



Civil Engineers & Transport Planners

Bicester Golf and Country Club

Flood Risk Assessment

January 2017

160842/FRA/MK/KTP/01



Civil Engineers & Transport Planners

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- Level 1 SFRA Map – Cherwell District Council
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1 INTRODUCTION

1.1 General

1.1.1 Lanmor Consulting Ltd has been appointed by Bicester Hotel to prepare a Flood Risk Assessment (FRA) report for the proposed development of a swimming lake within the grounds of Bicester Golf and Country Club, Akeman Street, Chesterton, Bicester, Oxfordshire, OX26 1TE. The location for the site is shown below as figure 1.1.

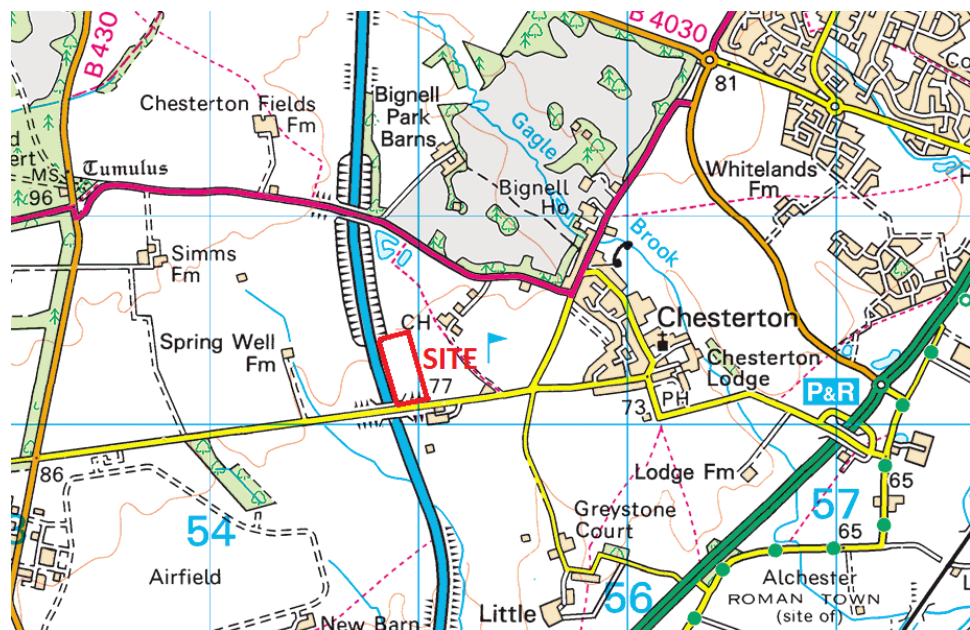


Figure 1.1 - Location Plan

1.2 Scope

1.2.1 This report describes the existing site conditions, development proposals and implications of flooding on the development as described in the governments guidance document; National Planning Policy Framework (NPPF) and its technical guidance. This report will consider the following:

- Development proposals
- Sources of flooding and flood defences
- Flooding extents, depth, and climate change predictions
- Impact of flooding on the development
- Dangers presented by flooding

- 1.2.2 This FRA has been prepared in accordance with the requirements of the National Planning Policy Framework (NPPF) and its accompanying Planning Practice Guidance. It will demonstrate that the proposed development will be safe and will not increase flood risk.
- 1.2.3 This FRA has been prepared for the planning application of a swimming lake within the grounds of Bicester Hotel. The lake is proposed to be approximately 160 x 30m. The layout of the swimming lake is indicated on drawing SK.14-652-03A in Appendix A.

2 BASELINE CONDITIONS

2.1 Existing Site

2.1.1 The hotel is located adjacent to Green Lane and approximately 4km to the west of Bicester North Station. The nearest watercourse, Gaggle Brook is 2km to the east of the site. The existing site is a hotel and golf club providing a range of facilities, the swimming lake to be a new facility.

2.2 Development Proposal

2.2.1 The proposed swimming lake will be approximately 4,800m² (160m x 30m) and located to the south west of the hotel.

2.3 Geology

2.3.1 The British Geological Survey (BGS) indicates that the Cornbrash Formation underlies the site. This sedimentary bedrock was formed approximately 161 to 168 million years ago, in the Jurassic Period. These rocks were formed in warm shallow seas with carbonate deposited on platform, shelf, and slope areas; often rich in corals and shelly faunas. There is no indication that there are any superficial deposits overlaying the bedrock.

3 SOURCES OF FLOODING

3.1 Fluvial/Tidal Flooding

3.1.1 Flood information has been extracted from the Environment Agency (EA) for this site. The National Planning Policy Framework (NPPF) defines the flood zone as follows:

- Zone 1: 'Low Probability' - This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (1%-0.1%)
- Zone 2: 'Medium Probability' – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year
- Zone 3a: 'High Probability' – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b: 'The Functional Floodplain' – This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes.

