# Bicester Office Park

## Environmental Impact Assessment

## Volume 2: Technical Appendices

Prepared for:
Scenic Land Developments Limited

Date:
December 2017

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### ES Volume 2

# ES Volume II: Technical Appendices

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# Bicester Office Park

## EIA Scoping Report

Prepared for

Scenic Land Developments Limited

15 May 2017

# INTRODUCTION

## Site Location and Context

1. Scenic Land Developments Limited (hereafter referred to as the 'Applicant') is seeking outline planning permission for the construction of a commercial scheme (hereafter referred to as the 'Proposed Development'). The site, in Cherwell District Council (CDC) is approximately 13.1 hectares (ha) and is centred on National Grid Reference 457910,221631. It is bounded by a Tesco foodstore and farmland to the north, farmland to the east, the A41 (Oxford Road) to the west and Bicester Avenue Garden Centre and more fields to the south.

2. Further east of the site is a railway line, and to the south a sewage treatments works. Langford Brook is located further southeast of the site and it meanders to the north of the sewage treatment works before cutting beneath the railway line and heading northwards towards the village of Langford. West of the site and the A41 is the Kingsmere Residential Estate (a phased development of 726 homes under construction) as well as Premier Inn hotel and the Brewers Fayre Pub and Restaurant. North of the Tesco foodstore is Bicester Village, an outlet shopping centre. Chesterton is located approximately 2 kilometres (km) to the west and Langford Village is located approximately 1km to the east of the site. Graven Wood, located on Graven Hill is situated approximately 1.5km to the southwest.

3. The location of Bicester is shown in Figure 1. Figure 2 shows the planning application site boundary.

4. Given the scale of this development, the location of the Site and the potential for environmental effects, the Applicant is submitting an Environmental Statement (ES) alongside the outline planning application. Trium Environmental Consulting LLP (Trium) has been commissioned to undertake the Environmental Impact Assessment (EIA) on behalf of the Applicant in line with the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended 2015) (hereafter referred to as the 'EIA Regulations') and other relevant EIA guidance.

# THE PROPOSED DEVELOPMENT

5. The Proposed Development, includes the construction of a business park comprising between 55,000 and 60,000m$^2$ office use (B1), parking for approximately 2,000 cars, associated highway, infrastructure and earthworks. The office park will be made up of differently sized buildings which will vary in height between 2 and 4 storeys and located within a landscaping space. The site will be accessed from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road.

# PLANNING HISTORY

6. Part of the site was granted outline planning permission in 2010 for the construction of a 60,000m$^2$ B1 Business Park comprising 53,000m$^2$ of B1 office space and a 7,000m$^2$ C1 hotel, served by approximately 1,837 car parking spaces (Planning Ref: 07/01106-OUT). This outine planning application was accompanied by an ES.

7. Detailed planning consent was subsequently granted on part of the site in November 2013 for the construction of a Tesco foodstore of 8,135m$^2$ and petrol filing station on part of the consented Business Park site (Planning Ref: 12/01193/F). The planning application in relation to the proposed Tesco foodstore was supported by a Transport Assessment which considered the effect of the Tesco foodstore on the highway network local to the site. The Tesco foodstore has been constructed and opened in April 2016. The development of the Tesco foodstore comprised the relocation and expansion of a previous Tesco foodstore which was situated adjacent to Bicester Village and the development was linked to an extension to Bicester Village, known as Bicester Village Phase 4 which is currently under construction and scheduled to be completed in October 2017 (See Table 1).



BICESTER OFFICE PARK SCOPING REPORT

Figure 1: Site Location Map

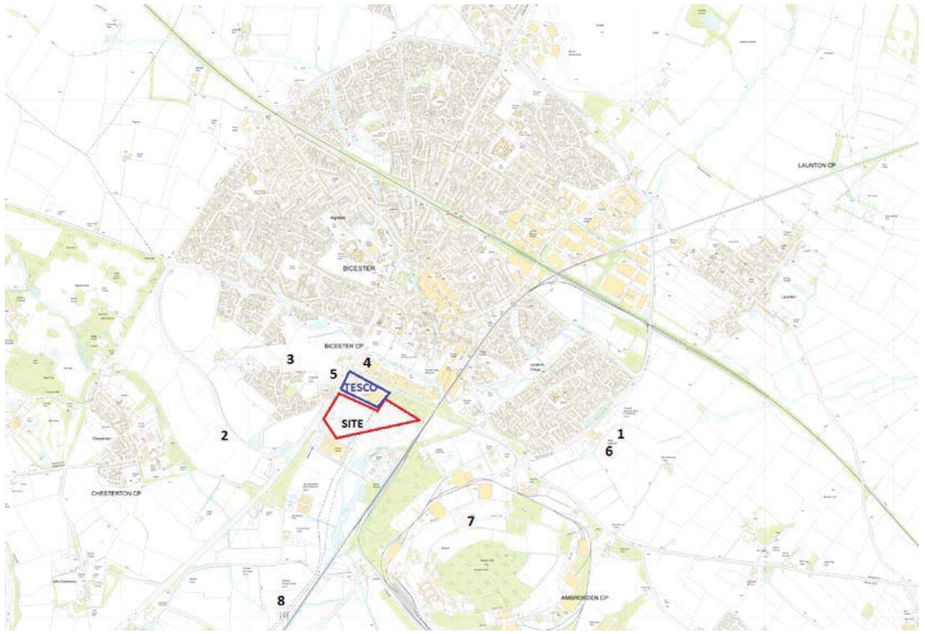
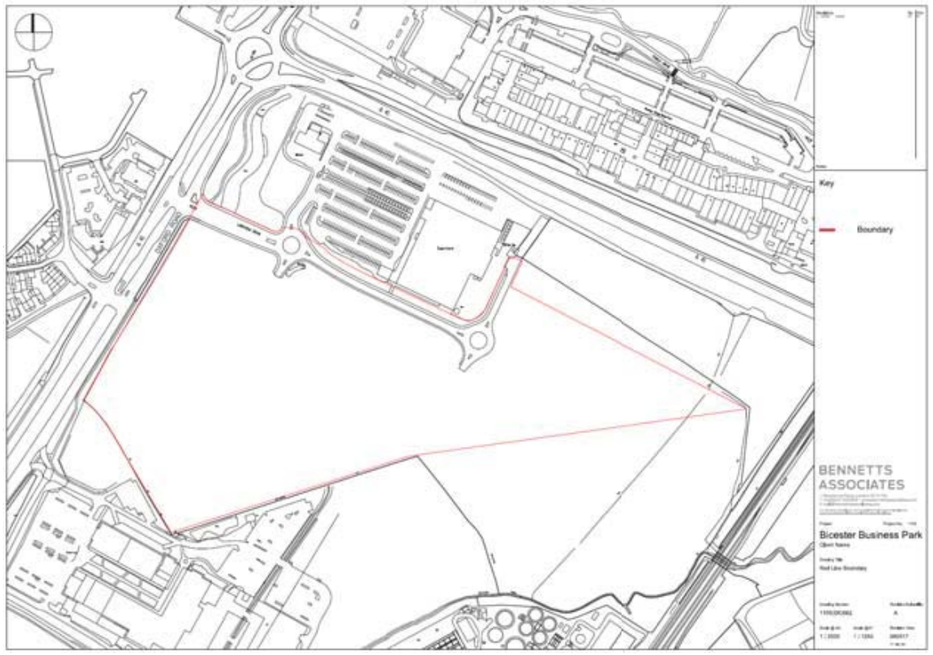


Figure 2: Application Site








## The Purpose of Scoping in the EIA Process

8. EIA Scoping forms one of the first stages of the EIA process. It refers to the activity of identifying the environmental 'topics' that should be considered within the EIA. In addition, EIA Scoping allows for the early identification of the receptors that may be affected or impacted by a new development. Through consideration of environmental 'topics' and potential receptors (both existing and introduced as a result of a new development), EIA Scoping initiates the process of defining the potential for significant impacts, which in turn results in the identification of the issues to be addressed in the EIA.

9. Regulation 13 of the EIA Regulations allows for an Applicant to ask the Local Planning Authority, in this case CDC (who in turn seek the opinion of other relevant Statutory Consultees), to state in writing their opinion as to the scope of the EIA. This report constitutes a request for a Scoping Opinion under Regulation 13 of the EIA Regulations.

10. The EIA will be undertaken in accordance with the requirement of the 2011 EIA Regulations. It is recognised that on 16th May 2017, the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 come into force, however, the Transposition Note that accompanies the revised Regulations state that where an EIA Scoping Opinion is sought from a Local Authority prior to 16th May 2017, the 2011 EIA Regulations will be the overriding relevant legislation.

## Structure of the Scoping Report

11. The remainder of the Scoping Report presents the following:

- An overview of the existing Site and potential sensitive receptors;
- An overview of the Proposed Development;
- Key legislative and planning policy documents;
- EIA Methodology;
- A preliminary list of EIA consultees;
- The environmental 'topics' to be addressed within the EIA;
- The proposed structure of the ES; and
- Summary and conclusions to the EIA Scoping Report

## OVERVIEW OF THE EXISTING SITE AND SENSITIVE RECEPTORS

12. The land encompassing the site is currently used for agricultural purposes (Grade 4). The site is generally flat, with a slight drop to the south and east. A drainage channel runs north / south, from the access road to the southern boundary, along the north of the drainage channel is an area used for material storage. This area had plastic and concrete pipework, gravel and wood chippings. Two heaps of wood, comprising tree branches and timber up to 3m high, are in the south of the site. The site is accessed from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road. Bicester village is located to the south and the site is a 10-minute walk from Bicester Town Centre. Bicester Village is located to the south and the site is a 10-minute walk from Bicester Town Centre.

13. Bicester currently extends as far south as the A4030 Middleton Stoney Road in the west and the A41 Boundary Way in the east. The two roads meet in central south Bicester at a large four arm roundabout junction, known as the "Esso" roundabout junction. Here, the A41(east Boundary Way meets the A41 (south) where it is known as Oxford Road.

14. On the northern side of the A41 Boundary Way, between the site and the town centre is Bicester Village, a factory outlet shopping centre which attracts a large proportion of its visitors from outside Bicester. To the west of Bicester Village, on land to the north east of the Esso Roundabout is a new Tesco which has been operational since April 2016. The Bicester Avenue Garden centre and the Tesco foodstore are the closest buildings to the site and are generally 2 storeys in height. There are established links for non-car users between the supermarket, Bicester Village, the town centre and railway stations.

15. Part of the site is identified by CDC as land for an Approved Employment Site and part of the site is identified as land for a New Employment site.

16. Traffic noise from the M40 dual carriageway to the west of the site and the Tesco foodstore to the north of the site are likely to be the dominant noise sources with the operational railway to the east of the site being secondary.

17. The majority of the land within the red line is designated as zone 1 –low risk of flooding – with a small area on the boundary of zone 1 and zone 2. This is due to the proximity of the Langford Brook located east of the site.

### Potential Environmental Sensitivities / Sensitive Receptors

18. When undertaking an EIA it is important to understand which receptors will be considered as part of the assessment. Initial studies and consultations have revealed the following potential sensitive receptors to the Proposed Development (as shown in Figure 2):

- Key short, medium and long-distance views;
- Bicester Conservation Area approximately 0.35km north of the site including listed buildings within the conservation area such as the Grade II* Old Priory and attached garden walls in Priory Lane north east of the site and the Grade II* listed Old Vicarage located in Church Street also north east of the site;
- Ecology – hedgerows and protected species (and associated habitat (if present);
- Archaeological resources;
- Although the site itself does not fall within an Air Quality Management Area (AQMA), Bicester Town Centre as declared an AQMA;
- Residential Property – Kingsmere Residential Estate, isolated farm properties to the east of the railway line; further residential areas to the north at The Acorn Public House, and beyond at Middleton Stoney Road;
- Commercial Property – Bicester Village Retail Park, Bicester Avenue Garden Centre; Tesco foodstore, Sewage Treatment Works
- Water Resources – Langford Brook located east of the site and two tributary streams, Pingle Stream and Town Brook, north of the site;
- The site location adjacent to Flood Zone 2;
- Pedestrians, cyclists and road users within proximity of the site; and
- Public transport.





## KEY LEGISLATIVE AND PLANNING POLICY DOCUMENTS

### EIA Statutory Requirements and Guidance

19. The ES will be prepared in accordance with legislative requirements and current guidance for EIA, covered by 'statutory requirements'. In particular, the ES will be prepared with due consideration to:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended 2015);
- Preparation of Environmental Statements for Planning Projects that require Environmental Assessment: Good Practice Guide, Department of the Environment (DoE) 1995;
- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment, 2004; and
- Office of the Deputy Prime Minister (ODPM) Environmental Impact Assessment – A Guide to Procedures, 2000.

20. Consideration will also be given to the new Environmental Impact Assessment (EIA) Directive (2014/52/EU) although this currently awaiting formal adoption in the United Kingdom (England and Wales).

### Planning Policy Context

21. Each of the technical chapters contained within the ES will include reference to relevant national, regional and local planning policy, a summary of which is given below.

*National Planning Policy and Guidance*

22. The EIA will have regard to the National Planning Policy Framework (NPPF) (2012), which replaces the previous suite of national Planning Policy Statements and Planning Policy Guidance documents.

