, Worledge Associates

RAMSEY, W, 1987, *The Blitz Then and Now Volume 1*, Battle of Britain Prints, London.

RAMSEY, W, 1988, *The Blitz Then and Now Volume 2*, Battle of Britain Prints, London

RAMSEY, W, 1990, *The Blitz Then and Now Volume 3*, Battle of Britain Prints, London

The National Archives

HO 203 – Ministry of Home Security, Home Security Daily Intelligence Reports

This assessment has been produced for Ridge and Partners LLP and has been completed without the benefit of knowing the exact intentions of third parties and should therefore not be used by such organisations without prior consultation with Fellows International Ltd (Fellows).

Our assessment relies upon the accuracy of the information contained in the documents and resources consulted on the date of production. Fellows can in no way be held responsible for the accuracy of such information or data supplied or for any hazard encountered at the site due to import of materials after this date.

Fellows is recognised as one of the leading UXO Risk Management companies specialising in UXO Risk Assessments, Site Survey, Ground Investigation Support and UXO Awareness Training.

Conducting these operations requires not only the most experienced field staff, but also dedicated and experienced project management. Careful planning and co-ordination are needed from start to finish, backed up by detailed operational procedures. With many years' experience, Fellows has built up a reputation for reliability, whatever the risk. In recognition of our commitment to the quality of our work and the health and safety of our workforce, Fellows has been awarded UKAS accreditations in both ISO 9001-2015 (Quality) and ISO 45001-2018 (Occupational Health & Safety).

**FELLOWS**  
The UXO risk management experts

Part of the Optima Group

Fellows International Ltd  
160 Ordnance Business Park  
Aerodrome Road  
Gosport  
Hampshire  
PO13 0FG

t. 08000 424 424  
e. [info@fellowsint.com](mailto:info@fellowsint.com)

## *Reports prepared by others*

Ridge and Partners LLP. June 2021. 'Ground Condition Assessment,' Ref 5015203-RDG-XX-ST-DOC-C-OOGCA01., undertaken for Bicester Motion.



# RIDGE

**GROUND CONDITION ASSESSMENT**

**BICESTER MOTION – INNOVATION QUARTER**

June 2021





## GROUND CONDITION ASSESSMENT

### BICESTER MOTION – INNOVATION QUARTER

June 2021

#### Prepared for

Bicester Motion  
Buckingham Road  
Bicester  
Oxfordshire  
OX26 5HA

#### Prepared by

Ridge and Partners LLP  
Partnership House  
Moorside Road  
Winchester  
Hampshire  
SO23 7RX

Tel: 01962 834400

#### Contact

Max Smeeth  
Senior Chartered Geo-Environmental Engineer  
msmeeth@ridge.co.uk  
07824 692661

Ridge and Partners LLP. December 2020. 'Review of Ground Investigation Reports and Detailed UXO Desk Study,'. Ref 5015286-RDG-XX-ST-DOC-C-00LR01.; undertaken for Bicester Motion - Innovation



# RIDGE

**REVIEW OF GROUND INVESTIGATION REPORTS &  
DETAILED UXO DESK STUDY**

**BICESTER MOTION – INNOVATION QUARTER**

December 2020



BICESTER  
MOTION

**REVIEW OF GROUND INVESTIGATION REPORTS &  
DETAILED UXO DESK STUDY**

**BICESTER MOTION – INNOVATION**

December 2020

**Prepared for**

Bicester Motion  
Buckingham Road  
Bicester  
Oxfordshire  
OX26 5HA

**Prepared by**

Ridge and Partners LLP  
Partnership House  
Moorside Road  
Winchester  
Hampshire  
SO23 7RX

Tel: 01962 834400

**Contact**

Max Smeeth  
Senior Chartered Geo-Environmental Engineer  
msmeeth@ridge.co.uk  
07824 692661

**VERSION CONTROL**

VERSION	DATE	DESCRIPTION	REPORT REFERENCE	CREATED	REVIEWED
01	21.12.20	First draft for comment	5012836-RDG-XX-ST-DOC-C-00LR01	MS	RJH

Carl Bro Group Limited. February 2002. 'Phase Two Land Quality Assessment,'. Ref 73.1247.02: undertaken for Defence Estates.



**DEFENCE ESTATES**



DE LIT BLAKEMORE DRIVE SUTTON COLDFIELD WEST MIDLANDS B75 7RL	
C. D NO 34091	COPY
SHELF MARK OP/LQA/00390C	

**RAF BICESTER ESA**

**PHASE TWO  
LAND QUALITY ASSESSMENT**

**LAND QUALITY ASSESSMENT REPORT**

**FINAL**

**PROJECT NO: 12074**

**LQA Report  
February 2003**

Defence Estates  
Copthorne Barracks  
Copthorne Road  
Shrewsbury  
SY3 7LT

Prepared by Carl Bro Group Limited  
for the Defence Estates under  
Term Commission DE 11/4470

**REPORT RELEASE SHEET**



**DEFENCE ESTATES**



**RAF BICESTER ESA**

**PHASE TWO  
LAND QUALITY ASSESSMENT**

**LAND QUALITY ASSESSMENT REPORT**

**FINAL**

**PROJECT NO: 12074**

Task Officer  
Defence Estates  
Cophorne Barracks  
Cophorne Road  
Shrewsbury  
SY3 7LT  
Tel: 01743 262071

Prepared by Carl Bro Group Limited  
for the Defence Estates under  
Commission DE11/4470

**Main Contributors**  
Owen Mills

Report Issued by:  
Owen Mills

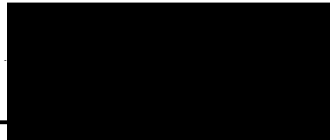


*OP* \_\_\_\_\_

Accepted by Task Officer  
on behalf of Defence Estates:

\_\_\_\_\_

Report Reviewed by:  
Colin Macdonald



*CP* \_\_\_\_\_

Accepted by Sponsor:

\_\_\_\_\_



Carl Bro Group Limited. February 2003. 'RAF Bicester Phase Land Quality Assessment Technical Note,'. Ref 73.1247.02: undertaken for Defence Estates.

RESTRICTED - COMMERCIAL



**DEFENCE ESTATES**



**RAF BICESTER ESA  
PHASE TWO  
LAND QUALITY ASSESSMENT**

**TECHNICAL NOTE**

**FINAL**

**PROJECT NO: 12074**

**Technical Note  
February 2003**

Defence Estates  
Cophorne Barracks  
Cophorne Road  
Shrewsbury  
SY3 7LT

Prepared by Carl Bro Group Limited  
for the Defence Estates under  
Commission DE11/4470

RESTRICTED - COMMERCIAL

RESTRICTED - COMMERCIAL

**REPORT RELEASE SHEET**



**DEFENCE ESTATES**



**RAF BICESTER ESA**

**PHASE TWO  
LAND QUALITY ASSESSMENT**

**TECHNICAL NOTE**

**FINAL**

**PROJECT NO: 12074**

Task Officer  
Defence Estates  
Cophorne Barracks  
Cophorne Road  
Shrewsbury  
SY3 7LT  
Tel: 01743 262071

Prepared by Carl Bro Group Limited  
for the Defence Estates under  
Commission DE11/4470

**Main Contributors**  
Owen Mills

Report Issued by:  
Owen Mills

Report Reviewed by:  
Colin Macdonald

\_\_\_\_\_  
Accepted by Task Officer  
on behalf of Defence Estates:

\_\_\_\_\_  
Accepted by Sponsor:

RESTRICTED - COMMERCIAL

Grontmij Group Limited. April 2008. Phase 2 Land Quality Assessment - Update – RAF Bicester Ref: P0000462400.