3.1.2 The Environment Agency (EA) has confirmed that the site is currently within Flood Zone 1 with a probability of flooding of less than 0.1% in any year (EA response included in Appendix A). As the swimming lake is a significant distance from the nearest river, site has a very low risk of fluvial flooding. The SFRA Map provided by Cherwell District Council included within Appendix A, shows the main rivers, flood zones, and defences within Chesterton – it also states no historical flood events have been recorded for this area. Figure 3.1 below indicates the flood extents prepared by EA and shows the site is in Flood Zone 1.

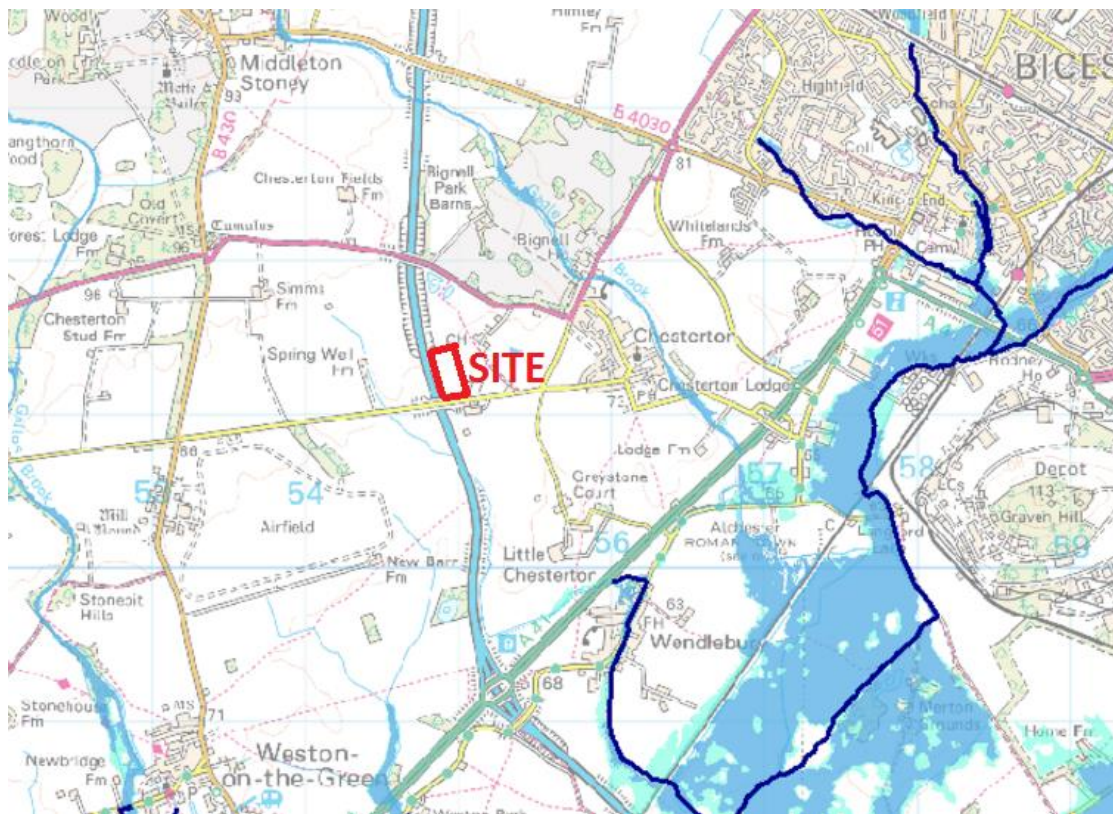


Figure 3.1 – Environment Agency Flood Map

3.2 Sewer Flooding

3.2.1 The most recent sewer flood reports provided by Oxfordshire County Council (last updated in November 2016) outlines that the site has not been subject to any sewer flooding. A small number of incidents have been reported in other areas within the borough, mainly in Bicester, however they were a substantial distance from the site, therefore the risk of the proposed lake being subject to sewer flooding is relatively low. The figure 3.2 below shows the sewer flood map which outlines the locations of where drainage flooding has taken place and the distance from the site.