23. The policies contained within the NPPF articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

24. It will also take into consideration the national Planning Practice Guidance (PPG).

*Local Planning Policy and Guidance*

25. The EIA will consider the Cherwell Local Plan 2011 – 2031, Part 1 Adopted 20 July 2015 (incorporating Policy Bicester 13 re-adopted on 19 December 2016), July 2015, Cherwell District Council, North Oxfordshire which sets out the vision and spatial strategy for Cherwell District.

26. It will also take into account the Bicester Masterplan, Consultation Draft, August 2012, Supplementary Planning Document, which incorporates a detailed set of proposals for connecting the transport and movement, housing, employment, green infrastructure and the town centre actions together. The draft masterplan indicates where and what type of new development is proposed and the strategic linkages between them.

## EIA METHODOLOGY

27. This section outlines the methodology to be used throughout the ES.

28. The EIA will address the direct effects of the Proposed Development in addition to the indirect, cumulative, short, medium and long term, permanent, temporary, beneficial and adverse likely significant effects arising from the Proposed Development. The main mitigation measures envisaged in order to avoid, reduce or remedy significant adverse effects will be described. The concluding chapters will provide a summary of the cumulative and residual effects of the Proposed Development.

29. Each technical chapter of the ES will define the baseline against which the potential significant environmental effects of the Proposed Development will be assessed. The baseline conditions will be

taken as the current (2016) conditions on site i.e. the existing buildings. Where relevant and appropriate, a 'future baseline' scenario will be identified for some ES topics, such as Transport. The transport future baseline considers the conditions when the full Proposed Development is expected to open and may consider other developments and any highway improvements that are considered to have an impact on the study area. Any reference to and inclusion of a future baseline will be fully explained within the relevant ES chapter.

30. Following on from the definition of the baseline conditions, the impact of the Proposed Development will be assessed during the demolition and construction phase and on completion and occupation of the Proposed Development. Mitigation measures will be identified to either eliminate, mitigate or reduce adverse effects and following the incorporation of mitigation measures, the significance of any remaining residual effects will be defined by applying a standard set of significance criteria. Interactions between effects will then be assessed (see below for further details).

## Significance Criteria

31. For each technical chapter, the significance of effects will be evaluated with reference to definitive standards, accepted criteria and legislation where available. Where it has not been possible to quantify effects, qualitative assessments will be carried out, based on expert opinion and professional judgement. Where uncertainty exists, this will be noted in the relevant chapter of the ES.

32. Specific significance criteria for each technical discipline will be developed, giving due regard to the following:

- Extent and magnitude of the impact;
- Effect duration (whether short, medium or long-term);
- Effect nature (whether direct, indirect, reversible or irreversible);
- Whether the effect occurs in isolation, is cumulative or interactive;
- Performance against any relevant environmental quality standards;
- Sensitivity of the receptor; and
- Compatibility with environmental policies.

33. In order to provide a consistent approach across the different technical disciplines addressed within the ES, the following terminology will be used throughout the ES to define residual effects (i.e. the effect post the application of any required additional mitigation measures):

- Adverse – Detrimental or negative effects to an environmental resource or receptor; or
- Negligible – Imperceptible effects to an environmental resource or receptor; or
- Beneficial – Advantageous or positive effect to an environmental resource or receptor.

34. Where adverse or beneficial effects are identified, these will be assessed against the following scale:

- Minor; or
- Moderate; or
- Major.

35. In general, residual effects found to be 'moderate' or 'major' are deemed to be 'significant'. Effects found to be 'minor' are considered to be 'not significant', although they may be a matter of local concern. 'Negligible' effects are considered to be 'not significant' and not a matter of local concern. Each technical chapter of the ES will provide further explanation and definition on the scale of effect significance, i.e. minor through to major. Broadly, short to long-term (temporary) effects will be considered to be those associated with the construction phase and permanent effects will be those associated with the completed operational Proposed Development. Local effects will be defined as those affecting the Site and neighbouring receptors, whilst effects upon receptors in the CDC will be considered to be at a district





level. Effects affecting Oxfordshire will be considered to be at a regional level, whilst effects, which affect different parts of the country, or England as a whole, will be considered to be at a national level.

36. Mitigation measures will then be identified to either eliminate or reduce adverse effects. These will be incorporated into either the design of the Proposed Development; construction commitments or operational or managerial standards/procedures.

37. Where mitigation measures are inherent (e.g. industry standard best practice) this will be outlined up front in the ES Chapter and included within the assessment of effects.

## Environmental Design and Management Measures

38. Throughout the ES, where applicable, the way that potential environmental effects have been or will be avoided, prevented, reduced or offset through design and / or management measures will be described. These are measures that are inherent in the design and construction of the Proposed Development and include measures such as the implementation of an Environmental Management Plan (CEMP). Proposed environmental enhancements will also be described, where applicable.

39. These design measures will be considered prior to the assessment of effects to avoid considering assessment scenarios that are unrealistic in practice i.e. do not take account of such measures even though they are likely to be standard practice. These will then be followed through the assessment to ensure that realistic likely environmental effects are identified.

## Cumulative Effect Assessment

40. In accordance with the EIA Regulations, the EIA will give consideration to 'cumulative effects'. By definition these are effects that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the Proposed Development. For the cumulative assessment, two types of effect will be considered:

- The combined effect of individual impacts, for example noise, airborne dust or traffic on a single receptor; and
- The combined effects of nearby consented or under construction development schemes, which may, on an individual basis be insignificant but, cumulatively, have a likely significant effect.

41. An assessment of the combined effects of individual impacts will be undertaken and presented within the 'Effect Interactions' Chapter of the ES. The combined effects of nearby consented or under construction development schemes will be presented in each technical assessment.

42. With regard to the combined effects of nearby consented schemes, in order to ascertain if there were any schemes in the vicinity that could potentially lead to cumulative environmental effects a search of the local planning registers was undertaken with the following criteria:

- Developments with planning permission (or with a resolution to grant consent), those under construction and those with site allocation status;
- Development located within an approximate 4km radius of the Site; and
- Developments resulting in an increase of more than 10,000m$^2$ gross external area (GEA) in floor area (or over 50 residential units).

43. Bicester Village Phase 4, although, under the 10,000m$^2$ criteria has also been included due to its proximity to the site. Table 1 lists the proposed cumulative scheme and Figure 1 shows their approximate locations.

**Table 1: Proposed Cumulative Schemes for Assessment**

| | Site | Proposal / Description | Status | Approximate distance from site |
|---|---|---|---|---|
| 1 | SE Bicester Extension | Site Allocation – Bicester 12: A mixed use site for employment and residential development to the east of the ring road to the south east of Bicester for 1,500 homes | Site Allocation | 5km |
| 2 | NW Bicester Extension | Site Allocation – Bicester 1: A new zero carbon(i) mixed use development including 6,000 homes will be developed on land identified at North West Bicester. | Site Allocation | 2.9km |
| 3 | Kingsmere Residential Estate | Site Allocation – Bicester 3: A development of 726 homes with associated services, facilities and other infrastructure with contributions toward community facilities, education, health, and open space. The development area is 29ha. | Site Allocation | 700m |
| 4 | Bicester Village Phase 4 | 5,181m$^2$ GIA of retail floorspace and 147 car parking spaces | Permission granted November 2016 | 200m |
| 5 | Bicester Gateway Retail | Outline application for 4 no. Class A1 units (7,840m$^2$ GIA); 1 Class A3 unit (435m$^2$ GIA); and 1 Class D2 unit (967m$^2$ GIA) with car parking area (345 spaces) | Resolution to grant at April 13$^{th}$ committee. | 0.8km |
| 6 | Wretchwick Green, Wretchwick Way, Bicester | Outline application for up to 1,500 new dwellings; up to 18ha of employment land (B1 / B8 use); a local centre; a new primary school; and landscaping and infrastructure works | Determination deadline was 28 September 2016, decision is outstanding due to holding objections | 5km |
| 7 | Graven Hill | Future phases in relation to reserved matters approval (15/02159/OUT) 2,100 homes | RMA approved, NMA to increase GIA figures was permitted March 2017. | 3.7km |
| 8 | Gateway Office Park | Phase 1 comprising Class B1 employment buildings (up to 14,972m$^2$ GEA); a hotel (up to 149 beds); and associated infrastructure and car parking. | Resolution to grant at April 13$^{th}$ committee. | 0.8km |





## Consideration of Climate Change within the EIA

44. The key climate projections for the UK (UKCP09) are that:

- Summers will become hotter and drier;
- Winters will become milder and wetter;
- Soils will become drier on average;
- Snowfall and the number of very cold days will decrease;
- Sea levels will rise; and
- Storms, heavy and extreme rainfall, and extreme winds will become more frequent.

45. The climate change projections and climate change impacts, adaptation and mitigation measures will be considered within the appropriate sections of the ES, and other supporting planning documents.

46. During construction, the main measures to mitigate climate change will be considered in terms of reducing carbon dioxide (CO2) emissions from equipment, and reducing, reusing and recycling site waste where possible. This will be discussed in the 'Construction' chapter of the ES. For design related construction impacts, such as the choice of building materials, this will be considered throughout the design process to reduce its impact on climate change.

47. For the operational phase, the potential for the Proposed Development to adapt to and mitigate climate change will predominantly relate to reducing pollutant emissions to air through reducing the need to travel (especially by car), reducing the amount of pollutant emissions from any proposed energy use, reducing the volume of water usage, and reducing the potential impacts from flood risk. Ultimately, climate change as a result of the operation of a Proposed Development is detailed within Cherwell's Low Carbon Environmental Strategy highlights the common need to improve energy efficiency, reduce carbon emissions, encourage the take-up of low carbon and renewable energy technologies, and reduce the need to travel and provide good access to public and other sustainable modes of transport. It notes the need to conserve water, to minimise flood risk, and to be resilient to the impacts of climate change. Cherwell also have a long term vision to be carbon neutral as set out in the District's Sustainable Communities Strategy published in 2009.

48. To inform this process, a Transport Assessment and Flood Risk Assessment will be submitted in support of the outline planning application.

## EIA CONSULTATION

49. The process of consultation is important to the development of a comprehensive and balanced ES. Views of the interested parties serve to focus the environmental studies and to identify specific issues that require further investigation.

50. Consultees involved in the evolution of the design of the Proposed Development and preliminary assessment of environmental effects will include, but are not limited to:

- Cherwell District Council;
- Oxfordshire County Council (OCC);
- Environment Agency (EA);
- Historic England (HE);
- Natural England (NE);
- Thames Water Utilities Limited (TWUL); and
- Neighbourhood / residents associations.

51. Consultation is an ongoing process and will be fed back into the design of the Proposed Development. A summary of the key consultation responses received from consultees which are relevant to the EIA process will be included within the ES.

## ENVIRONMENTAL TOPICS TO BE ADDRESSED WITHIN THE EIA

### Introduction

52. The EIA and associated technical studies will reflect current guidelines and relevant legislation and will be carried out in accordance with statutory guidance, including the requirements for the contents of an ES. For the EIA to be an effective decision-making tool, the ES needs to focus on the main or *likely significant environmental effects*, within a range of topics. These issues have been identified through a review of existing information, baseline studies and preliminary review of the emerging Proposed Development.

53. The EIA will consider the potential significant effects associated with the following environmental 'topics':

- Socio-economics;
- Traffic and Transportation;
- Noise and Vibration;
- Air Quality;
- Buried Heritage (Archaeology) and Built Heritage;
- Ecology; and
- Landscape and Visual Impact Assessment.

54. The following sub-sections of this Scoping Report provide details on each of the above environmental 'topics', specifically, the works proposed to fulfil the requirements of the EIA process. In addition to the above, the following chapters will be provided as part of the ES:

- Introduction to the Environmental Statement;
- EIA Methodology (see below for further details);
- Alternative and Design Evolution (including the 'Do Nothing Scenario', 'Alternative Sites' and 'Alternative Designs');
- The Proposed Development (including information on drainage infrastructure and flood risk);
- Construction;
- Effect Interactions; and
- Residual Effects and Conclusions.

### Alternatives Assessment

55. The EIA process provides an opportunity to consider alternative development options with their respective environmental effects before a final decision is taken on the design. In accordance with the EIA Regulations and statutory guidance, the ES will describe those alternatives that were considered by the Applicant, project team and architects, including:

- 'Do nothing scenario' – the consequences of no redevelopment taking place on the site;
- 'Alternative sites' – the rationale behind choosing the site. It will be outlined that alternative sites have not been considered by the Applicant as there are very few sites suitable for development in the area which will meet all the requirements of the Applicant's Development Brief; and
- 'Alternative designs' – the ES will summarise the evolution of the design of the Proposed Development; the modifications which have taken place to date and the environmental considerations which have led to those modifications. A summary of the main alternatives





considered, such as alternative use combinations, and massing will be presented together with a summary justification for the final design.

### Construction

56. The ES will provide details of an indicative construction programme together with proposed construction activities and methods, and their anticipated duration. This is commensurate with the outline nature of the Proposed Development. Information will be provided on, but not limited to site preparation and construction, including: site access and egress; materials and waste management; land or soil remediation and working hours. Details of any assumptions made will be provided.