Defence Estates

**RAF Bicester**

DE Project No. 12074

**Phase 2 Land Quality  
Assessment - Update**

**Final**

April 2008

**Prepared for:**

**Defence Estates**

Kingston Road  
Sutton Coldfield  
West Midlands  
B75 7RL

**Prepared by:**

**Grontmij**

Grove House  
Mansion Gate Drive  
Leeds  
LS7 4DN

**T** +44 (0)113 262 0000

**F** +44 (0)113 307 3004

**E** enquiries@grontmij.co.uk



**DEFENCE ESTATES**



**RAF BICESTER**

**UPDATED PHASE 2**

**LAND QUALITY ASSESSMENT REPORT**

**DE PROJECT NO: 12074**

**FINAL**

LQA REPORT  
APRIL 2008

Defence Estates  
Kingston Road  
Sutton Coldfield  
West Midlands  
B75 7RL

Prepared by Grontmij Group Limited  
for the Defence Estates under  
Term Commission DE 11/4470

*Grontmij Group Limited. June 2008. Phase 2 Land Quality Assessment – RAF Bicester – Technical Note, Ref: P0000462400.*

Defence Estates

**RAF Bicester**

DE Project No. 12074

**Phase II Land Quality  
Assessment**

**Technical Note**

**Final**

**June 2008**

**Prepared for:**

**Defence Estates**

Kingston Road  
Sutton Coldfield  
West Midlands  
B75 7RL

**Prepared by:**

**Grontmij**

Grove House  
Mansion Gate Drive  
Leeds  
LS7 4DN

**T** +44 (0)113 262 0000

**F** +44 (0)113 307 3004

**E** enquiries@grontmij.co.uk



RESTRICTED - COMMERCIAL



**DEFENCE ESTATES**



**RAF Bicester**

**LAND QUALITY ASSESSMENT  
PHASE 2 TECHNICAL NOTE**

**DE PROJECT NO: 12074**

**FINAL**

TECHNICAL NOTE  
JUNE 2008

Defence Estates  
Kingston Road  
Sutton Coldfield  
West Midlands  
B75 7RL

Prepared by Grontmij Group Limited  
for the Defence Estates under  
Term Commission DE 11/4470

RESTRICTED - COMMERCIAL

*Crestwood Environmental Limited. July 2018. Phase 1 Land Contamination and Ground Condition Report, Ref: CE-BE-1363-RP03-Draft v1.0.*

# **Bicester Heritage Centre**

## **Phase 1 Land Contamination and Ground Condition Report**

**In support of a Planning Application for a Mixed Use  
Development at Bicester Heritage Centre, Buckingham  
Road, Bicester, Oxfordshire  
OX27 8AL**

Report Reference: CE-BI-1363-RP03-Draftv1.0



Produced by Crestwood Environmental Ltd.

3<sup>rd</sup> July 2018

Crestwood Report Reference: **CE-BI-1363-RP03-Draftv1.0**

<b>Version &amp; Status</b>	<b>Date Produced</b>	<b>Written / Updated by:</b>	<b>Checked &amp; Authorised by:</b>
Draft v1	03/07/2018	Stephen Barnes (Director & Principal Environmental Consultant)	Sid Lambert (Managing Director)

This report has been prepared in good faith, with all reasonable skill, care and diligence, based on information provided or known available at the time of its preparation and within the scope of work agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

The report is provided for the sole use of the named client and is confidential to them and their professional advisors. No responsibility is accepted to others.

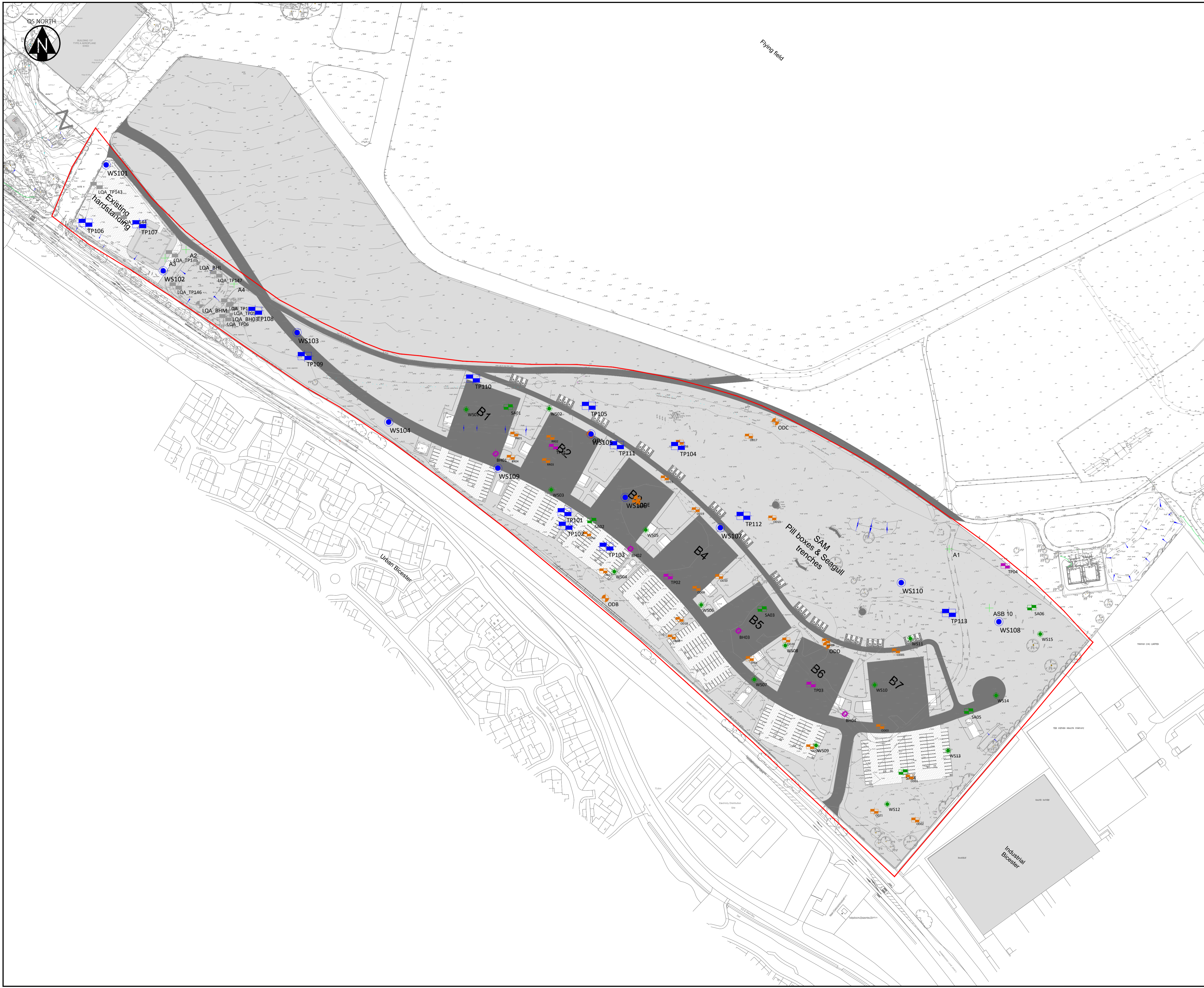
Crestwood Environmental Ltd.  
1-2 Nightingale Place  
Pendeford Business Park  
Wolverhampton  
West Midlands  
WV9 5HF