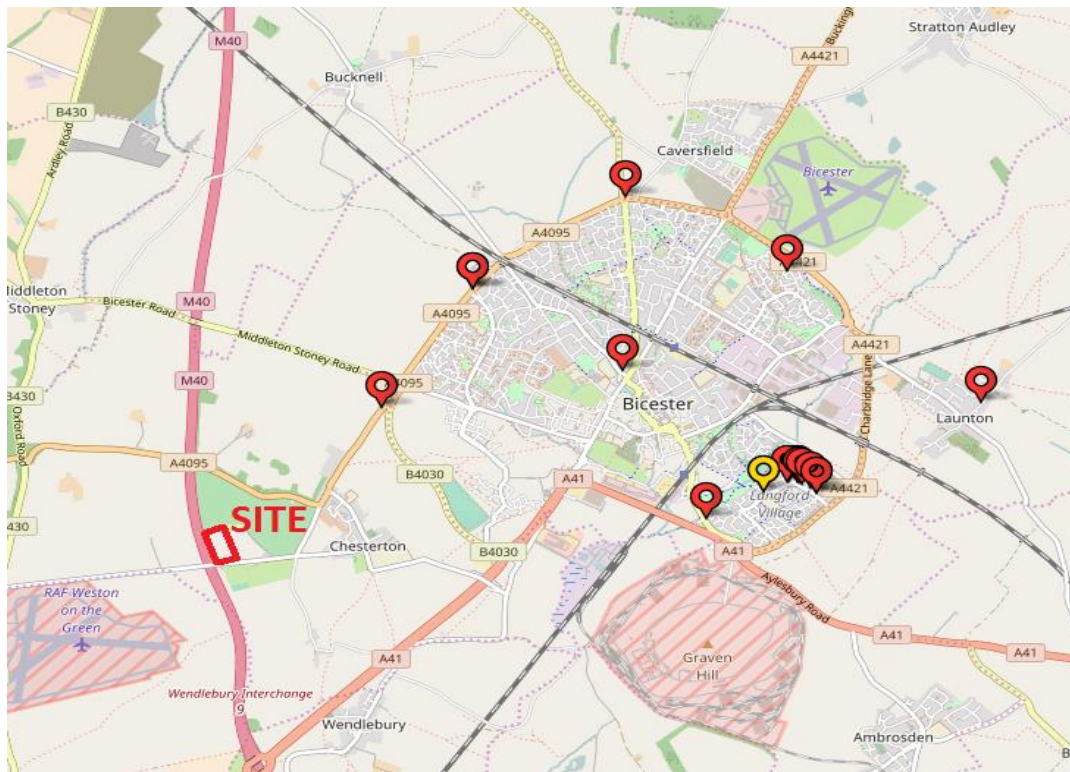


Figure 3.2 – Sewer Flooding Map

3.3 Groundwater Flooding

3.3.1 Information provided by Oxfordshire County Council for the SFRA shows no historic groundwater flooding of the site. The geology was also considered and as the underlying Cornbrash Formation is classified as a Secondary Aquifer which comprises, “permeable layers capable of supporting water supplies at a local rather than strategic scale”; it suggests the risk of groundwater flooding is likely to be small. There is also no history of groundwater flooding occurrences within the site.

3.4 Surface Water Flooding

3.4.1 Bicester Hotel is indicated to have a low probability of being prone to surface water flooding, on the EA surface water flood maps. Figure 3.3 below shows the site is in a low risk area and there is no record that the site has suffered from surface water flooding.