57. Estimates of the quantities of materials to be used throughout the construction phase will be considered, and an estimate of the peak periods of daily heavy goods vehicle (HGV) movements will be provided.

58. The ES will define and assess the potential effects of a reasonable worst-case scenario. The peak period or level of activity will be assessed in terms of traffic, noise and air quality effects. The peak period will be defined on the basis of the maximum number of HGV movements and an indication of the plant and equipment location on-site in relation to the excavation and construction boundary.

59. The Construction ES Chapter will present the broad content of a Construction Environmental Management Plan (CEMP). The mitigation measures identified as a result of the site preparation, excavation and construction assessment will be presented within the ES for future inclusion within a CEMP, to be agreed with CDC as part of any futured detailed reserved matters application(s) or planning condition(s). It is likely that specific mitigation measures will be defined to reduce effects specifically on or arising from:

- Site preparation, excavation and construction traffic and workforce presence on-site;
- Working close to neighbouring boundaries;
- Site access and egress (including mitigation for any loss of public right of way and road closures);
- Noise and vibration;
- Soil removal and land contamination;
- Water usage and site drainage;
- Energy usage and monitoring;
- Emission of dust and other pollutants; and
- Waste generation, management and disposal.

60. The mitigation measures and outline CEMP will take account of the requirements of the London Councils' guidance on 'The Control of Dust and Emissions from Construction and Demolition' (2006).

### Socio-economics

61. The Proposed Development will create between 55,000 and 60,000m$^2$ gross internal area of new commercial floor space (B1a office) and will make a major contribution to the local and wider sub-regional economies. Once it is fully occupied, Bicester Office Park will be a key employment hub, generating significant gross value added to the local and sub-regional economies.

62. The Proposed Development is expected to generate a range of socio-economic effects, some of which would be temporary, whilst others would be long-term and permanent.

*Outline Scope of Assessment*

63. The temporary socio-economic effects will include:

- Temporary employment created during the construction phase of the redevelopment;
- Gross value added to the local economy by the temporary construction employment; and

- Construction training opportunities.

64. The permanent socio-economic effects will include:

- Employment generation, including direct jobs created on site and associated indirect/induced employment created through multiplier effects;
- Gross value added to the local economy by the net additional employment created;
- Training and skills development opportunities;
- Additional local spending by office workers; and
- The provision of amenity space for office users.

65. The socio-economic assessment, undertaken by Indigo Planning, will include a high-level review of the relevant planning, economic development and regeneration policies. The purpose of the policy review will be to understand the key strategic regeneration outcomes sought for the local area. The assessment will consider whether the socio-economic impacts of the Proposed Development are well aligned with the overall direction of policy.

66. The socio-economic assessment will identify and interpret baseline information on a variety of indicators. The socio-economic indicators will be grouped into a number of subject areas that address a broad range of outcomes typically associated with major development proposals. Taken together, these subject areas provide a robust indication of the socio-economic strengths and weaknesses of a local area.

67. The main subject areas to consider will be as follows:

- Population and demographic change;
- Economic activity;
- Education and skills;
- Housing;
- Health conditions; and
- Deprivation and poverty

68. Data will be obtained from a variety of sources, including the 2011 Census, the Office for National Statistics, the National Online Manpower Information Service (NOMIS) and the Indices of Multiple Deprivation for 2015 which enable data to be provided at the very small area level.

69. An assessment of effects will be undertaken to assess the impact of the Proposed Development on the baseline conditions. The methodology for assessing socio-economic impacts will follow standard EIA guidance and will entail:

- Consideration of local policy, plans and development constraints;
- Review of baseline conditions at the Proposed Development Site area, locality and Oxfordshire;
- Assessment of the likely scale, permanence and significance of effects associated with:
  - Direct, indirect and induced employment during the construction phase of the scheme; and
  - Direct, indirect, and induced net employment once the scheme is operational.
- Identification of avoidance and mitigation measures (if and where relevant) and thus an assessment of the residual effects of the development.

70. Wherever possible the impacts of the socio-economic assessment will be appraised against relevant national standards. Where no standards exist, professional experience and judgement will be applied and justified.





*Determination of Significance and Classification of Effects*

71. Policy thresholds and best practice will be used to assess the significance of the effects. In the absence of specific guidance on assigning significance, professional judgement will be used to assess the impact of the Proposed Development on the social and economic baseline. The assessment will aim to be objective and quantify impacts and their effects as far as possible. However, some impacts can only be evaluated on a qualitative basis.

72. Effects will be assessed based on:

- Magnitude of change - this entails consideration of the absolute number of people or businesses affected and the size of area in which impacts will be experienced;
- Scale of the impact - this entails consideration of the relative magnitude of each effect in its relevant context (for example, the impacts on local employment will be considered in the context of the overall size of the local labour market); and
- Scope for adjustment or mitigation - the assessment will be concerned in part with economies. These adjust themselves continually to changes in supply and demand, and the scope for the changes brought about by the Proposed Development to be accommodated by market adjustment will therefore be a criterion in assessing significance.

## Traffic and Transportation

*Summary Baseline Context*

73. The site is accessed from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road. The A41 Oxford Road runs on a broadly north-south alignment and connects north to Bicester town and south to the M40.

74. At the north-east corner of the site, the A41 Oxford Road connects with the A41 at a junction known as the Esso roundabout. The A41 links east from The Esso roundabout towards Aylesbury. North of the A41 junction, Oxford Road forms a junction with Pingle Drive which provides access to the Bicester Village shopping park.

75. The consented development proposals for Bicester Village Phase 4 and the constructed Tesco foodstore included a package of highway works which are currently under construction and are expected to be completed by September 2017. The highway works include improvements to the Oxford Road junctions with Pingle Drive, Esso roundabout and Lakeview Drive.

76. Local Pedestrian Network - Footways are provided along both sides of the site access as well as the eastern side of the A41, Oxford Road. These connect with the existing pedestrian network on Oxford Road and Pringle Drive offering access to the residential developments to the north as well as Bicester Village to the north east.

77. Local Cycle Network - The site is well located with regard to National Cycle Network Route 51, a signed route along Wendlebury Road and Pingle Drive in the immediate vicinity of the site. This route connects the area to Oxford to the south and Bedford via Bletchley to the north east.

78. Local Bus Network - The nearest bus stops to the site are located approximately 500 metres to the north on Oxford Road and are served by the S5 and X5 services. The S5 operates every 15 minutes Monday to Friday and every 30 minutes on Saturdays and Sundays between Oxford City Centre and Launton, as well as the Bicester Park & Ride facility. The X5 operates twice an hour on weekdays and hourly on weekends between Cambridge Parkside Bus Station and Oxford City Centre via Milton Keynes Railway Station.

79. A further bus stop is located on Pringle Drive approximately 800 metres to the north east and is served by the Bicester Village Shuttle operating towards Bicester North Railway Station.

80. Local Rail Network - The nearest station is Bicester Village Railway Station located approximately 1.4 kilometres to the north east of the site. Bicester Village Station is located on the Oxford to London Marylebone line with services operating in each direction every 30 minutes. Bicester North Railway

Station is located approximately 1.8 kilometres to the north of the site and offers connections to London Marylebone, Banbury and Birmingham Moor Street and Snow Hill. Services run up to twice per hour in

*Outline Scope of Assessment*

81. The Transport Assessment, carried out by Motion, will consider the effect of the development proposals on the highway network local to the site.

82. It is proposed that the following scope of junctions are considered within the scope of the Transport Assessment and included with junction capacity modelling:

- Oxford Road/ Middleton Stoney Road;
- Oxford Road / Pingle Drive roundabout;
- Oxford Road / A41 signalised roundabout;
- Oxford Road (A41) / Lakeview Drive signalised junction (site access junction);
- Oxford Road (A41) / Kingsmere signalised junction; and,
- Oxford Road (A41)/ Vendee Drive

83. The Traffic and Transport Assessment will consider a future assessment year of 2022. Forecast traffic for the future assessment year of 2022 will be determined by applying traffic growth factors derived from TEMPRO. In addition to TEMPRO growth factors, the future year assessment will consider committed developments in the vicinity of the site. The committed developments considered as part of the assessment are listed in Table 1.

84. Expected trip generation and distribution of trips associated with each of the committed developments will be extracted from the Transport Assessments submitted alongside each of the approved planning applications.

85. It is noted that the Kingsmere Residential Estate is part built out and therefore traffic flows associated with part of the development will already be on the highway network and included within the surveyed traffic flows. For the purpose of assessing outstanding consented development, consideration will be given to the remaining elements of the Kingsmere Residential Estate which are yet to be constructed.

86. Traffic growth factors derived from TEMPRO include assessment of traffic growth as a result of expected committed developments in the local area. To this extent, applying by TEMPRO growth factors and including traffic associated identified committed developments to baseline traffic flows will result in double-counting of likely traffic growth on the highway network and over-estimate future year traffic flows. On that basis traffic growth factors derived from TEMPRO will be adjusted, on the basis of the consented development proposals being considered separately, in order to minimise the likelihood of double-counting of likely traffic growth.

87. In order to consider the trip attraction of the development proposals the industry standard TRICS database will be used in order to assess the likely vehicle trips associated with the development proposals during the morning and evening peak hours and throughout the day.

88. In order to assess the distribution of vehicle trips on the highway network local to the site, journey to work data from the 2011 Census data will be interrogated to establish the likely origins of employees at the proposed Office Park. Vehicle trips will be routed between census origins to the development, based on online mapping route calculation.

89. As detailed in the IEMA 'Guidance for Environmental Impact Assessment' mode specific significance criteria will be used to assess the environmental effects associated with changes in traffic as a result of the Proposed Development. In accordance with relevant guidance, each of the following environmental effects will be considered:

- Delay;
- Severance;





- Amenity, Fear and Intimidation; and
- Accidents and safety.

90. The potential effects of the Proposed Development will be considered in the following scenarios;

- Existing baseline year;
- Do nothing year, future baseline without the development;
- Do something year, future baseline with the development in place

91. In accordance with the IEMA guidance consideration will be given to two rules to define the scale and extent of assessment and these are:

- Rule 1: include highway links where traffic flows will increase by more than 30%, or where the number of HGVs increase by more than 30%;
- Rule 2; include highway links that are particularly sensitive to the Proposed Development where traffic flows have increased by 10% or more.

92. The environmental effects of the developments will be judged in terms of its likely effect on service, delay, amenity, fear and intimidation and accidents and safety. The scope of assessment will be considered where there is a 30% increase or greater in traffic flow or where the increase in HGV movements is 30% or greater. Additional extent of highway network will be considered where they are deemed to be sensitive and where the increase in traffic is 10% or more.

93. Each of the potential environmental effects associated with the Proposed Development will be considered based on the following scale; major adverse, moderate adverse, minor adverse, negligible, minor beneficial, moderate beneficial or major beneficial.

## Noise and Vibration

*Summary Baseline Context*

94. The current primary noise source at the Site and surrounding area is traffic noise on the local road network, along with existing commercial and retail uses in the vicinity.

95. Noise monitoring will be undertaken at agreed locations to represent the nearest sensitive receptors, likely to be to the west of the site towards the A41 and the east of the site towards the railway line, along with the northern edge of the site in proximity to the Tesco foodstore.

*Outline Scope of Assessment*

96. Potential noise effects may occur at existing residential and commercial uses due to the Proposed Development as a result of:

- Construction activities;
- Changes in road traffic flows;
- Car Parking and other activity associated with the Proposed Development; and
- Fixed plant associated with the Proposed Development.

97. The site is not subject to any existing sources of vibration that could have amenity implications. Construction is unlikely to take place sufficiently close to residential properties or for a sufficient length of time, as to give rise to vibration that could have amenity of structural implications. The operational development is unlikely to give rise to any vibration that would be measurable beyond the site boundary. It is not proposed, therefore, to undertake any further assessment of vibration.

98. A construction noise assessment will be undertaken based on construction activity, plant use and traffic movement information. Depending on the availability of details of likely construction equipment, some quantitative analysis may be possible, but the focus will be on mitigation measures to be included in the CEMP. Noise levels at receptors will be calculated using BS 5228-1:2009 (and update A1 2014 Part 1

Noise) data and procedures. From the results of the construction noise assessment, preliminary mitigation measures will be advised in line with BS 5228 and CDC planning policy.

99. Noise from the operation of the Proposed Development will be assessed in line with BS 4142:2014 where applicable, along with guidance contained in the World Health Organisation "Guidelines for Community Noise" and Planning Practice Guidance on Noise.

100. Building services noise associated with the operation of the Proposed Development will be assessed in line with BS 4142:2014 and limits recommended such that noise does not exceed the typical LA90 background noise level. The plant on the Proposed Development will be selected and attenuated to achieve these limits during the design development.

101. Noise levels associated with construction traffic and future operational traffic flows will be assessed in line with Calculation of Road Traffic Noise (CRTN) issued by the Department of Transport in 1988. The significance of the impact on road traffic noise levels will be assessed based on a range of relevant guidance including the Design Manual for Roads and Bridges (DMRB) and mitigation measures detailed where necessary.

102. Receptors currently identified at scoping stage include:

- Kingsmere Residential Estate;
- Isolated farm properties to the east of the railway line; and
- Further residential areas to the north at The Acorn Public House, and beyond at Middleton Stoney Road

103. These receptors will be considered within the design development of the Proposed Development and assessed within the Noise Assessment submitted as part of the ES.