Tel: 01902 229 563

Email: [info@crestwoodenvironmental.co.uk](mailto:info@crestwoodenvironmental.co.uk)  
Web: [www.crestwoodenvironmental.co.uk](http://www.crestwoodenvironmental.co.uk)

# Appendix D Exploratory hole location plan, exploratory hole logs and photographs

## *Exploratory hole location plan*



**KEY**

- Site Boundary (approximate)
- Hydrock Dynamic Sampler Borehole
- Hydrock Trial Pit
- Superficial Samples
- ##

**Previous SI: Ridge Property & Construction Consultants (2021)**

- Rotary Borehole
- Dynamic Sampler Borehole
- Trial Pit
- Soakaway Pit

**Previous SI: LQA SI(2003)**

- Trial Pit
- Borehole

**Previous SI: LQA SI(2007)**

- Trial Pit
- Borehole

**NOTES**

- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
- This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.
- This drawing has been based on the following drawings and information: Ridge Property & Construction Consultants Topographical Survey No: 25557Q-1 Dated: August 2021. Indicative Layout Plan, Number: 220127-3DR-22-00-DR-A-08003. Dated: 01/06/23.

PO2	SECOND ISSUE					
RT	23/10/23	NT	23/10/23	JC		23/10/23
PO1	FIRST ISSUE					
SD	02/08/23	NT	02/08/23	JC		02/08/23
REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

**Hydrock**

Hawthorn Park  
Holdenby Road  
Spratton  
Northampton NN6 8LD  
TEL: 01604 842 888  
E-Mail: northampton@hydrock.com  
or visit www.hydrock.com

**CLIENT**

Bicester Motion Ltd

**PROJECT**

Bicester Motion Innovation Quarter

**TITLE**

Exploratory Hole Location Plan

HYDROCK PROJECT NO.	SCALE @ A1
27280	1:1250
PURPOSE OF ISSUE	STATUS
SUITABLE FOR INFORMATION	S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-XX-XX-DR-GE-1002	PO2

## *Exploratory hole logs*





Project: Bicester Motion Innovation Quarter

Borehole No

WS01

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459517.64, 224040.60

Checked By:

Hydrock Project No: 27280

Ground Level: 75.95m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	N=25 (4,5,4,5,7,9)		MADE GROUND (MADE GROUND)	0.25	(0.25)	75.70		
			1.60	SPT	50/75mm (,50)		CORNBRASH FORMATION (CORNBRASH FORMATION)	0.90	(0.65)	75.05		
							CORNBRASH FORMATION (CORNBRASH FORMATION)	1	(0.90)			
End of Borehole at 1.80m								1.80		74.15		
								2				
								3				
								4				
								5				
								6				

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No

WS02

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459577.32, 224039.86

Checked By:

Hydrock Project No: 27280

Ground Level: 75.93m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	50/75mm (.50)		MADE GROUND (MADE GROUND) CORNBRAH FORMATION (CORNBRAH FORMATION)	0.10 (0.10)	75.83			
							End of Borehole at 1.00m	1.10	74.83			
2												
3												
4												
5												
6												

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No  
WS03

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459579.64, 223982.37

Checked By:

Hydrock Project No: 27280

Ground Level: 75.74m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							TOPSOIL (MADE GROUND TOPSOIL)	0.10	(0.10)	75.64		
							MADE GROUND (MADE GROUND LANDFILL)		(0.40)			
							CORNBRASH FORMATION (CORNBRASH FORMATION)	0.50		75.24		
			1.00	SPT	N=45 (6,8,9,10,11,15)							
			1.50	SPT	50/75mm (.50)							
							End of Borehole at 1.70m					
								1.70		74.04		
								2				
								3				
								4				
								5				
								6				

General Remarks:

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459624.63, 223921.72

Checked By:

Hydrock Project No: 27280

Ground Level: 74.58m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	N=7 (2,2,2,1,1,3)		MADE GROUND (MADE GROUND TOPSOIL) MADE GROUND (MADE GROUND LANDFILL)	0.10	(0.10)	74.48		
			2.00	SPT	N=6 (1,2,2,1,1,2)				(2.70)			
			2.80	SPT	50/225mm (21,50,0,0)		CORNBRASH FORMATION (CORNBRASH FORMATION)	2.80		71.78		
								3.00	(0.20)	71.58		
								----- End of Borehole at 3.00m				

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No  
WS05

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459648.52, 223952.57

Checked By:

Hydrock Project No: 27280

Ground Level: 75.51m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	N=6 (3,2,2,2,1,1)		Made Ground (MADE GROUND TOPSOIL)	0.15	(0.15)	75.36		
			2.00	SPT	N=5 (1,1,2,1,1,1)		MADE GROUND (MADE GROUND LANDFILL)		(2.85)			
			3.00	SPT	N=50 (2,2,2,2,15,31)		CORNBRAsh FORMATION (CORNBRAsh FORMATION)	3.00		72.51		
								3.50	(0.50)	72.01		
								End of Borehole at 3.50m				

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No  
WS06

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459688.56, 223897.52

Checked By:

Hydrock Project No: 27280

Ground Level: 74.01m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							MADE GROUND (MADE GROUND TOPSOIL)	0.50	(0.50)	73.51		
			1.00	SPT	50/225mm (3,3,50,0,0)		CORNBRASH FORMATION (CORNBRASH FORMATION)	1	(1.00)			
			1.40	SPT	50/75mm (25,50)			1.50		72.51		
							End of Borehole at 1.50m					
								2				
								3				
								4				
								5				
								6				

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No  
WS07

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459727.31, 223843.21

Checked By:

Hydrock Project No: 27280

Ground Level: 73.25m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	50/75mm (.50)		TOPSOIL (MADE GROUND TOPSOIL)	0.30	(0.30)	72.95		
							CORNBRASH FORMATION (CORNBRASH FORMATION)		(0.70)	72.25		
							End of Borehole at 1.10m					
								1.00				
								2				
								3				
								4				
								5				
								6				

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No

WS08

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459749.62, 223867.81

Checked By:

Hydrock Project No: 27280

Ground Level: 74.22m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
							Made Ground (MADE GROUND TOPSOIL)	0.10	(0.10)	74.12		
							MADE GROUND (MADE GROUND)		(0.40)			
			1.00	SPT	N=50 (6,8,6,13,25,6)		CORNBRAsh FORMATION (CORNBRAsh FORMATION)	0.50		73.72		
			1.40	SPT	50/75mm (25,50)			1	(1.00)			
								1.50		72.72		
							End of Borehole at 1.50m					
								2				
								3				
								4				
								5				
								6				

