

Unit 10 Coopers Place Combe Lane, Godalming Surrey GU8 5SZ Tel: 01883 343572 Fax: 01883 344060 email: enquiries@riskmanagementltd.co.uk Web: www.riskmanagementltd.co.uk

PROJECT No. RML 7118 SITE INVESTIGATION

AT LAND NORTH OF BICESTER ROAD, LAUNTON, BICESTER

ON BEHALF OF CREATED LIFE THREE (BICESTER) LIMITED

MAY 2021













CONTENTS

1.0 INTRODUCTION & SCOPE OF WORKS

- 2.0 FIELDWORK
- 3.0 GROUND CONDITIONS
- 4.0 **DISCUSSION**

APPENDICES

- Light Percussion Borehole Records (BH1-BH3)
- Falling Head Permeability Test Results Sheet (SA1)
- Proposed Site Plan, Messrs. The Harris Partnership Architects Drawing No. 15987-002, Revision A.
- Sketch Fieldwork Location Plan, Drawing No. RML 7118/1

1.0 INTRODUCTION & SCOPE OF WORKS

- 1.1 This report has been prepared by Risk Management Limited (RML) under cover of Messrs. The Rowe Partnership Limited's signed Instructions to Proceed, dated 22nd March 2021 on behalf of the Client, Messrs. Created Life Three (Bicester) Limited.
- 1.2 The site under consideration is a plot of land to the north of the A4421 Bicester Road, Launton, Bicester, OX26 5AF.
- 1.3 It is understood that the currently proposed development at the site will consist of a Greggs 'Drive-Thru' Unit and associated hardstanding and car parking. The plan layout of the currently proposed development is indicated on the appended Proposed Site Plan, Messrs. The Harris Partnership Architects Drawing No. 15987-002, Revision A.
- 1.4 The current work was commissioned to provide preliminary information on the sub-soil conditions at this site in order to provide information for subsequent road pavement design and assess the soakage characteristics of the underlying soil.
- 1.5 Risk Management Limited have also carried out a Phase I, *Non-Intrusive*, Desk Study which has been issued under separate cover.
- 1.6 This report presents the work carried out and discusses the findings.

2.0 FIELDWORK

- 2.1 All fieldwork was generally executed in accordance with the recommendations given in British Standard BS 5930:2015, "Code of Practice for Ground Investigations".
- 2.2 The borehole and CBR locations are shown on the appended Sketch Fieldwork Location Plan, Drawing No. RML 7118/1.
- 2.3 Fieldwork was undertaken on Saturday 10th April 2021 and comprised the following:-

Light Percussion Boreholes

- 2.4 A total of three light percussion boreholes (BH1-BH3) were drilled at this site. All three boreholes were terminated owing to SPT 'N' values in excess of 50 being encountered at depths ranging between 1.55m and 1.70m below existing ground level.
- 2.5 The drilling rig used was a Premier tracked drive-in-sampler rig which includes a 98mm diameter casing system driven into the ground with a series of 1-metre long metal tubes, varying in diameter from 80mm down to 35mm, driven through the casing to obtain disturbed samples at regular depth intervals.
- 2.6 Standard Penetration Tests (SPT's) were carried out in order to provide information on the consistency of the material encountered.
- 2.7 The Dynamic Probe employed comprises a weight of 63.6 kg dropping through a free-fall height of 762mm in accordance with British Standard BS 1377 : Part 9. The weight drives a 50mm diameter "split-spoon" sampler into the ground. The resistance to penetration is recorded for 6 consecutive 75mm increments with the SPT 'N' value calculated from an addition of the final four 4 readings.
- 2.8 Upon completion of borehole BH1 a combined groundwater/gas monitoring standpipe was installed to a depth of 1.70m below existing ground level. The monitoring installation comprised a 0.7 metre length of plain 50mm diameter HDPE pipe followed by slotted geotextile wrapped HDPE pipe, capped at the base. A cement/bentonite seal was installed from 1.00m to ground level and the installation was finished with a gas valve on top of the pipe.
- 2.9 Full details of the Light Percussion borehole findings are given on the appended borehole record sheets.