104. The Proposed Development has the potential to affect existing noise sensitive properties from increases in road traffic noise due to increased traffic flows generated by the Proposed Development.

105. In addition, during construction, there is potential for noise impacts at noise sensitive properties.

106. The operation of the Proposed Development is unlikely to give rise to any other significant effects, but operational noise from car parking and other commercial activity will be assessed.

107. Where required, mitigation measures will be recommended for both the construction and operational phases. This is likely to amount to measures to be included in the CEMP and any traffic management measures. There is unlikely to be a need for significant mitigation measures and noise impacts from the Proposed Development are expected to be low.

## Air Quality

*Summary Baseline Context*

108. CDC monitors concentrations of nitrogen dioxide (NO2) using 42 passive diffusion tubes throughout the District. This includes eight locations in Bicester town centre, all within 2 km of the site of Proposed Development. Monitoring data for the year 2015 at these locations indicate that annual mean concentrations of NO2 are above or just below the objective along Queens Avenue, Field Street and the B4100, while well below the objective elsewhere. Four Air Quality Management Areas (AQMAs) have been declared to date in the District, including one in Bicester town centre, declared for exceedances of the annual mean NO2 objective (Cherwell District Council, 2016). Current and future air quality conditions at the site of Proposed Development will be determined through detailed dispersion modelling, as described below.

*Outline Scope of Assessment*

109. Potential air quality impacts will be considered in relation to the construction and operational phases of the Proposed Development include:

- Impacts of dust emissions during the construction phase of the Proposed Development;





- Impacts of heavy duty vehicles and non-road mobile machinery emissions during the construction phase of the Proposed Development; and
- Impacts of road traffic emissions generated by the Proposed Development when operational.

110. The scope of the air quality assessment will include:

- The determination of baseline air quality conditions through examination of local monitoring data and other publicly available data;
- The identification of relevant sensitive receptor locations for the construction and operational phases of the Proposed Development;
- A qualitative assessment of impacts of the Proposed Development on dust soiling and concentrations of PM10 during the construction period;
- Consideration of potential impacts from heavy duty vehicles and non-road mobile machinery during the construction period; and
- A quantitative assessment of the impacts of the operation of the Proposed Development on concentrations of NO2, PM10 and PM2.5 from road traffic in the proposed year of opening.

*Construction Impacts*

111. The potential impacts from dust generated during the construction phase of the Proposed Development will be considered using an approach based on the Institute of Air Quality Management (IAQM) Guidance for assessing impacts from construction activities (IAQM, 2014). Cumulative impacts arising from committed developments being constructed in the study area concurrently to the construction of the Proposed Development will also be considered.

112. Construction plant emissions will not be explicitly modelled, as relevant guidance from the IAQM (IAQM, 2014) states that "experience from assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) […] suggests that they are unlikely to make a significant impact on local air quality and in the vast majority of cases they will not need to be quantitatively assessed". However, suitable mitigation measures for site plant will be presented as part of the mitigation measures based on advice presented in the IAQM guidance.

113. The number of heavy duty vehicles that will be in operation during the construction phase of the Proposed Development will be considered in the context of the guidance from IAQM and Environmental Protection UK (EPUK & IAQM) (2017) and the Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2007). As the Proposed Development is not anticipated to lead to an increase in heavy duty vehicles that would be capable of having a significant impact on air quality, it is expected that such impacts will be screened out of the air quality assessment.

*Operational Impacts*

114. The dispersion model ADMS-Roads will be used to quantify the impacts that road traffic emissions associated with the operation of the Proposed Development will have on concentrations of NO2, PM10 and PM2.5 at selected sensitive receptor locations.

115. The scenarios that will be considered as part the assessment will include:

- Current baseline scenario (for model verification purposes);
- Opening Year – without the proposed development, including committed developments; and
- Opening Year – with the proposed development, including committed developments.

116. Suitable receptor locations will be identified based upon detailed maps and photographs. Background pollutant concentrations will be determined using data derived from the Background Maps published by Defra (Defra, 2015).

117. The assessment will include a sensitivity test for the prediction of NO2 road traffic impacts to address elevated real-world nitrogen oxides emissions from certain diesel vehicles. This test will be carried out

by applying adjustments to the 'official' emission factors and will represent a reasonable worst-case upper-bound to the assessment.

118. Meteorological data will be taken either from Bedford or Benson meteorological stations, or any other suitable site identified through discussions with the local authority. The year of meteorological data to be used in the dispersion model will be selected to match the latest year with available local monitoring data.

119. Baseline model output will be verified against appropriate monitoring data from the local authority, and an adjustment factor will be determined, in line with the methodology set out in the LAQM TG (16) guidance document (Defra, 2016).

120. The opening year 'without development' and 'with development' scenarios will both include vehicle trips associated with general growth from the baseline situation and also relevant committed developments. The opening year 'with development' scenarios will also include additional traffic associated with the Proposed Development. The inclusion of relevant committed developments in the traffic data utilised in the assessment will allow an inherently cumulative assessment of the Proposed Development to be undertaken.

121. The predicted concentrations will be compared with the relevant air quality objectives and any exceedances will be highlighted. The significance of the impacts will be evaluated using criteria recommended by the IAQM & EPUK

122. Appropriate mitigation measures, as listed in the IAQM guidance document on construction dust, will be proposed for the construction phase of the Proposed Development, based on the level of risk identified by the construction dust assessment.

## Buried Heritage (Archaeology) and Built Heritage

*Summary Baseline Context*

123. The site has been the subject of numerous previous archaeological investigations which have indicated the archaeological potential of the site and the surrounding area. An archaeological trial trench evaluation was undertaken across the site and the area to its north, where the Tesco foodstore was subsequently constructed, in September and October 2007. This evaluation identified a quantity of exceptionally well preserved Mesolithic flint, which suggests the presence of in situ prehistoric deposits in the vicinity. Possible evidence of late prehistoric and Roman settlement was also encountered, including post holes and drip gullies that could potentially be associated with circular buildings. Boundary ditches were also identified. While some of these ditches were clearly post-medieval in date, others could potentially be of late prehistoric origin. AOC undertook detailed archaeological investigations on the Tesco foodstore site between November 2013 and January 2014. The excavations revealed a sequence of at least seven Bronze Age buildings and associated activity on either side of a relict watercourse. The buildings were represented by postholes; forming two roundhouses that were kept in good repair and rebuilt, probably across generations, and are likely to represent elements of a farmstead. The relative permanence of settlement is also indicated by the presence of three cremation burials at the top of the hill above the farmstead. Other postholes represented fences, which may have enclosed stock enclosures or settlement boundaries on flat ground either side of a river. Roman and post-medieval features were also identified on the site.

124. Ordnance Survey mapping from 1875 depicts the known location of a Roman Road along the western boundary of the site, along the current line of the Oxford Road, A41. In the middle of the first century AD the Romans established and fortified the town of Alchester at the intersection of Akeman Street and a road from Towcester to Dorchester, a location approximately 1km south of the site.

125. The only Scheduled Monument within the 1km study area is the aforementioned Alchester Roman Site. There are 116 Listed Buildings within the 1km study area; all but two of these are Grade II Listed and most are located north of the site within the Conservation Area at Bicester. The Grade II* Old Priory and attached garden walls is located in priory Lane north east of the site and the Grade II* Listed Old Vicarage is located in Church Street also north east of the site.

*Outline Scope of Assessment*





126. Groundworks required for the Proposed Development have the potential to impact directly upon known buried archaeological remains present within the site and as such direct effects will be considered in the ES.

127. Indirect effects can have a variety of forms, if the Proposed Development affects the water table, it could potentially damage the preservation of organic remains within buried archaeological contexts beyond its boundaries. The majority of indirect affects result from changes to the settings of heritage assets and the Proposed Development also has the potential to indirectly affect the settings of designated heritage assets including Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Battlefields and Registered Parks and Gardens. Designated heritage assets up to 1 km distant from the site will initially be identified. Those whose setting could potentially be impacted by the Proposed Development will be considered in detail in the assessment. The assessment will also consider the potential for non-visual settings effects, such as that which could potentially result from elevated traffic, lighting and noise.

128. The ES chapter will be prepared by AOC Archaeology Group and will conform to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Code of Conduct, the CIfA Standard and Guidance for Commissioning Work on, or Providing Consultancy Advice on, Archaeology and the Historic Environment, the CIfA Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations.

129. The ES chapter will comply with National Planning Policy and Guidance on cultural heritage as contained within NPPF (2012) and Historic England Good Practice Advice notes as well as local planning policy represented by The Cherwell Local Plan, 2011-2031.

130. The primary source of information for the presence and significance of known non-designated historic/archaeological remains in the area will be the Oxfordshire Historic Environment Record and evaluation reports from previous archaeological works within and adjacent to the site. Up to date information on Scheduled Monuments, Listed Buildings, Registered Battlefields and Registered Parks and Gardens along with GIS shapefiles recording their locations and extent will be obtained from Historic England's Designation Data Download Area. Information on Conservation Areas, including their boundaries and character appraisals will be obtained from CDC.

131. All heritage assets within a distance of up to 1km from the site boundary will be identified within the ES. This will allow for an assessment of direct impacts and indirect impacts upon setting. An assessment of the potential for hitherto unknown archaeological remains to survive on the site will also be made. The need to assess any assets beyond the 1km study area will be identified through Scoping Opinions and consultation.

132. The submitted ES chapter will fully describe the baseline historic environment conditions, collating the results of desk-based data gathering, map regression, the examination of aerial photographs held by Historic England Archives, Swindon and a walkover survey. It will identify areas where the Proposed Development may impact upon heritage assets and include a constraints map for direct impacts. The ES chapter will provide and assessment of the identified designated heritage assets in the area surrounding the site which could be subject to potential effects upon setting.

133. Appendix 1 outlines the proposed detailed methodology for assessing effects upon heritage assets both direct and indirect. It takes account of NPPF, its practice guide and Historic England's Good Practice Advice Note 3: the setting of heritage assets (Historic England 2015).

134. Where significant effects are identified the ES chapter will put forward mitigation proposals. These proposals will seek to avoid or reduce identified effects. Where it is impossible to avoid or reduce the level of effect the ES chapter will considered the potential to offset any significant effects.

## Ecology

*Summary Baseline Context*

135. Prime Environment Ltd have undertaken a Preliminary Ecological Appraisal of the application site (See Appendix 2). The survey aimed to inform the scope for any further works that may be required in the assessment of ecological effects arising from the Proposed Development. The survey found that the site is predominantly an intensively managed arable field, currently under a grass crop. The site also includes wet and dry ditches, hedgerows and mature boundary trees. One hedgerow qualifies as

important under the hedgerow regulations and the ditches were relatively species rich containing emergent and swamp vegetation. The habitats are described more fully in the PEA document.

136. Full desk study data has not yet been received, but there are no statutory designated sites that are likely to be effected by the proposals. Bicester Wetland Reserve is 280m from the site.

137. There are a number of ponds nearby which are suitable to support great crested newts. Drift net and pitfall trapping surveys were undertaken for great crested newts in terrestrial habitats at the site in 2006, but none were found.

138. The site's field margins, as well as a large log pile and the ditches are suitable habitat for reptiles.

139. Several skylark territories were noted during the survey.

140. The ditches, hedges and trees are suitable foraging and commuting habitat for bats and some of the trees could support bat roosts.

141. There is a single mammal burrow, which is likely to be an outlier badger sett (currently occupied by rabbits).

*Outline Scope of Assessment*

142. The assessment will consider both direct and indirect effects on the identified important ecological features resulting from a range of activities including, but not limited to:

- loss of vegetated ditch and arable margins;
- loss of great crested newt terrestrial habitat (if they are present);
- loss of skylark breeding habitat;
- loss of badger sett (unlikely to be significant in EIA terms, but included as has legislative implications; and
- direct and indirect effects on bat populations using the site to roost, feed or commute.
- Outline Scope of Further Surveys
- The following further surveys will be undertaken to inform the assessment:
- Great crested newt eDNA survey to identify whether a population is extant within ponds close to the Site (500m) (to be undertaken by June);
- Skylark survey to establish the number of territories held at the site (two visits between May and June);
- Bat activity surveys – two transect routes, walked monthly between May and September (to be reviewed in July);
- Bat activity surveys – four static detectors sampling for five consecutive nights each month; and
- Bat Tree Assessments – detailed tree assessments for those which are at risk of interference effects e.g. lighting, possibly followed by climbing inspections.

143. The Ecological Impact Assessment (EcIA) will be undertaken with reference to the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal - Second Edition'). The aims of the ecology assessment will be to:

- Identify relevant ecological features (i.e. designated sites, habitats, species or ecosystems) which may be impacted;
- Provide an objective and transparent assessment of the likely ecological impacts and resultant effects of the Proposed Development. Impacts and effects may be beneficial (i.e. positive) or adverse (i.e. negative);





- Facilitate objective and transparent determination of the consequences of the Proposed Development in terms of national, regional and local policies relevant to nature conservation and biodiversity; and
- Set out what steps would be taken to adhere to legal requirements relating to the relevant ecological features concerned.