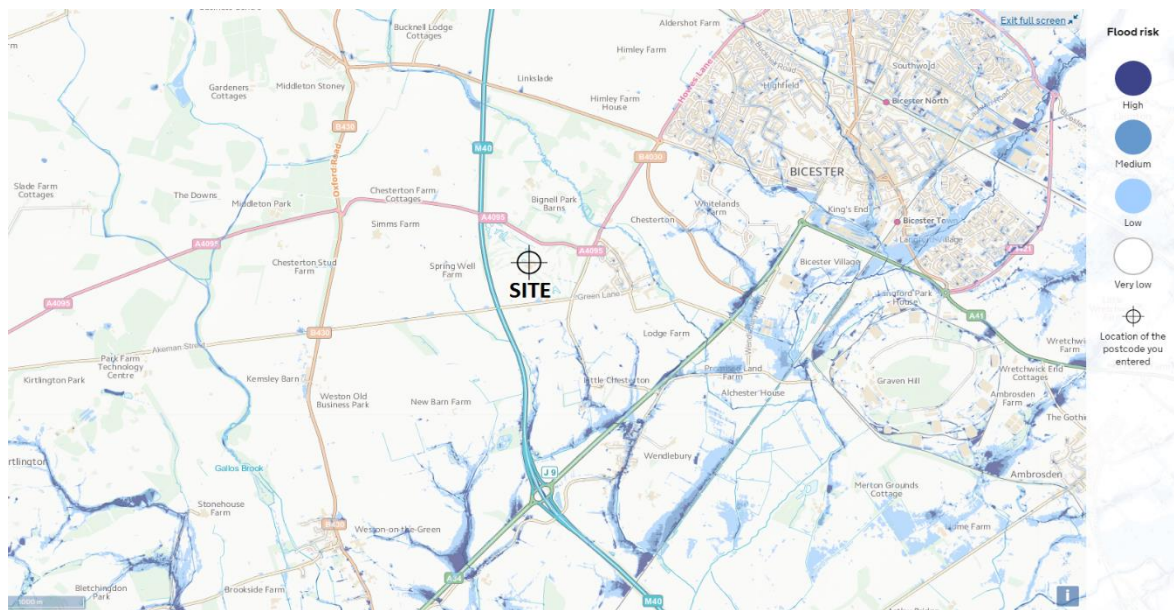


Figure 3.3 – Surface Water Flood Map

3.5 Reservoir Flooding

3.5.1 The EA reservoir flood mapping illustrates that the site will not be affected by reservoir flooding, therefore it is concluded to have a low risk. Figure 3.4 below outlines the nearest reservoirs and the proximity to the site to potential flood risk.

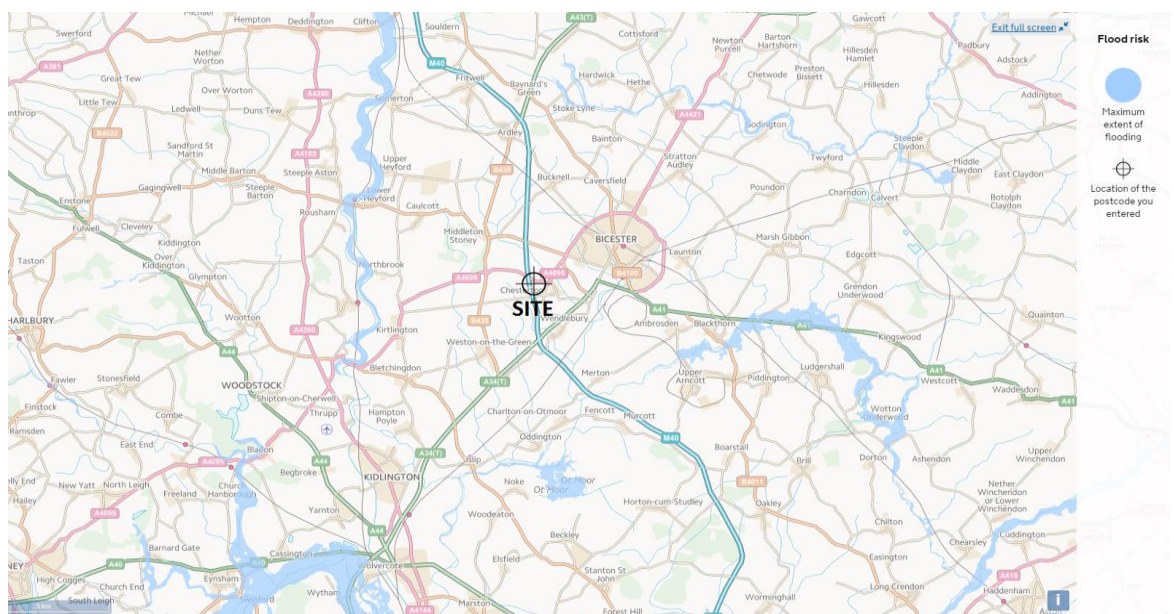


Figure 3.4 – Reservoir Map

3.6 Existing Flood Defences

- 3.6.1 The Level 1 SFRA Map provided by Cherwell District Council included in Appendix A, shows the flood defences for the main rivers in Chesterton and Bicester – no defences are in place for Gaggle Brook however a river much further east of the site comprises a flood defence.

4 FLOOD PROBABILITY AND CLIMATE CHANGE

4.1 Flood Probability

4.1.1 The main source of fluvial flooding for the site comes from Gaggle Brook however due to the site being a significant distance from the river, it is clear of any likely flooding. Information provided from the Environment Agency (EA) states the site is situated in a Flood Zone 1 area; with a probability of flooding at 0.1% or less, clearly demonstrating there is a low risk of fluvial flooding.

4.1.2 The swimming lake is considered to be a water compatible development under NPPF. The flood probability for the site is therefore considered to be less than 0.1% AEP.

4.2 Climate Change

4.2.1 Past, present, and future emissions of greenhouse gases are expected to cause significant global climate change during this century – the nature of climate change at regional level will vary. The NPPF recommends that Flood Risk Assessments should consider the future flood levels and the impact climate change may have on rising sea levels, increased rainfall and so forth.

4.2.2 This FRA has considered changes in flood water levels due to climate change. The flood modelling undertaken by the for zones 2 and 3 are some distance from the development so even when climate change allowance are factored in, the site will still be some distance from zones 2 and 3.