General Remarks:





Project: Bicester Motion Innovation Quarter

Borehole No  
WS09

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459772.93, 223795.23

Checked By:

Hydrock Project No: 27280

Ground Level: 73.20m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	N=47 (8,17,11,8,12,16)		MADE GROUND (MADE GROUND TOPSOIL)	0.20	(0.20)	73.00		
			1.60	SPT	50/75mm (25,50)		CORNBRAsh FORMATION (CORNBRAsh FORMATION)		(1.40)	71.60		
							End of Borehole at 1.60m					
2												
3												
4												
5												
6												

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No

WS10

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459815.87, 223838.89

Checked By:

Hydrock Project No: 27280



Ground Level: 73.34m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth magl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	50/225mm (9,11,50,0,0)		MADE GROUND (MADE GROUND TOPSOIL)	0.20	(0.20)	73.14		
			1.40	SPT	50/150mm (20,5,50,0)		CORNBRAsh FORMATION (CORNBRAsh FORMATION)		(1.30)			
							End of Borehole at 1.50m	1.50		71.84		

General Remarks:

Method: Dynamic (Windowless) Sampler		Date(s):	
Client: Bicester Motion Ltd		Co-ords: 459841.44, 223865.71	Checked By:
Hydrock Project No: 27280		Ground Level: 74.14m OD	Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- station / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	N=50 (15,10,18,12,15,5)		MADE GROUND (MADE GROUND TOPSOIL) CORNBRAsh FORMATION (CORNBRAsh FORMATION)	0.15	(0.15)	73.99		
			1.70	SPT	50/150mm (17,8,50,0)			1.00	(1.85)			
End of Borehole at 2.00m								2.00		72.14		
								3.00				
								4.00				
								5.00				
								6.00				

General Remarks:







Project: Bicester Motion Innovation Quarter

Borehole No  
**WS14**

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459903.51, 223831.36

Checked By:

Hydrock Project No: 27280

Ground Level: 73.00m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- station / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.20				MADE GROUND (MADE GROUND TOPSOIL)	0.20	(0.20)	72.80		
			1.00	SPT	N=39 (9,10,10,10,10,9)		CORNBASH FORMATION (CORNBASH FORMATION)		(2.25)			
			2.00	SPT	50/150mm (9,16,50,0)							
End of Borehole at 2.45m								2.45		70.55		

General Remarks:



Project: Bicester Motion Innovation Quarter

Borehole No

WS15

Page No. 1 of 1

Method: Dynamic (Windowless) Sampler

Date(s):

Client: Bicester Motion Ltd

Co-ords: 459935.41, 223875.71

Checked By:

Hydrock Project No: 27280

Ground Level: 73.12m OD

Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrum- entation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			1.00	SPT	50/150mm (6,10,50,0)		MADE GROUND (MADE GROUND TOPSOIL) TOPSOIL (MADE GROUND)	0.10 (0.10)	73.02			
							CORNBRAsh FORMATION (CORNBRAsh FORMATION)	0.45	72.67			
								1				
								2	(2.00)			
								2.45	70.67			
								3				
								4				
								5				
								6				

End of Borehole at 2.45m

General Remarks:







Method: Trial Pit	Date(s): 11/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459589.96, 223955.69	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 75.19m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets and roots and rare medium gravel sized fragments of brick and coal. Gravel is sub-angular fine to medium of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	75.04	
0.30	D			Firm orangish brown very gravelly CLAY with occasional rootlets and medium gravel sized fragments of brick and ash. Gravel is sub-angular fine to medium of limestone. (MADE GROUND LANDFILL)	0.40	(0.25)	74.79	
0.70	B			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone. (CORNBASH FORMATION)	0.90	(0.50)	74.29	
0.70	ES			Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.10	(0.20)	74.09	
				Base of Excavation at 1.10m				
				2				
				3				
				4				
				5				

General Remarks:  
 1) Trial pit terminated at 1.10m bgl due to shallow rock. 2) Trial pit sides spalling from 0.50m to 1.10m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.90m: Easy, 0.90m - 1.10m: Difficult. 5) Trial pit backfilled with arisings upon completion.

Groundwater: Not encountered.



Method: Trial Pit	Date(s): 11/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459619.72, 223940.44	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 75.24m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10 0.10 0.10 - 0.20	B ES B			Dark grey mottled orangish brown clayey GRAVEL with frequent fine to coarse gravel sized fragments of brick (1-15cm), ceramic (1-10cm), ash (1-6cm), occasional metal wire (50cm), metal (1-15cm), clinker (1-6cm), glass (1-5cm) and roots and rootlets. (MADE GROUND LANDFILL)	0.30	(0.30)	74.94	
0.50	ES			Light orangish brown and dark grey mottled slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone with occasional fine to coarse gravel sized fragments of asphalt, asphalt and roots. (MADE GROUND LANDFILL)				
0.90	B				1	(1.30)		
1.70	ES			Very soft light brown, dark brown and grey mottled slightly sandy very gravelly CLAY with occasional orangish brown relict rootlets and rare fine gravel sized brick fragments. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND LANDFILL)	1.60	(0.40)	73.64	
2.60 2.60	B ES		▼	Soft light grey and light brown mottled slightly sandy very gravelly CLAY with occasional orangish brown relict rootlets. Gravel is sub-angular fine to coarse of limestone. (FOREST MARBLE FORMATION)	2	(0.80)	73.24	
3.00 3.00 3.00	D ES HSV	93kPa		Stiff bluish grey CLAY with occasional shell fossils. (FOREST MARBLE FORMATION)	2.80	(0.30)	72.44	
Base of Excavation at 3.10m					3.10		72.14	
					4			
					5			

General Remarks:  
 1) Trial pit terminated at 3.10m bgl. 2) Trial pit sides spalling from 2.00m to 3.10m due to groundwater in the pit. 3) Ease of excavation with a toothed bucket: 0.00m - 0.30m: Easy, 0.30m - 1.60m: Moderate, 1.60m - 3.10m: Easy. 4) Trial pit backfilled with arisings upon completion.



Method: Trial Pit	Date(s): 11/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459671.87, 224013.88	Stability: Stable.	Dimensions: <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 75.68m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and medium gravel sized fragments of brick. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.20	(0.20)	75.48	
0.30 0.30	B ES			Firm orangish brown very gravelly CLAY with occasional rootlets and medium gravel sized fragments of brick and ash. Gravel is sub-angular fine to medium of limestone. (MADE GROUND LANDFILL) ... Below 0.40m: Decreasing gravel content.	0.50	(0.30)	75.18	
				Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBRAsh FORMATION)	0.70	(0.20)	74.98	
				Base of Excavation at 0.70m				
				1				
				2				
				3				
				4				
				5				

General Remarks:  
 1) Trial pit terminated at 0.70m bgl due to shallow rock. 2) Trial pit sides stable. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.50m: Easy, 0.50m - 0.70m: Difficult. 5) Trial pit backfilled with arisings upon completion.