144. The assessment will describe the methods used to identify and assess the potential significant effects of the Proposed Development during the construction and operational phases. Baseline conditions will be described, including a summary of legislation/policy relevant to the baseline conditions, and subsequently the impact assessment will be undertaken taking into account avoidance and mitigation measures that are inherent to the design (e.g. the retention of a boundary tree known to support a bat roost), including the use of best practice construction methods (e.g. implementation of methods to supress dust generation or avoid pollution of water courses). Additional mitigation, compensation and enhancement measures will be described, followed by an assessment of the significance of residual effects. A summary of the assessment will then be provided, together with relevant conclusions.

145. In line with the CIEEM guidelines the terminology used within the EcIA will draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EcIA these terms will be defined as followed:

- Impact – Actions resulting in changes to an ecological feature. For example, demolition activities leading to the removal of a building utilised as a bat roost.
- Effect – Outcome resulting from an impact acting upon the conservation status or structure and function of an ecological feature. For example, killing/injury of bats and reducing the availability of breeding habitat as a result of the loss of a bat roost may lead to an adverse effect on the conservation status of the population concerned.

146. For each phase of the Proposed Development (e.g. demolition, construction, operation), the assessment will be structured and reported by ecological feature with relevant potential impacts on that feature described in turn, and then the overall effect arising from those impacts reported.

*Evaluation of Ecological Features*

147. Data received through consultation, desk-based investigations and field-based investigations will be used to allow relevant ecological features (including designated sites, ecosystems, habitat and species) of value (or potential value) to be identified, and the main factors contributing to their value described and related to available guidance.

148. Ecological features may be important for multiple different reasons (e.g. rarity in a particular geographic context; role in habitat connectivity; or a species on the edge of their range). Relevant reasons for which an ecological feature is important will be described and considered in order to assign each relevant ecological feature an overall value in accordance with the following geographical frames of reference:

- International (i.e. European);
- National (i.e. England);
- County;
- Borough;
- Local;
- Site;
- Negligible (used where the value is lower than the Site level).

149. In determining the value of relevant ecological features the social and economic values will be considered separately. Where appropriate the significance of relevant social and economic effects will be defined and reported within separate community and/or socio-economic assessments.

150. Characterising potential ecological impacts

151. When describing potential impacts (and where relevant the resultant effects) reference will be made to the following characteristics:

- Beneficial/adverse:
- Magnitude:
- Spatial extent:
- Duration:
- Reversibility; and
- Timing and frequency.

152. For each receptor only those characteristics relevant to understanding the ecological effect and determining the significance will be described.

153. Potential impacts on relevant ecological features will be assessed and a judgement reached on whether or not the resultant effect on conservation status or structure and function is likely to be significant. This process will take into consideration the characteristics of the impact, the sensitivity of the ecological feature concerned, and the geographic scale at which the feature is considered important.

154. The CIEEM guidelines state that:

'For the purposes of EcIA a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' (i.e. relevant ecological features) or for biodiversity in general'…….

155. In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

156. For designated sites, defined sites and ecosystems the assessment will consider how the proposals are likely to affect the conservation objectives for the Site and/or its interest/qualifying features. For ecosystems, consideration will be given to whether the proposals are likely to result in a change in ecosystem structure and/or function.

157. For species and habitats the effects of impacts on individual habitats and species will be considered in relation to 'conservation status' which is defined in the CIEEM guidelines as follows:

- For habitats: conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area;
- For species: conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

158. In considering effects on conservation status, reference will be made to relevant available guidance on the existing conservation status of a feature.

159. Conclusions on the significance of effects relate to the concepts of 'structure and function' or 'conservation status' as being either:

- Not-significant (i.e. no effect on structure and function, or conservation status); or
- Significant (i.e. structure and function, or conservation status is affected).

160. Such judgements will be based, wherever possible, on quantitative evidence. However, where necessary the professional judgement of an experienced ecologist will be applied.

161. For those effects considered significant, the effect will also be characterised as appropriate (e.g. adverse or beneficial), and qualified with reference to the geographic scale at which the effect is significant (e.g. an adverse effect significant at a national level).





162. The scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species of principal importance for nature conservation at the national level may not have a significant effect on the conservation status of the national population of that species.

## Landscape and Visual Impact Assessment

*Outline Scope of Assessment*

163. The LVIA will be prepared in accordance with a Methodology informed by guidance set out in 'Landscape and Visual Impact Assessment' published by the Landscape Institute and Institute for Environmental Assessment (2013). This baseline assessment will inform a description of the landscape character, condition and sensitivity of the existing site and key landscape and visual receptors. The assessment of landscape sensitivity seeks to establish the degree to which the landscape can accommodate change, without affecting the fundamental characteristics which contribute to aspects such as local distinctiveness, sense of place, appearance and landscape quality. These studies may include evaluation of physical landscape value and or quality and condition.

164. The study area for the landscape and visual assessment will be defined as the visual envelope or Theoretical Zone of Visual Influence (TZVI) for the Proposed Development. The Baseline ZVI and the Development Case TZVI will be modelled by creating a 3D digital terrain model (DTM) generated from Ordnance Survey (OS) base data.

165. The topographical data will be generated from Ordnance Survey (OS) base. The location, extent and height of existing vegetation have been recorded from the OS 1:25,000 scale raster file, from Google Earth and site observation.

*Visual baseline*

166. Baseline visual receptors will be identified using a combination of desk-based study and site survey. This has identified the following types of potential community, residential, employment and transport based receptor locations:

- Public places e.g. playing fields, cricket club, church, school, Common Land;
- Public Rights of Way e.g. footpaths, byways, and bridleways;
- Residential e.g. detached, semi-detached, bungalow, terrace, apartment;
- Workplaces e.g. business or commercial property; and
- Transport routes e.g. classified and unclassified roads, cycle routes.

167. All potential visual receptors within the study area will be considered. A list of viewpoints has been prepared (see Figure 3) to demonstrate the wide range of potential baseline and development case views of the development site and the Proposed Development. Views from these locations will be documented in a structured and consistent manner. This process will use written descriptions and photographs to record the visual baseline. The viewpoint photographs have been taken in accordance with the Landscape Institute Advice Note 01/11. Due to the timing of the project, the visual assessment and the baseline photography will be undertaken in spring condition. A description of the view and identification of the type, location and receptor sensitivity has been made through a site based visual assessment.

168. Visual sensitivity will be assigned using the criteria derived from the GLVIA. Degree of exposure to the view e.g. permanence versus transience.

*Assessment of Potential Impacts*

169. The assessment methodology will follow the standard GLVIA approach of assessing changes in the development case against the baseline condition. Predicted effects will be identified at, or for each receptor, and the magnitude of the identified landscape and visual changes evaluated by professional judgement. The significance of these effects will be determined by the inter-relationship of nature of effect (magnitude) and the nature of receptor (sensitivity)

170. Once a potential impact on these components has been identified, an experienced based judgement of the nature of the predicted landscape effect will be made and recorded as:

- Beneficial or adverse;
- Direct or indirect;
- Temporary/permanent;
- Short, medium or long term;
- Local/regional/national in scale; and
- Single or cumulative.

171. The duration of effect would fall into the following categories:

- Short term – 0-5 years e.g. partial clearance of vegetation for construction;
- Medium term – 5-10 years e.g. loss of new hedgerows for construction but replanted;
- Long term – 10-50 years e.g. loss of semi-mature woody vegetation for construction but replanted; and;
- Permanent – 50+ years e.g. loss of vegetation where replacement vegetation would not achieve pre-construction dimensions within 50 years.

172. Experience based judgement will then be used to identify the magnitude of the potential change that would result from the identified landscape impact. The significance of the predicted landscape effects will then be identified using a matrix form of evaluation. Effects will be assigned one of the four categories of Insignificant, Minor, Moderate or Major considering the magnitude of the change and the ability of the receptor to accommodate the proposed change (sensitivity).

173. The visual assessment will describe the changes to the existing views resulting from the proposed facilities. This written assessment will be supported by photographic analysis of the baseline views. For each viewpoint an experienced based judgment of the nature of the predicted visual effect will be made and recorded as: Beneficial or adverse; Direct or indirect; Temporary/permanent; Short, medium or long term; Local/regional/national in scale; Single or cumulative.

174. The views will be photographed in accordance with the Landscape Institute Guidance. The assessment will be supported by wireframe photomontages of the development case. These will be produced to LI guidelines and will be presented as wireframe photomontages as panoramas, for context, and as scaled views to enable the viewer to better judge scale and impact. All methodologies will be defined in the assessment document.

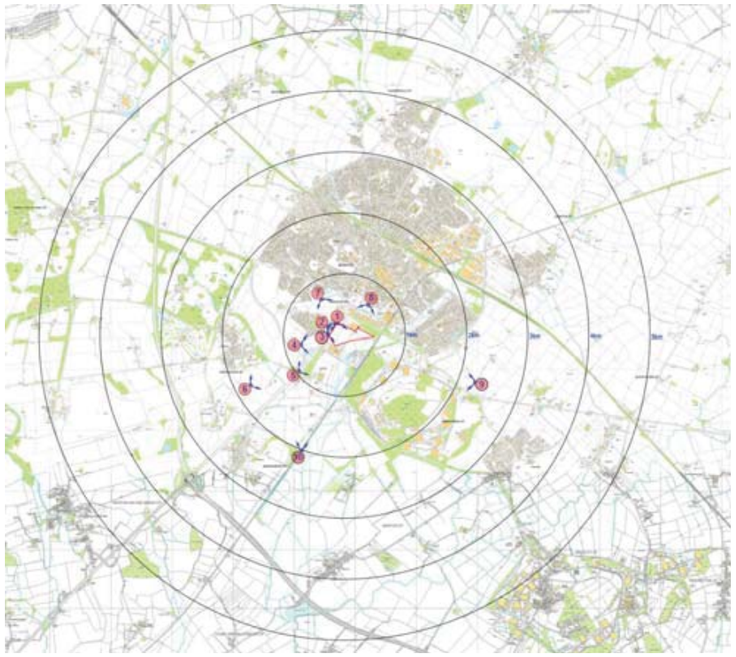
175. The magnitude of the identified visual impact will be identified for receptors through a written assessment. The significance of the identified visual effects will then determined by the inter-relationship of magnitude of impact and receptor sensitivity. The parameters for the significance threshold assigned for each identified landscape and visual effect will be defined within the written assessment.

176. Mitigation requirements will be considered following the assessment of impacts with the effectiveness of the mitigation identified over year one, year 5 and year 20 with residual impacts being identified.





Figure 3: Photography Location Plan



## ENVIRONMENTAL TOPICS TO BE 'SCOPED OUT' OF THE EIA

### Ground Conditions

177. A Phase 1 Environmental Risk Assessment has been undertaken by Buro Happold. The Phase 1 Environmental Risk Assessment Report is provided within Appendix 3 to this EIA Scoping Report. A summary of the report is provided below.

*Existing and Historical Uses On-Site Use*

178. The site, historically and presently, is open agricultural land. Prior to 1880, the site was agricultural land with field boundaries throughout the site. [Of particular interest is the western field boundary, which remained constant throughout the mapping and is now the drainage ditch running through the site]. A single, small building was present in the west of the site. Prior to 1898, a second small building has been constructed in the west of the site. These building were removed by 1950. Prior to 1985 two different buildings were constructed in the west of the site and a new drain had been laid in the central to the site running north / south, and by 2002 a third building had been constructed. This layout was present up and including the 2014 map. In recent years (since 2014), the land adjacent to the north has been developed as a food superstore with a petrol forecourt, another petrol forecourt is located 100m north west.

*Existing and Historical Uses On-Site Use*

179. Prior to 1880, the site was surrounded by agricultural land that was noted as 'Liable to Floods'. Roman Way bound the west of the site. Adjacent to the eastern corner of the site was Bicester Sewage Pipe, flowing 200m south to a sewage tank. 50m east was the Oxford Main line. The edge of Bicester was 500m north. Prior to 1960 new railway sidings and depots were constructed from 250m south around Graven Hill. By 1970, Bicester had expanded west, and Roman Way was straightened and renamed to Oxford Road, a Sewage treatment works was constructed 200m south. 50m north was a new building, part of a farm, and a well. This well appears to be the source of the water, which enters the drainage ditch intersecting the site (it is assumed the well was present before this, just unlabelled). By 1985 Bicester had expanded further west, the sewage treatment works also expanded. The field boundary / drainage ditch was no longer present adjacent to the north. A garden nursery was constructed adjacent to the south. By 1995 the A41 was constructed adjacent to the north of the site running east, beyond this was a new commercial area with recreation grounds beyond. The nursery to the south also expanded.

*Geoenvironmental Conditions*

180. In 2014, BuroHappold commissioned Structural Soils to complete a Site Investigation to provide information on a proposed trunk sewer, access road and ornamental lake. The data was combined with an investigation from 2008. The 2008 works comprised five cable percussion boreholes, a rotary cored borehole and five machine dug trial pits. In 2014, an additional cable percussive borehole and five mechanical trial pits were completed. The exploratory holes extended to a maximum depth of 11.70m below ground level (bgl) in the rotary borehole. The logs are reproduced in Appendix 3..