5 IMPACTS OF FLOODING

5.1 Impact of Flood Waters

5.1.1 The proposed development of which involves creating a swimming lake within the Bicester Hotel, Golf, and Spa site, is situated in a Flood Zone 1 area. Therefore, the proposed development of a swimming lake has a probability of 0.1% (1 in 1000 return period) of being at risk from a flood and no historical records show the site being subject to fluvial flooding or from any other source.

5.1.2 The proposals will therefore have no impact on the flow of flood waters with a probability 0.1% or greater including climate change.

5.2 Impact on Storage Volumes

5.2.1 The development of the swimming lake will be in flood zone 1 therefore it will not result in a loss of flood storage volumes on the site for an event with a probability of 0.1% or 1 in 1000 years.

5.2.2 When climate change impacts are factored into flood levels, the hotel will remain outside of Flood Zones 2 and 3.

5.3 Flood Impact on the Development

5.3.1 According to the EA Flood Maps and the SFRA, the site is assessed to have 0.1% probability of flooding, including Climate Change – the site has a significant distance from the nearest fluvial flooding sources and hasn't been affected from flooding in the past – this shows there is minimal risk of fluvial flooding as well as ground and surface water flooding the swimming lake.

5.4 Safe Access

5.4.1 Since the swimming lake will be within a site not situated in Flood Zones 2 and 3, the proposed development will not be prone to flooding and will therefore allow safe and dry access between the hotel and swimming lake. The EA Flood Map in Figure 3.1 shows what areas that might be affected by flooding and clearly demonstrates that the hotel will not be. Overall the residual risk is considered insignificant and safe access can be provided to Bicester Hotel which is located within Flood Zone 1.

6 SEQUENTIAL TEST

6.1.1 The proposed development of a swimming lake is classified as ‘water compatible’ according to the National Planning Policy Framework (NPPF). The aim of a sequential test is *“to demonstrate that there are no reasonable available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed. A sequential test approach should be used in areas known to be at risk from other forms of flooding”*

Table 3: Flood risk vulnerability and flood zone ‘compatibility’

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
 × Development should not be permitted.

Table 6.1 – Flood Risk Vulnerability and Flood Zone ‘Compatibility’

6.1.2 Given the proposed use is water compatible in a low flood risk area “Zone 1”, it therefore meets the sequential test to allocate the development to a low flood risk area and is therefore considered acceptable.

7 ONSITE DRAINAGE

7.1 Proposed Swimming Lake Drainage

7.1.1 The proposed swimming lake will not need any drainage, it will receive runoff from the adjacent building. The underlying soil is likely to be clay but with some gravel layers, which may allow ingress of water from the lake. If these are found during excavation, consideration should be given to lining the pond to prevent the loss of water from the lake and prevent the risk of flooding to the surrounding area.

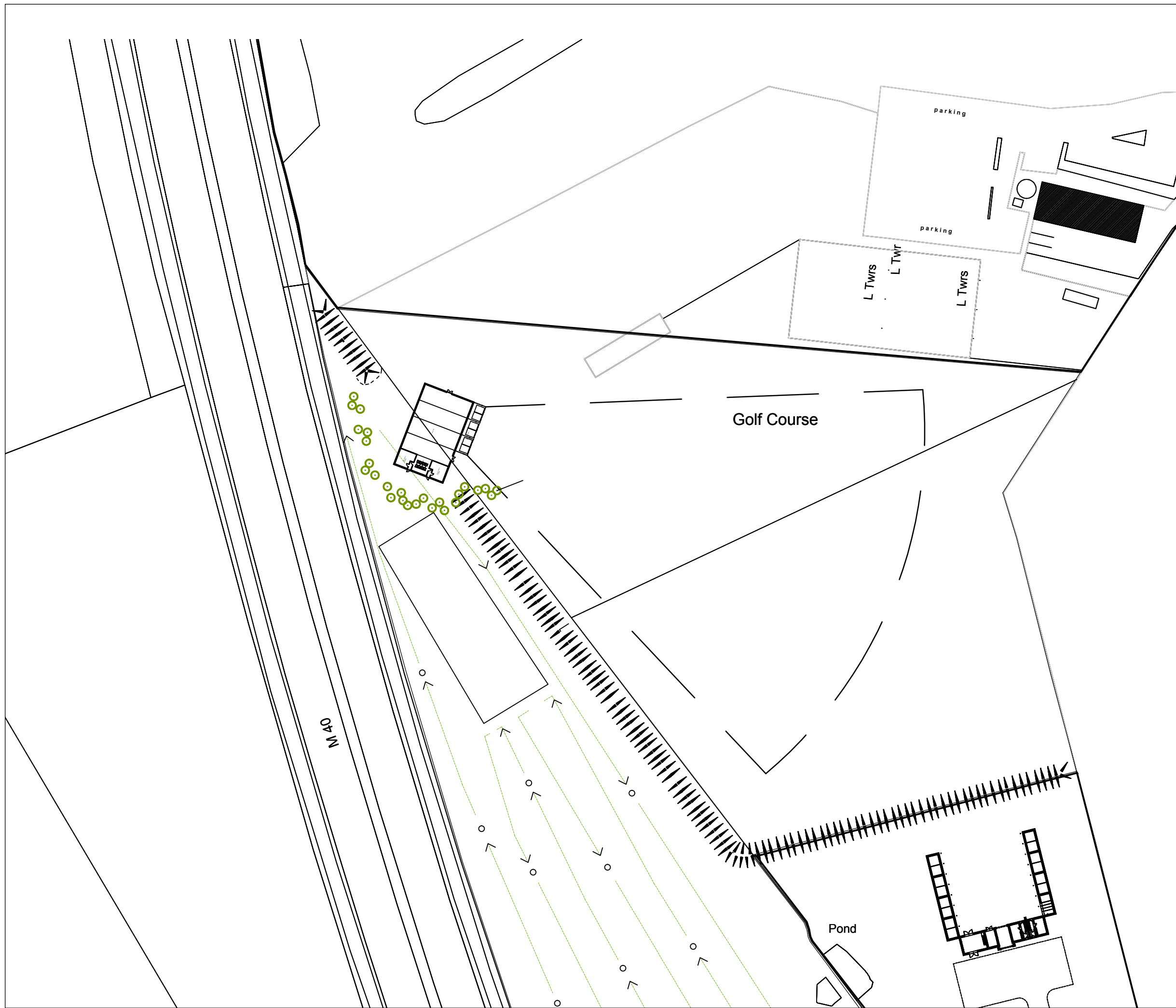
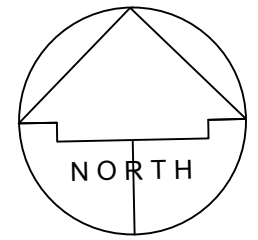
8 SUMMARY AND CONCLUSION