MEXE Probe (CBR) Tests

- 2.10 In addition to the above noted boreholes, six MEXE Probe tests were undertaken across the site of the proposed hardstanding and access roads at a depth of 0.50m below existing ground level in order to provide California Bearing Ratio (CBR) information for road pavement design.
- 2.11 The MEXE Probe consists of a cast aluminium housing containing a calibrated compression spring, operating shafts and dials with a CBR cone. The instrument is forced into the ground and an average of the readings obtained is considered the CBR value.
- 2.12 The following CBR test values were obtained at 0.50m below existing ground level.

CBR1 (BH1)	-	4.5%	-	Natural Ground
CBR2 (BH2)	-	4%	-	Natural Ground
CBR3	-	3.5%	-	Natural Ground
CBR4	-	5%	-	Natural Ground
CBR5	-	5%	-	Natural Ground
CBR6	-	7%	-	Natural Ground

Falling Head Permeability Test

- 2.13 One Falling Head Permeability Test (SA1) was carried out at a depth of 1.70m in the standpipe installed within borehole BH1.
- 2.14 The permeability test undertaken at this site was a falling head test undertaken in accordance with B.S. 5930:2015.
- 2.15 Full details are given on the attached summary sheet together with any assumptions made to obtain the permeability of the material tested and to help assess the drainage potential of the ground for proposed soakaways.

3.0 GROUND CONDITIONS

- 3.1 According to information published by the British Geological Survey (BGS) (1:50,000 Drift Edition, Sheet 219, Buckingham) the site is shown as being the Cornbrash Formation (limestone, grey to brown, rubbly) of the Great Oolite Group (GtO). An area of possible overlying Alluvium is shown in the far southern portion of the current site.
- 3.2 The Cornbrash Formation consists of limestone, medium to fine-grained and generally bluish grey when fresh and olive or yellowish brown when weathered. It belongs to the Great Oolite Group which consists of a variety of mudstone-dominated and ooidal, bioclastic and fine-grained limestone formations.
- 3.3 Full details of the ground conditions encountered are presented on the borehole records appended to this report and can be summarised as follows.

Depth from (m)	Depth to (m)	Description
0.00	0.15/0.20	Grass over Topsoil.
0.15/0.20	0.60	SAND.
0.60	1.50/1.60	Silty CLAY.
1.50/1.60	1.70 +	LIMESTONE.

3.4 Groundwater was not encountered during boring.

4.0 DISCUSSION

4.1 It is understood that the current work was commissioned to provide preliminary information on the sub-soil conditions at this site in order to provide information for subsequent road pavement design and assess the soakage characteristics of the underlying soil.

ROAD PAVEMENT DESIGN

4.2 The results of the current work recorded CBR values at 0.50m depth varying between 3.5% and 7% across the site. We would therefore recommend adopting a CBR value of some 3-4% in natural ground, beneath any topsoil, across the site.

SOAKAWAYS

- 4.3 One Falling Head Permeability test has been undertaken at this site within the standpipe installed in borehole BH1 at a depth of 1.70m below existing ground level.
- 4.4 Soakage was found to be "good" within the standpipe fitted within borehole BH1, however, owing to the shallow depth of the test the results pertain to the superficial deposits overlying the Limestone.
- 4.5 The underlying Limestone would be expected to exhibit "macro" permeability i.e., soakage through the fractures and fissures within the overall Limestone strata rather than through the Limestone itself.
- 4.6 Therefore, based on these results, we would recommend that a larger scale BRE Digest 365 Infiltration Test is undertaken just into the top of the underlying Limestone to check for the overall permeability at this location.

SOIL SAMPLES

4.7 All soil samples will be kept for a period of 28 days after the date of the invoice for this project unless otherwise notified to Risk Management Limited in writing. Should samples be required to be stored for longer than 28 days then a storage charge may be levied.



Prepared By :

Richard Price B.Sc. (Hons), F.G.S., M.I.Env.Sc. Project Manager



Checked By :

Malcolm S. Price B.Sc., M.Sc., M.I.C.E., C.Eng., M.I.Env.Sc. Director

Distribution : The Rowe Partnership Limited – pdf copy

The recommendations made and the opinions expressed in this report are based on the borehole records, examination of samples and the results of site tests.

The report is issued on the condition that Risk Management Limited will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the boreholes, trial pits or other tests carried out during the investigation.

In addition, Risk Management Limited will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata both between the borehole and/or trial pit positions and/or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.