181. Typically, from ground level to about 1-2m bgl there were superficial deposits. In the east, the Kellaways Clay Member were present up to 4.9m bgl, underlying the superficial deposits. The Kellaways Clay Member thins to the west and was not present in the far west. The Cornbrash Formation was encountered in all locations beneath the Kellaways Clay Member (where present) or the Superficial Deposits where the Kellaways Clay Member is not present. The base of the Cornbrash Formation was only proven in BH2, where the formation extended to 2.25m bgl. The Forest Marl Formation was proven between 2.25m bgl and 9.40m bgl, under the Forest Marl Formation the White Limestone was present to the base of the hole (11.70m bgl).

*Preliminary Risk Assessment*

182. Land contamination is regulated under several regimes, including environmental protection, pollution prevention and control, waste management, planning and development control, and health and safety legislation. The primary regulatory regimes under which contaminated land are managed in the UK are: under the planning process described in the National Planning Policy Framework and under Part 2A of the Environmental Protection Act. The framework for the assessment of potential land contamination adopted in this assessment is based on current guidance documents regarding the implementation of





these regimes and the assessment of potentially contaminated land, with particular reference to: the Environment Agency Model Procedures and their Guiding Principles on Land Contamination; and the relevant British Standard (BS10175:2011).

183. Base on the above, the conceptual model of the site the Phase 1 Environmental Risk Assessment did not identify any significant source-pathway-receptor linkages. The highest risk (a moderate / low risk) is to human health. This is based on the potential for asbestos containing materials within the bund that surrounds the site. The Phase 1 Environmental Risk Assessment states that a site investigation will be required to assess the geoenvironmental risks associated with the construction of the proposed structures. This investigation should quantify the potential risks to site neighbours and future site users and will inform the need for any mitigation or remediation requirements.

184. It is envisaged that several procedures will need to be fulfilled pre-commencement of the works across the site to ensure the protection of human health and the environment. The procedures are standard practices that need to be undertaken prior to the start of below ground works on any site and would be undertaken in accordance with relevant legislation. It is envisaged that the fulfilment of these procedures would be secured through appropriately worded planning conditions attached to the planning permission. Planning conditions pertaining to the following are anticipated:

- Selection of appropriate piling techniques and preparation of a piling method statement so as not to result in any unacceptable risk to groundwater;
- Preparation and execution of a site investigation scheme. The site investigation scheme shall be based on the risks identified in the preliminary risk assessment and shall provide provision for, where relevant, the sampling of vapour, ground gas, surface and groundwater;
- As required, preparation of a remediation method statement which will detail any required remediation works and shall be designed to mitigate any remaining risks identified in the risk assessment;
- As required, the execution of the remediation method statement and preparation of a verification report;
- Definition of the procedures for long term monitoring past the completion of the development works to verify the success of the remediation works;

  Definition of the procedures if any unexpected contamination is found on site including the reporting procedure for its identification and management.

*Conclusion*

185. The Phase 1 Environmental Risk Assessment (Appendix 3) has defined the risks in relation to the redevelopment of the site on human health and the environment, including controlled waters.

186. The risks can however be adequately managed (through industry recognised standards and best practice measures), and so the redevelopment of the site is unlikely to generate any significant ground conditions (including groundwater) related environmental effects.

187. The risks can be adequately managed so as not to cause unacceptable harm to human health, the built environment, ecology or controlled waters.

188. As such, it is considered that the risks and resultant effects are sufficiently well understood and that based on the information currently available, it is likely that the residual effects associated with ground conditions and groundwater would be insignificant.

189. Furthermore, several planning conditions attached to the planning permission are envisaged to cater for the further reporting, site investigation works and (if required) remediation prior to the start of works on site are anticipated.

190. On this basis, it is suggested that a full ground conditions (including groundwater) impact assessment is scoped out of the EIA. The ES will however include the Phase 1 Environmental Risk Assessment and will specifically, within Chapter 5: Demolition and Construction of the ES (Volume I), cite the industry

recognised standards and best practice measures (including those to be undertaken pursuant to planning conditions attached to the planning permission) to ensure the protection of human health, the environment and controlled waters.

## Water Resources and Flood Risk

*Flood Risk and Drainage*

191. The majority of the area within the red line has been subject to a flood risk assessment as part of the previous outline planning application and therefore the flood characteristics of the area are well documented.

192. The site's south eastern boundary is adjacent to a watercourse known as the Langford Brook and as a result falls within the flood zone of this watercourse. The majority of the land within the red line is designated as zone 1 –low risk of flooding – with a small area on the boundary of zone 1 and zone 2. The Proposed Development will be contained within zone 1. The exact limit of zone 2 will be determined by a Flood Risk Assessment (FRA) which will be prepared and presented as an appendix to the ES to support the outline planning application in accordance with the requirements of the NPPF, Regional Planning Policies and Environment Agency Guidance.

193. The FRA will include the following:

- details of any historical flooding events;
- acceptability of the proposed land use in relation to known flood zones;
- volume of surface water runoff likely to be generated by the development;
- details of existing and proposed SuDS surface water drainage;
- details of flood resilience and resistance measures as appropriate;
- access and egress arrangements; and
- climate change effects.

194. In addition to the FRA, a drainage strategy will be prepared for the site. The drainage network already constructed as part of the primary infrastructure was designed in accordance with the requirements within the original drainage strategy of the original outline planning application. Surface water runoff will be limited to greenfield runoff rates and attenuation measures will be incorporated within the development. These will be in accordance with good practice contained within Sustainable Drainage Systems (SuDS) recommendations. The surface water network constructed to serve the site has been sized accordingly with an outfall to the watercourse which currently drains the site. Therefore the existing surface water flow regime will be maintained.

*Water Demand and Wastewater*

195. The primary water supply and drainage infrastructure to serve the Proposed Development has been constructed and completed in December 2015. The anticipated water demand for the development was agreed with Thames Water and a new water main installed alongside the new access road. The main was increased in size over and above what is required to serve the proposed development in order to provide water for firefighting for the Tesco foodstore to the north of the site. Therefore, there is excess capacity to serve the size and type of development proposed. In addition, the capacity assessment has not included the reduction in demand that will occur from the use of water management strategies that will be adopted in accordance with good practice methods such as rainwater harvesting, low use appliances, and grey water use.

196. The Proposed Development will result in low volumes of waste water. A 600mm foul sewer has been constructed under the access road with connections to serve the Proposed Development. The sewer has been adopted by Thames Water and also serves the Kingsmere Residential Scheme. The volume of waste water arising from the Proposed Development will be insignificant in comparison with the capacity of the sewer.





*Conclusion*

197. The site's south eastern boundary is adjacent to a watercourse known as the Langford Brook and as a result falls within the flood zone of this watercourse. The majority of the area covered by the outline planning application is within flood zone 1 and no development is proposed within flood zone 2. A number of flood studies have been carried out since the initial outline planning application for the site in 2007 so the flood characteristics are well understood.

198. The primary drainage infrastructure has already been constructed and this is in line with the drainage strategy for the site. The site is already served by a water main and adopted foul sewer with capacities well in excess of the estimated demands from the Proposed Development. As a result no significant effects are anticipated in respect of water demand and waste water discharges resulting from the Proposed Development.

199. A Flood Risk Assessment submitted in support of the outline planning application will include a drainage strategy. It is intended to summarise the findings and recommendations of the FRA and Outline Drainage Strategy within the ES. Specifically, information will be presented on the measures proposed to avoid or mitigate flood risk, including the use of any SUDS and attenuation storage provision.

200. As a full FRA and Outline Drainage Strategy will be prepared and submitted as part of the ES, it is not intended to present within the ES an additional 'Water Resources, Flood Risk and Drainage' chapter. The FRA, Outline Drainage Strategy and the information on these aspects that will be summarised and presented within the ES will provide a sufficient level of understanding on the potential for significant effects associated with water resources, flood risk and drainage. No further analysis is considered necessary.

## PROPOSED STRUCTURE OF THE ENVIRONMENTAL STATEMENT

201. The ES will comprise the following set of documents:

202. **ES Non-Technical Summary (NTS):** this document will provide a concise summary of the Proposed Development, alternative designs that were considered, environmental effects and mitigation measures.

203. **ES Volume I:** This will contain the full text of the EIA with the proposed chapter headings as follows:

- Introduction;
- EIA Methodology;
- Alternatives and Design Evolution;
- The Proposed Development;
- Construction;
- Socio-economics;
- Transportation and Access;
- Noise and Vibration;
- Air Quality;
- Buried Heritage (Archaeology) and Built Heritage;
- Ecology;
- Landscape and Visual Impact Assessment
- Effect Interactions; and
- Residual Effects and Conclusions.

204. **ES Volume II: Technical Appendices:** these will provide supplementary details of the environmental studies conducted during the EIA including relevant data tables, figures and photographs and will include amongst others, the Flood Risk Assessment, Preliminary Ecology Appraisal, Phase 1 Environmental Risk Assessment and the Transport Assessment.

## SUMMARY AND CONCLUSIONS

205. This Report requests a Scoping Opinion of CDC pursuant to Regulation 13 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended 2015). The EIA Scoping Report suggests a comprehensive scope of work based on previous experience of the assembled team of specialists and existing knowledge of the site. CDC and consultees are invited to consider the contents of this report and comment accordingly within the five-week period prescribed by the EIA Regulations.





# Appendix 1 - Archaeology

## *Appendix 1: Assessment of Significance / Assessment Criteria*

This appendix sets out the methodology for assessing effects upon heritage assets both direct and indirect. It takes account of NPPF, its practice guide and Historic England's Good Practice Advice Note 3: the setting of heritage assets[1].

### *The Assessor*

AOC Archaeology Group conforms to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Code of Conduct[2], the CIfA Standard and Guidance for Commissioning Work on, or Providing Consultancy Advice on, Archaeology and the Historic Environment[3], the CIfA Standards and Guidance for Historic Environment Desk Based Assessments[4] and Field Evaluations[5].

AOC Archaeology Group is a Registered Archaeological Organisation of the Chartered Institute for Archaeologists. This status ensures that there is regular monitoring and approval by external peers of our internal systems, standards and skills development.

AOC is ISO 9001:2008 accredited, in recognition of the Company's Quality Management System.

### *Assessing Cultural Value (Significance) & Importance*

The definition of cultural significance is readily accepted by heritage professionals both in the UK and internationally and was first fully outlined in the Burra Charter, Article One of which identifies that '*cultural significance*' or '*cultural heritage value*' means aesthetic, historic, scientific, social or spiritual value for past, present or future generations[6]. This definition has since been adopted by heritage organisations around the world, including Historic England (HE). The NPPF defines cultural significance as:

> "*The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting*."[7]

The term '*cultural value*' will be used throughout the assessment as opposed to '*cultural significance*', in order to avoid confusion with the concept of a '*significant effect*' in EIA terms.

All heritage assets have some value, however some assets are judged to be more important than others. The level of that importance is, from a cultural resource management perspective, determined by establishing the asset's capacity to inform present or future generations about the past. In the case of many heritage assets their importance has already been established through the designation (i.e. scheduling, listing and register) processes applied by HE.

The criteria that will be used to establish importance in the ES are presented in Table 1 below and are drawn from the Department of Media, Culture and Sports publication, Principles for Selection of Listed Buildings,[8] and the Scheduled Monuments Policy Statements published by the same body,[9] which outline the criteria for designating heritage assets.

**Table 1: Criteria for Establishing Importance**

| Importance | Criteria |
|---|---|
| International and National | World Heritage Sites;<br><br>Scheduled Monuments (Actual and Potential);<br><br>Grade I and II* Listed Buildings;<br><br>Grade I and II* Registered Parks and Gardens;<br><br>Registered Battlefields;<br><br>Fine, little-altered examples of some particular period, style or type. |
| Regional | Grade II Listed Buildings;<br><br>Grade II Registered Parks and Gardens;<br><br>Conservation Areas;<br><br>Major examples of some period, style or type, which may have been altered;<br><br>Asset types which would normally be considered of national importance that have been partially damaged (such that cultural heritage value has been reduced). |
| Local | Locally Listed Heritage Assets;<br><br>Lesser examples of any period, style or type, as originally constructed or altered, and simple, traditional sites, which group well with other significant remains, or are part of a planned group such as an estate or an industrial complex;<br><br>Asset types which would normally be considered of regional importance that have been partially damaged or asset types which would normally be considered of national importance that have been largely damaged (such that their cultural heritage value has been reduced). |
| Negligible | Relatively numerous types of remains;<br><br>findspots or artefacts that have no definite archaeological remains known in their context;<br><br>Asset types which would normally be considered of local importance that have been largely damaged (such that their cultural heritage value has been reduced); |

[1] Historic England (2015) Good Practice Advice Note 3: the setting of heritage assets
[2] Chartered Institute for Archaeologists (2014) Code of Conduct
[3] Chartered Institute for Archaeologists (2014) Standard and guidance for commissioning work on, or providing consultancy advice on, archaeology and the historic environment
[4] Chartered Institute for Archaeologists (2014) Standards and Guidance for Historic Environment Desk Based Assessments
[5] Chartered Institute for Archaeologists (2014) Standard and guidance for archaeological field evaluation
[6] ICOMOS (1999). Burra Charter Article 1.2.
[7] DCLG: Department for Communities and Local Government (2012). NPPF, 56.
[8] DMCS (2010). Principles for Selection of Listed Buildings.
[9] DMCS (2013). Scheduled Monuments Policy Statements.