Method: Trial Pit	Date(s): 11/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459606.83, 224043.14	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 75.93m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and medium gravel sized fragments of brick. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	75.78	
0.30 0.30	B ES			Firm orangish brown very gravelly CLAY with occasional rootlets and medium gravel sized fragments of brick. Gravel is sub-angular fine to medium of limestone. (MADE GROUND LANDFILL)	0.50	(0.35)	75.43	
0.70 0.70	B ES			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone. (CORNBASH FORMATION)	0.80	(0.30)	75.13	
				Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel and cobbles. Fractures are infilled with clay. (CORNBASH FORMATION)	1.00	(0.20)	74.93	
				----- Base of Excavation at 1.00m				

General Remarks:  
 1) Trial pit terminated at 1.00m bgl due to shallow rock. 2) Trial pit sides spalling from 0.50m to 1.00m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.80m: Easy, 0.80m - 1.00m: Difficult. 5) Trial pit backfilled with arisings upon completion.



Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459239.92, 224176.60	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 77.80m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	B			Purplish grey slightly clayey sub-angular coarse GRAVEL of igneous rock with occasional rootlets. (MADE GROUND)	0.20	(0.20)	77.60	
0.30 0.30	B ES			Firm orangish brown slightly sandy gravelly CLAY with occasional rootlets. (CORNBASH FORMATION)	0.50	(0.30)	77.30	
0.60 0.60	B ES			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone with a low cobble content of sub-angular tabular limestone. (CORNBASH FORMATION)	0.90	(0.40)	76.90	
1.30 1.30	B ES			Firm light yellowish brown mottled light grey slightly sandy slightly gravelly CLAY with a low cobble content of sub-angular tabular limestone. Gravel is sub-angular fine to coarse of limestone. (CORNBASH FORMATION)	1.70	(0.80)	76.10	
				Strong LIMESTONE. (CORNBASH FORMATION)	1.75	(0.05)	76.05	
				Base of Excavation at 1.75m				
					2			
					3			
					4			
					5			

General Remarks:  
 1) Trial pit terminated at 1.75m bgl due to shallow rock. 2) Trial pit sides spalling from 0.90m to 1.75m due to granular material, fractured rock and groundwater in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.50m: Easy, 0.50m - 0.90m: Moderate, 0.90m - 1.70m: Easy, 1.70m - 1.75m: Difficult. 5) Trial pit backfilled with arisings upon completion.

Groundwater: Encountered at 1.70m bgl. Groundwater entered the pit at a moderate rate.

Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459279.16, 224175.59	Stability: Unstable.	Dimensions: <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 77.79m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and fine to coarse gravel sized fragments of brick and asphalt. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	77.64	
				Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBURASH FORMATION) ... From 0.15m to 0.20m: Parting of firm orangish brown clay.	0.60	(0.45)	77.19	
				Base of Excavation at 0.60m				
1								
2								
3								
4								
5								

General Remarks:  
 1) Trial pit terminated at 0.60m bgl due to shallow rock. 2) Trial pit sides spalling from 0.15m to 0.60m due to fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.15m: Easy, 0.15m - 0.40m: Difficult. 5) Trial pit backfilled with arisings upon completion.

Groundwater: Not encountered.



Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459363.64, 224112.42	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 76.61m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and fine to medium gravel sized fragments of brick and glass. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	76.46	
0.30	B			Firm orangish brown slightly sandy gravelly CLAY with occasional rootlets, low cobble content of limestone, medium gravel sized fragments of glass. Gravel is sub-angular fine to coarse of cream shelly limestone. (MADE GROUND)	0.45	(0.30)	76.16	
0.30	ES			Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.10	(0.65)	75.51	
1.30	B			Cream clayey sub-angular fine to coarse GRAVEL of brown shelly ooidal limestone lithorelicts. (CORNBASH FORMATION)	1.50	(0.40)	75.11	
1.30	ES			Firm cream mottled light brown gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse of limestone lithorelicts. (CORNBASH FORMATION)	1.80	(0.30)	74.81	
1.70	ES			----- Base of Excavation at 1.80m				
					2			
					3			
					4			
					5			

General Remarks:  
 1) Trial pit terminated at 1.80m bgl. 2) Trial pit sides spalling from 0.45m to 1.50m due to fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.45m: Easy, 0.45m - 1.10m: Moderate, 1.10m - 1.80m: Easy. 5) Trial pit backfilled with arisings upon completion.

Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459399.69, 224079.42	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 76.40m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	
Depth (m)	Type	Results							
0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and fine to medium gravel sized fragments of brick and asphalt. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	76.25		
0.20	B				0.25	(0.10)	76.15		
0.40	B			Tabular cobbles and boulders of limestone with occasional fine to coarse gravel sized fragments of asphalt. (MADE GROUND)	0.60	(0.35)	75.80		
0.40	ES								
0.80	B			Firm orangish brown slightly sandy gravelly CLAY with occasional rootlets, low cobble content of limestone, fine to medium gravel sized fragments of brick and asphalt. Gravel is sub-angular fine to coarse of cream shelly limestone. (MADE GROUND)	1.10	(0.50)	75.30		
0.80	ES								
				Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone with a low cobble content of sub-angular tabular limestone. (CORNBASH FORMATION)	1.20	(0.10)	75.20		
				Very strong grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)					
				Base of Excavation at 1.20m					

General Remarks:  
 1) Trial pit terminated at 1.20m bgl due to shallow rock. 2) Trial pit sides spalling from 0.60m to 1.00m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 1.10m: Easy, 1.10m - 1.20m: Very difficult. 5) Trial pit backfilled with arisings upon completion.





Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459522.40, 224063.05	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 76.31m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10 0.10	B ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and fine to coarse gravel sized fragments of and asphalt. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	76.16	
0.30 0.30	D ES			Firm light brown slightly sandy slightly gravelly CLAY with occasional rootlets and rare fine to medium gravel sized fragments of brick and asphalt. Gravel is sub-angular to rounded fine to coarse of limestone and quartzite. (MADE GROUND)	0.60	(0.45)	75.71	
0.70 0.70	B ES			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone with a low cobble content of sub-angular tabular limestone. (CORNBASH FORMATION)	0.80	(0.20)	75.51	
				Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1	(0.50)		
				Very strong grey vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.30 1.35	(0.05)	75.01 74.96	
				Base of Excavation at 1.35m				
2								
3								
4								
5								

**General Remarks:**  
 1) Trial pit terminated at 1.35m bgl due to shallow rock. 2) Trial pit sides spalling from 0.60m to 1.00m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.80m: Easy, 0.80m - 1.30m: Difficult, 1.30m - 1.35m: Very difficult. 5) Trial pit backfilled with arisings upon completion.

Groundwater: Not encountered.



Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459627.40, 224014.45	Stability: Unstable.	Dimensions: m <input type="text"/> m
Hydrock Project No: 27280	Ground Level: 75.57m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets and roots and rare medium gravel sized fragments of brick and coal. Gravel is sub-angular fine to medium of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	75.42	
0.40 0.40	B ES			Firm orangish brown slightly sandy gravelly CLAY with occasional rootlets, low cobble content of limestone, fine to medium gravel sized fragments of brick and asphalt. Gravel is sub-angular fine to coarse of shelly limestone. (MADE GROUND LANDFILL) ... Below 0.30m: <i>Becoming slightly sandy very gravelly.</i>	0.50	(0.35)	75.07	
0.60 0.60	B ES			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone with a low cobble content of sub-angular tabular limestone. (CORNBASH FORMATION)	0.70	(0.20)	74.87	
				Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.00	(0.30)	74.57	
				Very strong grey vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.20	(0.20)	74.37	
Base of Excavation at 1.20m								

General Remarks:  
 1) Trial pit terminated at 1.20m bgl due to shallow rock. 2) Trial pit sides spalling from 0.60m to 1.20m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.70m: Easy, 0.70m - 1.00m: Difficult, 1.00m - 1.20m: Very difficult. 5) Trial pit backfilled with arisings upon completion.



Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459719.60, 223962.87	Stability: Unstable.	Dimensions: m <input type="text"/> m <input type="text"/>
Hydrock Project No: 27280	Ground Level: 75.10m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and roots. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL) <i>... At 0.10m: Tree roots present in pit, tree not longer present on surface.</i>	0.15	(0.15)	74.95	
0.30	B			Soft orangish brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is sub-angular fine to coarse of shelly limestone. (CORNBASH FORMATION)	0.50	(0.35)	74.60	
0.30	ES							
0.55	B			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone with a high cobble content of sub-angular tabular limestone. (CORNBASH FORMATION) Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	0.60	(0.10)	74.50	
0.55	ES							
				Base of Excavation at 0.90m	0.90		74.20	
					1			
					2			
					3			
					4			
					5			

General Remarks:  
 1) Trial pit terminated at 0.90m bgl due to shallow rock. 2) Trial pit sides spalling from 0.50m to 0.90m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay 4) Ease of excavation with a toothed bucket: 0.00m - 0.60m: Easy, 0.60m - 0.90m: Difficult. 5) Trial pit backfilled with arisings upon completion.

Groundwater: Not encountered.



Method: Trial Pit	Date(s): 12/10/2023	Logged By: JM	Checked By: NT
Client: Bicester Motion Ltd	Co-ords: 459869.43, 223892.10	Stability: Unstable.	Dimensions: m <input type="text"/> m <input type="text"/>
Hydrock Project No: 27280	Ground Level: 73.82m OD	Plant: JCB 3CX	Scale: 1:25

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and roots and rare medium gravel sized fragments of ash and slag. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.10	(0.10)	73.72	
0.20	B			Soft orangish brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is sub-angular fine to coarse of shelly limestone. (CORNBASH FORMATION)	0.30	(0.20)	73.52	
0.20	ES			Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	0.60	(0.30)	73.22	
0.70	B			Light yellowish brown slightly clayey sub-angular fine to coarse GRAVEL of grey ooidal shelly limestone lithorelicts with a high cobble content of sub-angular tabular limestone lithorelicts. (CORNBASH FORMATION)	1.00	(0.40)	72.82	
0.70	ES			Strong very thinly bedded grey weathered yellowish brown vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.30	(0.30)	72.52	
				Very strong grey vertically fractured ooidal shelly LIMESTONE. Recovered as gravel, cobbles and boulders. Fractures are infilled with clay. (CORNBASH FORMATION)	1.40	(0.10)	72.42	
				Base of Excavation at 1.40m				
				2				
				3				
				4				
				5				

**General Remarks:**  
 1) Trial pit terminated at 1.40m bgl due to shallow rock. 2) Trial pit sides spalling from 0.30m to 1.40m due to granular material and fractured rock in the pit. 3) HSV not possible due to the high gravel content within the clay. 4) Ease of excavation with a toothed bucket: 0.00m - 0.30m: Easy, 0.30m - 0.60m: Moderate, 0.60m - 1.30m: Difficult, 1.30m - 1.40m: Very difficult. 5) Trial pit backfilled with arisings upon completion.

Groundwater: Not encountered.



Project: Bicester Motion Innovation Quarter

Borehole No  
WS101

Page No. 1 of 1

Method: Window Sampler	Date(s): 11/10/2023	Logged By: HT	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459254.96, 224218.79	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 78.12m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill	
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results								
			0.10	ES			Purplish grey slightly clayey sub-angular coarse GRAVEL of igneous rock with occasional rootlets. (MADE GROUND)	0.20	(0.20)	77.92			
			0.40	ES			Very soft orangish brown slightly sandy slightly gravelly CLAY with rare rootlets and fine gravel sized fragments of brick. Gravel is sub-angular to sub-rounded fine to coarse of limestone. (MADE GROUND)	0.40	(0.20)	77.72			
			0.60	SPT	N=33 (4,6,5,7,9,12)		Very soft light brown slightly sandy slightly gravelly CLAY with rare fine gravel sized fragments of brick. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND)	0.60	(0.20)	77.52			
			0.60 - 1.00	B			(MADE GROUND)		(0.40)				
			1.00	SPT	50/150mm (15,26,27,23)		Firm orangish brown slightly sandy slightly gravelly CLAY with rare fine gravel sized fragments of brick and a low cobble content of limestone. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND)	1.00		77.12			
							LIMESTONE (CORNBRASSH FORMATION)	1.15	(0.15)	76.97			
							End of Borehole at 1.15m						
<p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p>													

General Remarks:  
 1) Inspection pit hand dug to 0.60m bgl due to cobbles of limestone. 2) Borehole terminated at 1.15m bgl on SPT refusal. 3) Gas and groundwater monitoring well installed to 1.00m bgl, with the response zone between 0.50m and 1.00m. 4) Energy ratio (61%).

Groundwater: Not encountered.



Project: Bicester Motion Innovation Quarter

Borehole No  
WS102

Page No. 1 of 1

Method: Window Sampler	Date(s): 11/10/2023	Logged By: HT	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459296.55, 224141.55	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 77.13m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.10	ES			Brown slightly sandy slightly clayey GRAVEL. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND)	0.20	(0.20)	76.93		
			0.50	SPT	N=81 (9,12,12,17,22,30)		Soft light yellowish brown slightly sandy slightly gravelly CLAY with one cobble of limestone. Gravel is sub-angular fine to coarse of limestone. (CORNBRAsh FORMATION) ... At 0.30m: Cobble of limestone.	0.50	(0.30)	76.63		
			0.50 - 0.95	D			LIMESTONE (CORNBRAsh FORMATION)	0.95	(0.45)	76.18		
<p style="text-align: center;">----- End of Borehole at 0.95m -----</p>												
<p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">3</p> <p style="text-align: center;">4</p> <p style="text-align: center;">5</p> <p style="text-align: center;">6</p>												

General Remarks:  
 1) Inspection pit hand dug to 0.50m bgl due to the presence of shallow rock. 2) Borehole terminated at 0.95m bgl on SPT refusal. 3) Gas and groundwater monitoring well installed to 0.70m bgl, with the response zone between 0.40m and 0.70m. 4) Energy ratio (61%).

Groundwater: Not encountered.



Method: Window Sampler	Date(s): 10/10/2023	Logged By: HT	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459394.19, 224096.51	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 76.63m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and rare fine gravel sized fragments of ash. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL) ... At 0.05m: Cobble of limestone.	0.15	(0.15)	76.48		
			0.40	ES			Firm orangish brown slightly sandy gravelly CLAY with occasional rootlets and fine to medium gravel sized fragments of ash. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND) Grey LIMESTONE. Recovered as slightly sandy slightly clayey gravel. (CORNBRAsh FORMATION) End of Borehole at 0.90m					
			0.50	HSV	50kPa			0.60		76.03		
			0.60	SPT	51/150mm (12,15,24,27)							
			0.60 - 0.90	D					(0.30)	75.73		

General Remarks:  
 1) Inspection pit hand dug to 0.60m bgl due to the presence of shallow rock. 2) Borehole terminated at 0.90m bgl on SPT refusal. 3) Gas and groundwater monitoring well installed to 0.70m bgl, with the response zone between 0.40m and 0.70m. 4) Energy ratio (61%).