Groundwater levels may also vary with time from those reported during our site investigation due to factors such as tidal conditions, heavy pumping from nearby wells or seasonal changes.

No person other than the client to whom this report is addressed, shall rely on it in any respect and no duty of care shall be owed to any such third party.

Copyright of this Report remains with Risk Management Limited and in addition we will not accept any responsibility for the report and recommendations given until our invoice is settled in full.



Risk Management Limited Unit 10 Coopers Place Combe Lane Godalming Surrey GU8 5SZ

Borehole Log

Borehole No.

BH1

		- Sur	rey GU8 5SZ							S	heet 1 o	f 1
Рі	roject RMI 7118	Coor	linates					Drillin	g Technique:		Leve	(m):
N	0.							Light P	ercussion Rig		<u> </u>	
Si	te Land to the North	n of Biceste	er Road, L	aunton,		Date:	10/04/2	021	Diameter (n	nm):	Sca	ale:
A	ddress: Bicester, 0X26 5A	\F 			T				85			25
	Stratum Description	1	Legend	Depth (m)	Level (m		amples ai	nd In Situ	Testing		Water	Well
	Grass over Topsoil			(,		Depth (m)	Sample Type	Test Type	Results		Strikes	
_	· · · · · · · · · · · · · · · · · · ·			0.15		0.15	D1					
-	Orange and orange-brown S	AND										
_	with fragments of sandstone	2.				0.50	50	MEVE	4 5 9/			
-		-		0.60		0.50		IVIEAE	4.5 %			
-	 Grev silty CLAY.	-	×××									
_		-	^××									
1	_	-	^			1.00	D3					
		-	<u>× </u>									
-	-	-	<u>× </u>									
-		-	<u> </u>									
_			××^^	1.60		1.50	D4					
-		ļ		1.70		1.70		SPT	50 (25 for 35m	m/50		
-	Borehole terminated at 1.70m d	epth							for 25mm)		
2—												
-	-											
_												
-	-											
-	-											
-	-											
3												
-	-											
-												
-												
_												
-												
4-												
-	-											
-												
-	-											
-												
_	-											
-	-											
5-												
Service pit excavated to 1.20m depth. Groundwater not						К	EY					
Rem	noted during boring	g. Standpip	e installe	d to 1.70	m depth.	D = Disturb U = Undistur	ed Sample bed Sample	CPT = Cone SPT = Standar	Penetration Test d Penetration Test			
	Borehole terminate values in excess of F	a at 1.70m 50.	n depth o	wing to S	РТ 'N'	B = Bulk W = Wate	Sample r Sample	V = \ PP = Pocket	ane Test Penetrometer		Aug	
MEAE = INSILU CBK test												



Risk Management Limited Unit 10 Coopers Place Combe Lane Godalming Surrey GU8 5SZ

Borehole Log

Borehole No.

BH2

	en le le gernerie	Surrey GU8 5SZ							Sheet 1 o	f 1
Pr	roject	Coordinates:	·				Drillin	g Technique:	Leve	l (m):
N	0.	coordinates.					Light P	ercussion Rig		
Si	te Land to the North of	f Bicester Road, L	aunton,		Date:	10/04/2	021	Diameter (mm)	: Sca	ale:
A	ddress: Bicester, OX26 5AF							85	1:	25
	Stratum Description	Legend	Depth	Level (m)	S	amples ar	nd In Situ	Testing	Water	Well
	· · · · · · · · · · · · · · · · · · ·		(m)		Depth (m)	Sample Type	Test Type	Results	Strikes	
_	Grass over Topsoll				0 15	D1				
_			0.20		0.15					
_	Orange SAND with occasional									
_	fragments of sandstone.				0.50	D2	MEXE	4.0 %		
_		××	0.60							
_	Grey silty CLAY.	×_×_×								
_		×_*_×								
1 —		<u> </u>			1.00	D3				
_		<u>×_×_×</u>								
_		<u>××</u> ×								
-		<u>××</u> ×								
_		<u> </u>	1.50		1.50	D4	SPT	N=50 (25 for		
_	Grey LIMESTONE.		1.55		1.55			30mm/50 for		
-	Borenole terminated at 1.55m depti	n						2011111		
-										
2										
_										
_										
_										
_										
_										
_										
3-										
-										
-										
_										
_										
-										
4 —										
-										
_										
-										
-										
5-										
	<u> </u>			I		K	E Y			
	Service pit excavated t	o 1.20m depth. (Groundw	ater not	D = Dicturb	ed Sample	CPT = Cone l	Penetration Test		1
Rem	narks: noted during boring. E	Borehole termina	ted at 1.5	55m depth		bed Sample Sample	SPT = Standard V = V	d Penetration Test 'ane Test	AGS	
	owing to SPT 'N' value	s in excess of 50.			ы = Bulk W = Wate	r Sample	PP = Pocket MEXE = Ir	t Penetrometer nsitu CBR test	intero	
L										