***Methodology for assessing direct physical effects***

A direct effect by a development can potentially result in an irreversible loss of information content and therefore cultural heritage value. The potential magnitude of change upon heritage assets caused by the proposed development will be rated using the classifications and criteria outlined in Table 2 below.

**Table 2: Criteria for establishing magnitude of physical change**

| Physical Effect | Criteria |
|---|---|
| High | Major loss of information content resulting from total or large-scale removal of deposits from a site.<br><br>Major alteration of a monument's baseline condition. |
| Medium | Moderate loss of information content resulting from partial removal of deposits from a site.<br><br>Moderate alteration of a monument's baseline condition. |
| Low | Minor detectable changes leading to the loss of information content.<br><br>Minor alterations to the baseline condition of a monument. |
| Marginal | Very slight or barely measurable loss of information content.<br><br>Loss of a small percentage of the area of a site's peripheral deposits.<br><br>Very slight alterations to a monument. |
| None | No physical change anticipated. |

The predicted level of direct effect upon each asset will be determined by considering its importance in conjunction with the magnitude of change predicted for it. The method of deriving the level of effect classifications is shown in Table 3 below:

**Table 3: Method of rating level of direct effects on heritage assets by the Proposed Development**

| Magnitude of Change | Importance of Asset | | | |
|---|---|---|---|---|
| | Negligible | Local | Regional | National and International |
| High | Minor | Moderate | Moderate-Major | Major |
| Medium | Negligible - Minor | Minor-Moderate | Moderate | Moderate-Major |
| Low | Negligible | Minor | Minor-Moderate | Moderate |
| Marginal | Negligible | Negligible | Minor | Minor-Moderate |
| *None* | None | None | None | None |
| The level of effects recorded in grey highlighted cells are considered to be 'significant' | | | | |

***Methodology for assessing indirect effects upon setting***

This sub-section outlines the detailed methodology used in assessing potential effects upon the setting of heritage assets. The methodology presented here sets out criteria for assessing sensitivity to changes to setting (Relative Sensitivity), magnitude of change and level of effect.

Assessing Sensitivity of Assets to Changes to their Setting

Whilst determining the relative cultural value of a heritage asset is essential for establishing its importance, it is widely recognised[10] that the importance of an asset is not the same as its sensitivity to changes to its setting. Thus in determining effects upon the setting of assets by a proposed development, both importance and sensitivity to changes to setting need to be considered.

Setting is a key issue in the case of some, but by no means all assets. A nationally important asset does not necessarily have high sensitivity to changes to its setting (relative sensitivity) this may be because its value lies in its other characteristics and its setting is not a factor which contributes demonstrably to its value. An asset's sensitivity refers to its capacity to retain cultural heritage value in the face of changes to its setting. The ability of the setting to contribute to an understanding, appreciation and experience of the asset and its value also has a bearing on the sensitivity of that asset to changes to its setting. Assets with high sensitivity will be vulnerable to changes that affect their settings, and even slight changes may reduce their value or the ability of setting to contribute to the understanding, appreciation and experience of the asset. Less sensitive assets will be able to accommodate greater changes to their settings without significant reduction in their value, and in spite of such changes the relationship between the asset and its setting will still be legible.

The criteria for establishing an asset's relative sensitivity are outlined in Table 4 below.

**Table 4: Criteria for Establishing Relative Sensitivity**

| Sensitivity | Definition |
|---|---|
| High | An asset whose setting contributes significantly to an observer's understanding, appreciation and experience of it and its value should be thought of as having High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, contribute directly to their value (e.g. form part of their Evidential and Aesthetic Value[11]). For example an asset which retains an overtly intended or authentic relationship with its setting and the surrounding landscape. These may in particular be assets such as ritual monuments that have constructed sightlines to and/or from them, or structures intended to be visually dominant within a wide landscape area e.g. castles, tower houses, prominent forts etc.<br><br>An asset, the current understanding, appreciation and experience of which, relies heavily on its modern aesthetic setting. In particular an asset whose setting is an important factor in the retention of its cultural value. |
| Medium | An asset whose setting contributes moderately to an observer's understanding, appreciation and experience of it and its value should be thought of as having Medium Sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to value, but whereby its value is derived mainly from its physical evidential values. This could for |

[10] Lambrick (2008). Setting Standards: A Review prepared on behalf of the IFA.
[11] Historic England (2008). Conservation Principles, 28-29.

| Sensitivity | Definition |
|---|---|
| | example include assets which had an overtly intended authentic relationship with their setting and the surrounding landscape but where that relationship (and therefore the ability of the assets' surroundings to contribute to an understanding, appreciation and experience of them and their value) has been moderately compromised either by previous modern intrusion in their setting or the landscape, or where the asset itself is in such a state of disrepair that the relationship with setting cannot be fully determined.<br><br>An asset, the current understanding, appreciation and experience of which, relies partially on its modern aesthetic setting regardless of whether or not this was intended by the original constructors or authentic users of the asset. An asset whose setting is a contributing factor to the retention of its cultural value. |
| Low | An asset whose setting makes some contribution to an observer's understanding, appreciation and experience of it and its value should generally be thought of as having Low Sensitivity to changes to its setting. This may be an asset whose value is mainly derived from its physical evidential values and whereby changes to its setting will not materially diminish our understanding, appreciation and experience of it or its value. This could for example include assets which had an overtly intended authentic relationship with their setting and the surrounding landscape, but where that relationship (and therefore the ability of the assets' surroundings to contribute to an understanding, appreciation and experience of them and their) has been significantly compromised either by previous modern intrusion to its setting or landscape, or where the asset itself is in such a state of disrepair that the relationship with setting cannot be determined. |
| Marginal | An asset whose setting makes minimal contribution to an observer's understanding, appreciation and experience of it and its value should generally be thought of as having Marginal Sensitivity to changes to its setting. This may include assets for which the authentic relationship with their surrounding has been lost, possibly having been compromised by previous modern intrusion, but who still retain cultural value in their physical evidential value and possibly wider historical and communal values. |

The determination of an asset's sensitivity is first and foremost reliant upon the determination of its setting. The criteria set out in Table 4 above are intended as a guide. Assessments of individual assets are informed by knowledge of the asset itself, of the asset type if applicable, and by site visits to establish the current setting of the assets. This allows for the use of professional judgement and each asset is assessed on an individual basis. It should be noted that individual assets may fall into a number of the sensitivity categories presented above, e.g. a country house may have a high sensitivity to alterations within its own landscaped park or garden, but its sensitivity to changes in the wider setting may be less.

In establishing the relative sensitivity of an asset to changes to its setting, an aesthetic appreciation of that asset and its setting must be arrived at. The ES chapter will outline a range of factors which should be considered when establishing the setting of an asset and therefore determining its sensitivity. These will be used as a guide in assessing each asset from known records and in the field. In defining these criteria, emphasis will be placed on establishing the current setting of each asset and how the proposed development would affect it.

Assessing Magnitude of Change

Determining the magnitude of change caused by the proposed development requires an identification of the change to the setting of any given asset, and in particular changes to those elements of the setting that inform its cultural value. Table 5 below outlines the main factors affecting magnitude of change:

**Table 5: Factors Affecting Magnitude of Change**

| Site Details | Importance of detail for assessing magnitude of change |
|---|---|
| 1) Proximity to Proposed Development | Increasing distance of an asset from the Proposed Development will, in most cases, diminish the effects on its setting. |
| 2) Visibility of development (based on visualisations where appropriate) | The proportion of the development that is likely to be intervisible with the asset will usually directly affect the magnitude of change on its setting. |
| 3) Complexity of landscape | The more visually complex a landscape is, the less prominent the Proposed Development may appear within it. This is because where a landscape is visually complex the eye can be distracted by other features and will not focus exclusively on the Proposed Development. Visual complexity describes the extent to which a landscape varies visually and the extent to which there are various land types, land uses, and built features producing variety in the landscape. |
| 4) Visual obstructions | This refers to the existence of features (e.g. tree belts, forestry, landscaping or built features) that could partially or wholly obscure the Proposed Development from view. |

It is acknowledged that Table 5 above primarily deals with visual factors affecting setting. Whilst the importance of visual elements of settings, e.g. views, intervisibility, prominence etc, are clear, it is also acknowledged that there are other, non-visual factors which could potentially result in setting effects. Such factors could be other sensory factors, e.g. noise or smell, or could be associative. In coming to a conclusion about magnitude of change upon setting, the assessment will make reference to traffic, noise, air quality, and landscape and visual assessments, undertaken for the ES, as appropriate.

Once the above has been considered, the prediction of magnitude of change in setting is based upon the criteria set out below in Table 6. In applying these criteria, particular consideration will be given to the relationship of the proposed development to those elements of setting which have been qualitatively defined as most important in contributing to the value of the heritage asset and the ability to understand, appreciate and experience it and its value.

**Table 6: Criteria for Classifying Magnitude of Change in Setting**

| Magnitude | Criteria |
|---|---|
| High | Direct and substantial change in view affecting a significant sightline to or from a ritual monument or prominent fort;<br><br>Direct and substantial change in view affecting a key 'designed-in' view or vista from a Designed Landscape or Listed Building;<br><br>Direct severance of the relationship between a asset and its setting; |

| | |
|---|---|
| | Major imposition within a Cultural Landscape;<br><br>A change that alters the setting of an asset such that it threatens the protection of the asset and the understanding of its cultural value. |
| Medium | Oblique change in view affecting an axis adjacent to a significant sightline to or from a ritual monument but where the significant sightline of the monument is not obscured;<br><br>Oblique change in view affecting a key 'designed-in' view or vista from an Designed Landscape or Listed Building;<br><br>Partial severance of the relationship between a asset and its setting;<br><br>Notable alteration to the setting of an asset but not directly affecting those elements of the setting which contribute most to the understanding of the cultural value of the asset;<br><br>Notable, but not major, imposition within a Cultural Landscape;<br><br>A change that alters the setting of an asset such that the understanding of the asset and its cultural value is marginally diminished. |
| Low | Peripheral change in view affecting a significant sightline to or from a ritual monument, designed landscape or building;<br><br>Minor imposition within a Cultural Landscape;<br><br>A change that alters the setting of an asset, but where those changes do not materially affect an observer's ability to understand, appreciate and experience the asset or its value. |
| Marginal | All other changes to setting |
| None | No setting changes |

Assessing Level of Effect on Setting

The level of effect resulting from changes in the setting of cultural heritage assets is judged to be the interaction of the asset's sensitivity (Table 4) and the magnitude of the change (Table 6) and also takes into consideration the importance of the asset (Table 1). In order to provide a level of consistency the assessment of sensitivity, the prediction of magnitude of change and the assessment of level of effect have been guided by pre-defined criteria. A qualitative descriptive narrative is also provided for each asset to summarise and explain each of the professional value judgments that have been made in reaching a conclusion on sensitivity of the asset and the magnitude of change.

The interactions that guide the determination of level of effect on settings of the assets in question is shown in Table 7.

**Table 7: Level of Effect on the Setting of Cultural Heritage Assets**

| **Magnitude of Change** | **Relative Sensitivity** | | | |
|---|---|---|---|---|
| | *Marginal* | *Low* | *Medium* | *High* |
| *High* | Minor | Minor-Moderate | Moderate | Major |
| *Medium* | Negligible | Minor | Minor-Moderate | Moderate |
| *Low* | Neutral | Negligible | Minor | Minor-Moderate |
| *Marginal* | Neutral | Neutral | Negligible | Minor |
| The levels of effect recorded in grey highlighted cells are 'significant' | | | | |

***Cumulative Effects***

The assessment of cumulative effects will be undertaken in a similar manner to that of the potential effects but will take into consideration other developments as agreed with the planning authority, including those which are operational, under construction, consented or proposed. Cumulative effects relating to cultural heritage are for the most part limited to indirect effects upon the settings of heritage assets.

Those heritage assets which are included in the detailed setting assessment, under operational effects for the proposed development, will also be considered when assessing the potential for cumulative effects. However, only those assets which are judged to have the potential to be subject to significant cumulative effects will be included in the detailed cumulative assessment provided. While all developments and development proposals, as agreed with the planning authority, will be considered, only those specific developments which would contribute to, or have the possibility to contribute to, cumulative effects on specific heritage assets are discussed in detail in the text.

As there are no specific guidelines with regard to undertaking cumulative assessment for heritage assets, this assessment will follow the criteria for assessing setting impacts as set out above. The assessment of cumulative effects will consider whether there would be an increased impact upon the setting of heritage assets as a result of adding the proposed development to a baseline, which may include operational, under construction, consented or proposed developments as agreed with the planning authority.

***Harm***

The NPPF, where designated heritage assets are concerned, requires us to make an assessment as to the level of harm which could be caused to designated heritage assets by development. It requires a judgement to be made as to whether that harm is '*substantial*' or '*less than substantial*'[12]. Where no effect is predicted or where effects are predicted to be neutral, e.g. where a proposed development may be perceptible but will not materially affect the setting of an asset or diminish its cultural value, it may be found that there will be no harm to a heritage asset. The level of harm predicted, or lack thereof, establishes whether the planning test should be applied and where harm is found the level of that harm establishes the correct policy test. Extant guidance on harm relevant to this assessment is set out in the NPPG.