- 8.1.1 The proposed development is for a swimming lake within the grounds of Bicester Hotel, which is situated in Flood Zone 1 as shown in the Flood Map provided by the Environment Agency.
- 8.1.2 As the site is situated in Flood Zone 1, the swimming lake will therefore not be subject to fluvial or other flooding from an event with a probability of 0.1% including an allowance for Climate Change. It will not result in loss of flood storage volumes across the site or restrict the flow of flood waters. Historic records demonstrate no flooding has taken place on this site and given its location in a Flood Zone 1, it is unlikely the site will suffer damage from flooding.
- 8.1.3 A dry access can be provided between the lake and hotel at all times so the residual risk is considered low. It meets the sequential test to allocate the development to low flood risk areas.
- 8.1.4 Given the above, we consider the development is not at risk of flooding and see no reason to refuse it on the grounds of flood risk.

APPENDIX A

Drawing SK.14-652-03A – Swimming Lake Layout

Note: All dimensions must be checked on site and not scaled from this drawing.



Rev.	Date	Revisions

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 stevekarpa@hotmail.com

Client:
MR GRAHAM PAYNE

Job Title:
 PROPOSED ACTIVITY CENTRE AT:
 BICESTER GOLF & COUNTRY CLUB,
 CHESTERTON, OXON.

Drawing Title:

Site Plan

Scale: 1:1250	Date: June 2014	Drawn: SJK
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Drawing Number:
SK.14-652-03A