Project: Bicester Motion Innovation Quarter

Borehole No  
WS104

Page No. 1 of 1

Method: Window Sampler	Date(s): 10/10/2023	Logged By: JM	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459460.95, 224031.30	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 75.69m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill	
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results								
			0.05	ES	50/150mm (12,12,24,26)		Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and rare fine gravel sized fragments of brick. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.10	(0.10)	75.59	[Cross-hatch pattern]		
			0.20	ES			Firm brown slightly sandy gravelly CLAY with rare fine gravel sized fragments of brick. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND)	0.30	(0.20)	75.39	[Cross-hatch pattern]		
			0.40	SPT			Grey LIMESTONE. Recovered as clayey gravel. (CORNBRAH FORMATION)		(0.40)			[Brick pattern]	
			0.40 - 0.70	D			End of Borehole at 0.70m	0.70		74.99		[Brick pattern]	
								1					
								2					
								3					
								4					
								5					
								6					

General Remarks:  
 1) Inspection pit hand dug to 0.40m bgl due to the presence of shallow rock. 2) Borehole terminated at 0.70m bgl on SPT refusal. 3) Gas and groundwater monitoring well installed to 0.70m bgl, with the response zone between 0.50m and 0.70m. 4) Energy ratio (61%).

Groundwater: Not encountered.





Project: Bicester Motion Innovation Quarter

Borehole No  
WS105

Page No. 1 of 1

Method: Window Sampler	Date(s): 10/10/2023	Logged By: JM	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459608.49, 224022.52	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 75.81m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.15	ES	75/225mm (12,12,15,21,39)		Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets and occasional fine to medium gravel sized fragments of bitumen and brick. (MADE GROUND TOPSOIL)	0.20	(0.20)	75.61		
			0.25	ES			Firm brown slightly sandy slightly gravelly CLAY with occasional fine to coarse gravel sized fragments of brick, bitumen and ash. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND LANDFILL)	0.35	(0.15)	75.46		
			0.40	SPT			Grey LIMESTONE. Recovered as clayey gravel. (CORNBRAH FORMATION)		(0.42)			
			0.40 - 0.77	D				0.77		75.04		
							End of Borehole at 0.77m					
1												
2												
3												
4												
5												
6												

General Remarks:  
1) Inspection pit hand dug to 0.40m bgl due to the presence of shallow rock. 2) Borehole terminated at 0.77m bgl on SPT refusal. 3) Borehole backfilled upon completion. 4) Energy ratio (61%).

Groundwater: Not encountered.





Method: Window Sampler	Date(s): 10/10/2023	Logged By: JM	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459702.71, 223954.21	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 74.27m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.10	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is sub-angular fine to medium of limestone. (MADE GROUND TOPSOIL)	0.20	(0.20)	74.07		
			0.50	HSV	52kPa		Firm orangish brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular fine to coarse of limestone. (CORNBRAH FORMATION)		(0.50)			
			0.60	B								
			0.60	ES				0.70		73.57		
			0.80	ES			Firm light brown mottled grey slightly sandy slightly gravelly CLAY with occasional fine to medium gravel sized shell fossils. Gravel is sub-angular fine to coarse of limestone. (CORNBRAH FORMATION)		(0.30)			
			1.00	SPT	50/75mm (12,14,50)		Grey LIMESTONE. Recovered as clayey gravel. (CORNBRAH FORMATION)	1.00		73.27		
			1.00 - 1.23	D		▼			(0.23)	73.04		
End of Borehole at 1.23m												

General Remarks:  
 1) Inspection pit hand dug to 1.00m bgl due to the presence of shallow rock. 2) Borehole terminated at 1.23m bgl on SPT refusal. 3) Gas and groundwater monitoring well installed to 0.70m bgl, with the response zone between 0.30m and 0.70m. 4) Energy ratio (61%).

Groundwater: Encountered at 1.15m bgl. Groundwater entered the pit at a slow rate.

Method: Window Sampler	Date(s): 10/10/2023	Logged By: JM	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459905.79, 223885.67	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 74.16m OD		Scale: 1:30

Sample Run Info			Testing		Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type							
			0.00 - 0.30	B		Soft brown very gravelly CLAY with frequent rootlets and rare roots and a low cobble content of limestone. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	74.01		
			0.30 - 0.10	ES			Brown clayey sub-angular fine to coarse GRAVEL of limestone with a low cobble content of limestone. (CORNBRAH FORMATION)		(0.45)		
			0.60	SPT	N=60	Firm brown very gravelly CLAY with occasional rootlets and low cobble content of limestone. Gravel is sub-angular coarse of limestone. (CORNBRAH FORMATION)	0.60		73.56		
			0.60 - 1.00	D	(4,4,12,13,15,20)				(0.40)		
						Grey LIMESTONE. (CORNBRAH FORMATION)	1.00		73.16		
							1.05	(0.05)	73.11		
						End of Borehole at 1.05m					

General Remarks:  
 1) Inspection pit hand dug to 0.60m bgl due to due to limestone cobbles. 2) Borehole terminated at 1.05m bgl on SPT refusal. 3) Borehole backfilled upon completion. 4) Energy ratio (61%).



Project: Bicester Motion Innovation Quarter

Borehole No  
WS109

Page No. 1 of 1

Method: Window Sampler	Date(s): 11/10/2023	Logged By: HT	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459540.52, 223997.68	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 75.70m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.10	ES	60/225mm (12,15,15,21,24)		Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets and roots. Gravel is sub-angular to sub-rounded fine to coarse of limestone. (MADE GROUND TOPSOIL)	0.15	(0.15)	75.55		
			0.20	SPT			Soft cream slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND)	0.20	(0.05)	75.50		
			0.20 - 0.57	D			Grey LIMESTONE. Recovered as slightly clayey gravel. (CORNBRAH FORMATION)		(0.37)			
			0.30	D								
			0.30	ES					0.57		75.13	
							End of Borehole at 0.57m					
1												
2												
3												
4												
5												
6												

General Remarks:  
1) Inspection pit hand dug to 0.20m bgl due to the presence of shallow rock. 2) Borehole terminated at 0.57m bgl on SPT refusal. 3) Borehole backfilled upon completion. 4) Energy ratio (61%).

Groundwater: Not encountered.