Risk Management Limited Unit 10 Coopers Place Combe Lane Godalming Surrey GU8 5SZ

Borehole Log

Borehole No.

BH3

	Surrey GU8 5SZ								Sł	neet 1 of	f 1
Pr	roject	Coordinates					Drillin	g Technique:		Level	(m):
N	0.	coordinates.		1			Light P	ercussion Rig		<u> </u>	
Si	te Land to the North o	f Bicester Road, L	aunton,		Date:	10/04/2	2021	Diameter (n	nm):	Sca	ile:
A	ddress: Bicester, 0X26 5AF							85		1:2	25
	Stratum Description	Legend	Depth (m)	Level (m)	S	amples ai	nd In Situ	Testing		Water Strikes	Well
	Grass over Topsoil		(11)		Depth (m)	Sample Type	Test Type	Results		JUIKES	
			0.20		0.15	D1					
-			0.20								
-	fragments of sandstone										
			0.60		0.50	D2					
-	Crow cilty CLAV	× <u> </u>	0.00								
-	Grey Silly CLAY.										
1					1.00	D3					
-		××- × ××			2.00						
-		×_×_×									
_		×_×_×									
_			1.50		1.50	D4	SPT	N=50 (25 fr	or		
	Grey LIMESTONE.	/ /	1.55		1.55			40mm/50 f	or		
-	Borehole terminated at 1.55m dept	h						25mm)			
-											
2											
-											
-											
_											
_											
-											
3 —											
-											
-											
-											
-											
4											
-											
-											
-											
-											
_											
-											
-5											
<u> </u>						к 	EY				
	Service pit excavated	to 1.20m depth. (Groundwa	ater not	D - Disturb	n ed Sample	CPT = Cone F	Penetration Test			
Rem	narks: noted during boring. E	Borehole termina	ted at 1.5	5m depth	U = Undistur	bed Sample Sample	SPT = Standard V = V	Penetration Test ane Test		AGS	
	owing to SPT 'N' value	ы = Bulk W = Wate	r Sample	PP = Pocket MEXE = In	Penetrometer situ CBR test		nele				

्राभूमिः Risk Management			梢t ent	FALLI	NG HEAD PERMEABILITY TEST Risk Management Limited Tel : 01883 343572
Pro	ject Name :	Land North Bicester, OX	of Bicester Road 26 5AF	, Launton,	SOAKAWAY TEST SA1 (BH1) Job No. RML 7118 Date : May 2021
Test [Depth	Ho	=		
1.	.7	1.7	70		
Depth (m)	Time (mins)	Н	H/H₀		
0.000 0.500 0.610 0.620 0.640 0.670 0.770 0.870 0.940 1.020 1.120 1.190 1.200 1.250	0 1 2 3 4 5 10 20 35 60 90 115 120 135	$1.70 \\ 1.20 \\ 1.09 \\ 1.08 \\ 1.06 \\ 1.03 \\ 0.93 \\ 0.83 \\ 0.76 \\ 0.68 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.45 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ 0.51 \\ 0.50 \\ $	$ \begin{array}{c} 1.00\\ 0.71\\ 0.64\\ 0.62\\ 0.61\\ 0.55\\ 0.49\\ 0.45\\ 0.40\\ 0.34\\ 0.30\\ 0.29\\ 0.26\\ \end{array} $		
Diameter of pi Area (A) = Intake factor (Basic Time Fac Permeability (ipe = F) = ctor (T) = k) =	0.054 0.0023 0.15 75.0 3.43E-06	(m) (m ²) (min) m/sec		0.10