Level 1 SFRA Map – Cherwell District Council

Cherwell District Council: Level 1 SFRA

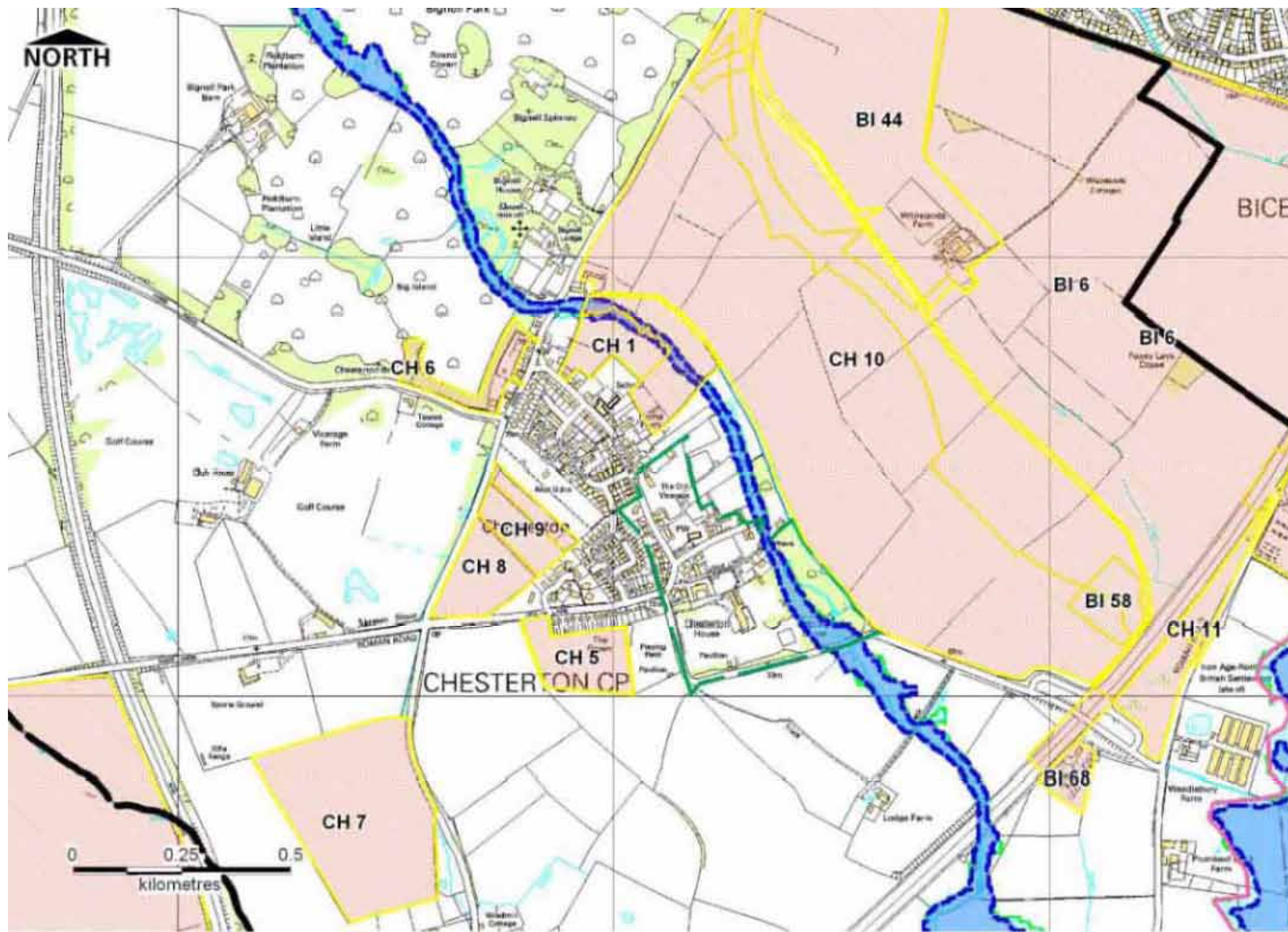


Chesterton Settlement Hierarchy

Existing NSCLP Categorisation:
Category 2

Potential LDF Categorisation:
Type B

Potential LDF Village Cluster:
N/A



Preliminary Core Strategy Assessment

Flood Zone	The majority of the proposed development sites are located in Flood Zone 1. CH1 is partially located within Flood Zones 2 and 3 associated with Gagle Brook.
Data Information	The SFRA will inform the preparation of the LDF. The current planning policy framework for the settlement as contained in the Non-Statutory Cherwell Local Plan (NSCLP) 2011 is set out below. The existing policy framework for the settlement, including the potential for housing and employment allocations, is being reviewed through the preparation of the Core Strategy and Delivery DPDs. This review includes the possibility of clustering some settlements in recognition of existing and potential linkages between villages.
Potential Housing Allocation	Chesterton is classified by the NSCLP as a Category 2 village. Category 2 settlements are smaller than Category 1 settlements with fewer services and/or are relatively remote and as such have limited potential for growth, usually in the form of infilling. Development here is subject to NSCLP Policy H17 which poses restrictions on development to conversions in accordance with Policy H22 and infilling. New builds will only be permitted when there is an essential need.
Potential Employment Allocation	Aims in rural areas are to encourage diversification of the rural economy whilst at the same time protecting the countryside and villages within it. Land provided for development should be restrained and limited to activities that will not result in excessive or inappropriate traffic.
Main River	Langford Brook flows along a small section of the south-eastern boundary of the parish of Langford. A non main river tributary of Gallos Brook flows along the western parish boundary. Gagle Brook, an ordinary watercourse tributary of Langford Brook, flows south eastwards adjacent the eastern edge of the village.
Flood Record Information	No historical flooding records or information were identified for Chesterton.

N.B. Flood Zones at this location are based on EA National Generalised Hydraulic Modelling.

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Environment Agency's Flood Zone Response

Mo Khan

From: WT Enquiries <WTenquiries@environment-agency.gov.uk>
Sent: 19 December 2016 15:38
To: mo.khan@lanmor.co.uk
Subject: THM32587 - Bicester Golf and Country Club, Oxfordshire - 160842
Attachments: Site Location.pdf; 32587_Flood Map for Planning.pdf

Dear Mo,

Thank you for your email requesting Product 4 data.