Project: Bicester Motion Innovation Quarter

Borehole No  
WS110

Page No. 1 of 1

Method: Window Sampler	Date(s): 11/10/2023	Logged By: HT	Drilled By: ADS Drilling
Client: Bicester Motion Ltd	Co-ords: 459834.62, 223914.16	Checked By: NT	Rig: WS Rig
Hydrock Project No: 27280	Ground Level: 75.11m OD		Scale: 1:30

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	Instrumentation / Backfill
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results							
			0.10	ES	N=75 (10,12,15,19,26)		Very soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets and roots and rare fine to coarse gravel sized fragments of brick and glass. Gravel is sub-angular to sub-rounded fine to coarse of limestone and coal. (MADE GROUND TOPSOIL)	0.25	(0.25)	74.86		
			0.35	ES			Soft brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is sub-angular fine to coarse of limestone. (MADE GROUND)	0.40	(0.15)	74.71		
			0.40	SPT								
			0.40 - 0.85	D			Grey clayey LIMESTONE. Recovered as slightly sandy gravelly CLAY with sub-angular to sub-rounded fine to coarse limestone lithorelicts. (CORNBRAUSH FORMATION)	0.85	(0.45)	74.26		
							End of Borehole at 0.85m					

General Remarks:  
1) Inspection pit hand dug to 0.40m bgl due to the presence of shallow rock. 2) Borehole terminated at 0.85m bgl on SPT refusal. 3) Borehole backfilled upon completion. 4) Energy ratio (61%).

Groundwater: Not encountered.

## *Exploratory hole photographs*

<p><b>Site Investigation Photograph 1</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> TP101, showing Made Ground Topsoil over Made Ground Landfill over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 2</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP101, showing Made Ground Topsoil, Made Ground Landfill and Cornbrash Formation.</p>	



<p><b>Site Investigation Photograph 3</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> TP102, showing Made Ground Topsoil over Made Ground Landfill over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 4</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP102, showing Made Ground Topsoil and Made Ground Landfill and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 5</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP102, showing Made Ground Landfill and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 6</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> TP103, showing Made Ground Landfill over Forest Marble Formation</p>	

<p><b>Site Investigation Photograph 7</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP103, showing Made Ground Landfill.</p>	

<p><b>Site Investigation Photograph 8</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North-west.</p>	
<p><b>Description:</b> Spoil from TP103, showing Made Ground Landfill and Forest Marble Formation.</p>	

<p><b>Site Investigation Photograph 9</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> TP104, showing Made Ground Topsoil and Made Ground Landfill and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 10</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP104 showing Made Ground Topsoil, Made Ground Landfill and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 11</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> West</p>	
<p><b>Description:</b> TP105 showing Made Ground Topsoil, Made Ground Landfill and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 12</b></p>	
<p><b>Date:</b> 11/10/33</p>	
<p><b>Direction Photograph Taken:</b> West</p>	
<p><b>Description:</b> Spoil from TP105 showing Made Ground Topsoil, Made Ground Landfill and Cornbrash Formation.</p>	

<b>Site Investigation Photograph 13</b>	
<b>Date:</b> 11/10/33	
<b>Direction Photograph Taken:</b> West	
<b>Description:</b> Spoil from TP105 showing Made Ground Landfill and Cornbrash Formation.	

<b>Site Investigation Photograph 14</b>	
<b>Date:</b> 12/10/33	
<b>Direction Photograph Taken:</b> West	
<b>Description:</b> TP106 showing Made Ground over Cornbrash Formation.	

<p><b>Site Investigation Photograph 15</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP106 showing Made Ground.</p>	

<p><b>Site Investigation Photograph 16</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP106 showing Made Ground.</p>	

<p><b>Site Investigation Photograph 17</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> TP107 showing Made Ground Topsoil over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 18</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> Spoil from TP107 showing Made Ground Topsoil and Cornbrash Formation.</p>	



<p><b>Site Investigation Photograph 19</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> TP108 showing Made Ground Topsoil over Made Ground over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 20</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> TP108 showing Made Ground Topsoil over Made Ground over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 21</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> Spoil from TP108, showing Made Ground Topsoil, Made Ground over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 22</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> TP109 showing Made Ground Topsoil over Made Ground over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 23</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> Spoil from TP109 showing Made Ground Topsoil, Made Ground and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 24</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> South</p>	
<p><b>Description:</b> Spoil from TP109 showing Made Ground Topsoil, Made Ground and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 25</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> TP110 showing Made Ground Topsoil over Made Ground Landfill over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 26</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP110 showing Made Ground Topsoil and Made Ground Landfill.</p>	

<p><b>Site Investigation Photograph 27</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP110 showing Made Ground Landfill and Cornbrash Formation</p>	

<p><b>Site Investigation Photograph 28</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> TP111 showing Made Ground Topsoil over Made Ground Landfill over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 29</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP111 showing Made Ground Topsoil, Made Ground Landfill and Cornbrash Formation</p>	

<p><b>Site Investigation Photograph 30</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP110 showing Made Ground Landfill and Cornbrash Formation</p>	

<p><b>Site Investigation Photograph 31</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> TP112 showing Made Ground Topsoil over over Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 32</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP112 showing Made Ground Topsoil and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 33</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP112 showing Made Ground Topsoil and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 34</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> North</p>	
<p><b>Description:</b> TP113 showing Made Ground Topsoil over Cornbrash Formation.</p>	



<p><b>Site Investigation Photograph 35</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP113 showing Made Ground Topsoil and Cornbrash Formation.</p>	

<p><b>Site Investigation Photograph 36</b></p>	
<p><b>Date:</b> 12/10/33</p>	
<p><b>Direction Photograph Taken:</b> East</p>	
<p><b>Description:</b> Spoil from TP113 showing Cornbrash Formation.</p>	

# Appendix E Geotechnical test results and geotechnical plots

## *Geotechnical laboratory test results*



# LABORATORY REPORT



**Contract Number: PSL23/9066**

Report Date: 08 November 2023

Client's Reference:

Client Name: Hydrock  
2 Esh Plaza  
Sir Bobby Robson Way  
Great Park  
Newcastle upon Tyne  
NE13 9BA

**For the attention of: Nathan Thompson**

Contract Title: Bicester Motion

Date Received: 25/10/2023

Date Commenced: 25/10/2023

Date Completed: 8/11/2023

**Notes: Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins  
(Director)

R Berriman  
(Quality Manager)

S Royle  
(Laboratory Manager)

  
L Knight  
(Assistant Laboratory Manager)

S Eyre  
(Senior Technician)

T Watkins  
(Senior Technician)

5 – 7 Hexthorpe Road,  
Hexthorpe,  
Doncaster,  
DN4 0AR  
Tel: 01302 768098  
Email: rberriman@prosoils.co.uk  
awatkins@prosoils.co.uk

Page 1 of

# SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP101	1	B	0.45		Brown very gravelly sandy CLAY.
TP103	1	LB	0.10		MADE GROUND brown sandy very clayey GRAVEL.
TP103	2	LB	2.60		Brown very gravelly sandy CLAY.
TP104	1	B	0.30		Brown very gravelly sandy CLAY.
TP106	1	B	0.30		Brown very gravelly sandy CLAY.
TP106	1	LB	1.30		Brown sandy very clayey GRAVEL.
TP108	1	B	0.30		Brown gravelly sandy CLAY.
TP110	1	D	0.30		Brown slightly gravelly sandy CLAY.
TP112	1	B	0.30		Brown sandy very clayey GRAVEL.
WS102	1	D	0.50	0.95	Brown slightly gravelly sandy CLAY.
WS107	1	B	0.60		Brown gravelly sandy CLAY.



Bicester Motion

**Contract No:**

**PSL23/9066**

**Client Ref:**