We unfortunately do not have any detailed flood risk modelling in this location.

We are sorry that we are therefore unable to provide modelled flood levels and extents for your site.

We have attached a copy of our Flood Map for Planning that we have records for.

For more information about how surface water flooding is managed in your local area please contact **Oxfordshire County Council**.

I trust this is helpful.

How we have considered your request

We have considered your request under the provisions of the Freedom of Information Act 2000 / Environmental Information Regulations 2004 (EIR). The Act requires that we respond to requests by advising you whether or not information is held, and if so by providing you with that information.

EIR Regulation 3(2) states that information is held if it is in our possession and has been produced or received by us, or it is held by another person on our behalf at the time the request is received.

Information not held

In this case, the information you have requested is not held by the Environment Agency, and we are therefore refusing your request on the grounds that there is no information we can provide.

Where a request is for environmental information, the Regulations allow us to refuse to disclose it if the exception at EIR Regulation 12(4)(a) applies. The regulation states that a public authority may refuse to disclose environmental information to the extent that it does not hold that information when an applicant's request is received.

It is not possible for us to conduct a public interest balancing test because the reason for non-disclosure is that the information is not held.

I hope that we have correctly interpreted your request. Please refer to our Open Government Licence for the permitted use of the supplied data:

<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Please be aware that many of our datasets are now available online. Simply visit environment.data.gov.uk

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

We are committed to providing a professional customer service. Please help us understand more about what is important to you by completing our [two minute](#) survey.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Simon Moffatt
Customers and Engagement Officer
Environment Agency - Thames
Internal: 48612
External: 0208 474 8612
Email: wtenquiries@environment-agency.gov.uk

From: Mo Khan [<mailto:mo.khan@lanmor.co.uk>]
Sent: 15 December 2016 14:44
To: Enquiries, Unit
Cc: kunal.patel@lanmor.co.uk
Subject: Bicester Golf and Country Club, Oxfordshire - 160842

Dear Sir/Madam

Lanmor Consulting has been asked to produce a Flood Risk Assessment (FRA) for the site at Bicester Golf and Country Club, Chesterton, Oxfordshire. Can we please request some specific details on the address provided at the bottom.

Could you please respond with a quotation to provide the following information:

- Flood levels for site
- Node points for watercourse
- Historical data
- Any flood decencies
- Flood outline

Address: Bicester Golf and Country Club, Akeman Street, Chesterton, Bicester, Oxfordshire, OX26 1TE

Attached is a site location plan for the proposed development.

Kind Regards,

Mo Khan

Training Civil Engineer

 LANMOR Consulting

Civil Engineering and Highway Planning

A: Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EW

M: 07950766451

T: 020 8339 7899

F: 020 8339 7898

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Borehole Test

2
(For Survey use only)
GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

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

THICKNESS

DEPTH

Feet Inches
... ..

Feet Inches
... ..

		THICKNESS		DEPTH	
		Feet	Inches	Feet	Inches
Drift Soil	Soil		3		3
? Cornbrash	Limestone	12	9	13	0
	Blue clay	2	0	15	0
	Blue stone	3	0	18	0
? Forest Marble	Blue clay	2	0	20	0
	Hard blue stone	3	0	23	0
? Whit. Bluntford	Dark blue clay	5	0	28	0
WhL. Andley Member	Blue stone - water	33	0	61	0
	Blue clay	1	6	62	6
? White limestone	Blue stone	4	0	66	6
	Blue clay		6	67	0
	Blue stone	1	0	68	0
	Blue clay	2	0	70	0
Shipton Member	Blue stone	5	0	75	0
	Blue clay	5	0	80	0
? Hampton	Blue stone	4	0	84	0
Wash	Blue clay	4	0	88	0
Wash	Grey stone	2	0	90	0
Rutland Fm	Soft blue clay	1	6	91	6
	Grey stone	3	0	94	6
? Tisbury	Soft clay	3	6	98	0
Stoney 14' 6"	Grey stone - water	2	0	100	0
	Soft clay	1	0	101	0
Troydon Fm	Hard grey stone - water	5	0	106	0
	Soft stone	2	0	108	0
? Hook Norton & Sudeley Beds	Hard stone - water	10	0	118	0
	Soft black sandstone - water	10	0	128	0
'White Sands' suggested class. if. 26-8-63 cf 21/97	Hard sandstone	2	0	130	0

3.96

4.57

5.40

6.10

7.01

8.55

18.50

18.05

20.27

20.42

20.78

24.34

22.86

24.38

25.60

26.82

27.43

27.89

28.8

28.47

30.44

30.78

32.31

32.92 part of

35.97

39.01

39.62