[12] DCLG: Department for Communities and Local Government (2012). NPPF, 31.

As there are no designated heritage assets within the Site, there will be no direct effects upon designated heritage assets as a result of the proposed development. As such, any discussion of harm in this assessment will relate to indirect effects on the setting of designated heritage assets.

The NPPG notes that the '*substantial*' harm is a '*high test*' and that as such it is unlikely to result in many cases. What matters in establishing whether harm is '*substantial*' or not, relates to whether a change would seriously adversely affect those attributes or elements of a designated asset that contribute to or give it its value.

In terms of effects upon the setting of designated heritage assets, it is considered that only those effects identified as 'significant' in this assessment will have the potential to be of '*substantial*' harm. Where no significant effect is found, the harm is considered to be '*less than substantial*'. This is because, as set out earlier in this methodology, effects only reach the significance threshold if their relative sensitivity to changes in setting is at the higher end of scale, or if the magnitude of change is at the higher end of the scale.

For many designated assets, setting may not contribute to their value or the contribution to value may be limited. For these assets, even High magnitude changes to setting are unlikely to have adverse effects on the value of the designated asset. As set out in Table 6, lower ratings of magnitude of change tend to relate to notable or perceptible changes to setting but where these changes do not necessarily obscure or damage elements of setting or relationships which directly contribute to the value of assets. As such, effects that are not significant will result in '*less than substantial*' harm. Where there are no effects or effects are deemed to be Neutral there will be no harm.

Where significant effects are found, a detailed assessment of the level of harm will be made. Whilst non-significant effects will cause '*less than substantial*' harm, the reverse is not always true. That is, the assessment of an effect as being *'significant'* does not necessarily mean that the harm to the asset is '*substantial*'. The assessment of level of harm in the ES Chapter, where required, will be a qualitative one, and will largely depend upon whether the effects predicted would result in a major impediment to the ability to understand or appreciate the heritage asset in question by reducing or removing its information content and therefore reducing its cultural value.

**TRIUM ENVIRONMENTAL**

**CONSULTING**

**PRELIMINARY ECOLOGICAL**

**APPRAISAL**

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**0271.0001**

**REV 2.0**

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## Document Control

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# CONTENTS







# 1 Introduction

## 1.1 Terms of Reference

In May 2017 Prime Environment Limited (Prime Environment) was instructed by Trium Environmental Consulting LLP (the Client) to undertake a Preliminary Ecological Appraisal of OS Parcel 2200 adjoining Oxford Road, north of Promised Land Farm, Oxford Road, Bicester. (Ordnance Survey (OS) grid Reference SP 57958 21564) (The Site).

The Site is 12 hectares and comprises an arable field with rough grassland margins and hedgerows with trees. There is a ditch running across the Site in the west and dry and wet ditches at the field boundaries. The Survey Area is slightly larger than the Site (15 ha) as the Site does not include all of the field.

The project proposals are to develop the Site into a large business park with associated hard and soft landscaping. The application will be subject to a formal Environmental Impact Assessment (EIA).

## 1.2 Aims and Objectives

The aims of the study were to:

- Identify, describe and assess the value of any sensitive ecological receptors at the Site and the immediate surrounding area.
- Identify potential ecological impacts of development and suggest appropriate building constraints, outline mitigation and compensation measures.
- Identify whether significant impacts to ecological receptors is likely, and therefore whether ecology should be included in the EIA.
- Make recommendations for any necessary further survey work or licensing, as required.

Ecological information for the assessment was provided by an Extended Phase 1 Habitat Survey and desk study (ongoing).

# 2 Methodology

This survey and reporting was undertaken by Jo Pedder Bsc. hons. Jo is a full member of the Chartered Institute of Ecology and Environmental Management and has over 14 years' professional ecology experience. Jo was supported in the field survey by Jon Moore MSc BSc (Hons). Jon is a full member of the Chartered Institute of Ecology and Environmental Management and has over 7 years' professional ecology experience. Both surveyors are registered to use survey licences for bats and great crested newts.

## 2.1 Desk Study

Thames Valley Environmental Records Centre (TVERC) was contacted for records of protected species and sites of nature conservation value within a 2 km search area, centred on the Site.

In addition, Ordnance Survey maps and online aerial photos were used to provide site context and the online Multi Agency Geographical Information Centre[1] (MAGIC) was used to identify any internationally protected areas within 5 km of the Site. Planning applications for developments in the local area have also been searched to identify further data relevant to the Site. This has included an Environmental Statement for an approved application known as 'Land at Whitelands Farm' (06/00967/OUT) which included the Site in its ecological surveys and another consented application for a similar scheme at the Site 07/01106/OUT

## 2.2 Extended Phase 1 Habitat Survey

A Phase 1 Habitat Survey was undertaken at the Site on the 2nd May 2017 to identify and map the habitats present following published criteria[2].

In addition to basic Phase 1 Habitat mapping, the Site was assessed to identify whether it includes any Habitats of Principal Importance (HPI) or is suitable to support Species of Principal Importance (SPI)[3], or other notable or legally protected species.

## 2.3 Hedgerow Assessment

This report has been prepared to support a planning application, and therefore there is no legal requirement for undertaking a Hedgerow Regulations assessment; removal of hedgerows is considered permitted under the legislation if the removal is part of a planning consent. However, this is a useful tool for identifying features of value within a site. Each hedgerow within the Site was assessed against the ecology criteria for 'important' hedgerows following the method set out in The Hedgerow Regulations 1997. **The assessment did not include an historical assessment of the hedgerows, which should be considered separately.**

[1] http://magic.defra.gov.uk/

[2] JNCC (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*

[3] HPI and SPI are habitats and species listed in Section 41 of the Natural Environment and Rural Communities Act 2006 and regarded as the highest conservation priorities in the UK. HPI and SPI are material consideration in planning.





## 2.4 Bat Tree Assessment

All trees within or adjacent to the Site (where access was possible) were assessed for their suitability to support roosting bats. Trees which could potentially support bats were subject to a detailed examination with binoculars. As there were a number of trees, and a plan with tree locations could not be provided at the time of the survey, individual trees were not assessed, but groups of trees supporting one of more specimens suitable for roosting bats were recorded.

## 2.5 Great Crested Newt Pond HSI

A Habitat Suitability Index[4] (HSI) score was calculated for two ponds adjacent to the Site.

The calculated HSI for a pond provides a score between 0 and 1. The pond's HSI can then be compared to the ranges of pond suitability, as shown in the table below. An inference can then be made between the HSI of a pond, and the likelihood of great crested newt presence.

**Table 1**
**HSI scores and suitability of ponds for GCN**

| HSI Score | Classification | Proportion of Ponds Occupied by Great Crested Newts |
|---|---|---|
| <0.5 | Poor | 0.03 |
| 0.5 – 0.59 | below average | 0.20 |
| 0.6 – 0.69 | Average | 0.55 |
| 0.7 – 0.79 | Good | 0.79 |
| > 0.8 | Excellent | 0.93 |

## 2.6 Constraints

Any ecology assessment must be considered as a 'snapshot' of the site conditions at the time of the survey; not all botanical species or communities would have been evident during the survey.

Notwithstanding this, given the agriculturally managed nature of the Site, the findings of the survey are considered to provide an appropriate assessment of the Site's ecological value.

Ecological constraints will change over time and therefore the findings of this report is considered to be valid for a period of one year, after which the report should be reviewed to assess whether the survey should be updated.

[4] Oldham, R.S., Keeble, J., Swan, M.J.S., & Jeffcote, M. (2000) *Evaluating the Suitability of Habitat for the Great Crested Newt (Triturus cristatus).* Herpetological Journal 10: 143-155.

# 3 Results

## 3.1 Desk Study

TVERC data has not yet been received. This report will be updated and re-issued when the data is available.

Only one statutory designated wildlife site occurs within the search area (2 km for local and national sites, 5 km for international sites): Bure Park Local Nature Reserve. The includes grass meadow, young broad-leaved woodland, hedges and scrub. A small river (the Bure) runs through the Site, feeding a small pond which is home to great crested newts. A balancing pond at one end of the Reserve is fed by run-off from the area. Bure Park is 1.8 km north of the Site, on the far side of Banbury.

Bicester Wetland Reserve, a private reserve owned by Thames Water is 280 m south-east of the Site. The reserve includes scrapes, pools and ditches and is managed principally for wetland birds. Other local sites are likely to be identified in the desk-study.

## 3.2 Surrounding Area

The Site is situated within a mixed landscape. To the immediate north of the Site is a new supermarket, beyond which is the town of Bicester. To the south there is a shopping complex including a garden centre and to the south east is a water treatment works (and the wetland reserve). Further south east are pasture fields and a military base. To the west of the Site is a large new housing development mostly on former arable fields.

Plate 1, an aerial photograph of the Site, shows the Site in context with the surrounding landscape. Note that this landscape has changed since the image was taken and does not include the housing estate to the west or the supermarket to the north.





**Plate 1**
**Aerial Photograph**

## 3.3 Site Habitats

The Site is approximately 12 ha and largely comprises an arable field which was seeded with grass for hay or silage at the time of survey. There is one habitat within the Site which is a species of principal importance - hedgerows.

The Site comprises:

- An arable field.
- Arable margins.
- Hedgerows.
- Trees.
- Ditches.
- Log piles.

A list of all species recorded with their Latin names is included in Appendix 2 (Table 3) and a Phase 1 Habitat Plan in Appendix 3.

### *3.3.1 Improved grassland*

**Phase 1 Habitat Survey type:** Arable

**Habitat of Principal Importance (HPI) present:** No.

**Management:** regular agricultural management.

The majority of the Site is an arable field. At the time of the survey it was under a grass crop (principally perennial rye-grass).

There were no forbs recorded within the sward, except at the margins (see below).

Part of the Site (in the south-west) can be seen on aerial photos as a rough grassland, but this has been incorporated into the arable field.

**Plate 2**
**Semi-improved grassland**





### *3.3.2 Field margins*

**Phase 1 Habitat survey type:** Poor semi-improved grassland.

**HPI**: No.

**Management:** Annual mowing, probable spraying.

The grass field margins are approximately 2 m wide in the north east and south west of the site, but almost absent from the south (along hedgerow 3 and 4). The field margins do not qualify as the Habitat of Principal Importance 'arable field margins' as they are not deliberately created and managed for wildlife.

The grassland is dominated by meadow fescue and includes a range of common flowering species such as lesser burdock, spear thistle and cleavers. The margins of the area recently taken into arable management is more diverse and includes species associated with woodlands and hedgerows such as Lords-and-Ladies and cow parsley. In the north east of the Site the margins include an unusual amount of comfrey.

**Plate 3**
**Arable margin**

### *3.3.3 Hedgerows*

**Phase 1 Habitat survey type:** species rich and species poor intact hedgerows and species poor defunct hedgerows.

**HPI**: Yes.

**Management:** mixed.

Most of the field boundaries with shrubs are no longer managed as hedgerows and could be considered to be tree lines. Most are species poor, but one (Hedgerow 4) has five woody hedge species and a further three as taller standard trees. Under woody species and associated features this hedge qualifies as important under the hedgerow regulations.

Details of the hedges are included in Appendix 2, Table 5 and 6.

**Plate 4**
**Hedgerow 4**

### *3.3.4 Trees*

**Phase 1 Habitat Survey type:** Scattered trees

**HPI:** No.

**Management:** None.

Within the Site are tree lines formed of former hedgerows and standard trees in hedges. Trees and tree groups are described in more detail in Appendix 2, Table 5.

Some of these are suitable for roosting bats, such as the pollarded willow pictured, which has a large hollow at the base, creating a cavity.

**Plate 5**
**Willow (G4)**





### *3.3.5 Ditches*

**Phase 1 Habitat Survey type:** Running water, swamp and marginal vegetation.

**HPI:** yes (swamp).

**Management:** Varied.

Ditches 1 and 2 include patches of standing water and wet mud. At the juncture of Ditch 2 and D3 is a steam (off site). Ditch 1 is the most biodiverse area of the Site.

Aquatic and semi-aquatic vegetation within the ditches includes water-crowfoot, water-plantain, water-starwort, common duckweed and brooklime. Hard rush, marsh horsetail and bulrush were recorded in dryer areas.

The bankside vegetation includes creeping bent, lords-and-ladies, white bryony and rosebay willowherb.

Ditch 1 has historically been tree-lined, but was cleared when the arable field was extended.

**Plate 6**
**Ditch**

### *3.3.6 Log pile*

**Phase 1 Habitat Survey type:** n/a

**HPI:** No.

**Management:** N/A

Two large piles of wood, which appear to comprise trees felled from clearance of bank side vegetation.

**Plate 7**
**Log pile**

### *3.3.7 Bare or disturbed ground and earth banks*

**Phase 1 Habitat Survey type:** spoil, bare ground

**HPI:** No.

**Management:** N/A

There is a spoil heap in the north west of the site and an earth bank that forms a boundary between the new supermarket and the Site.

The banks are likely to have been grass seeded, but also include colonising species present in the spoil heap and disturbed areas such as cleavers and bristly oxtongue as well as wild mignonette, white campion and charlock.

**Plate 8**
**Spoil heap**





## 3.4 Species

### *3.4.1 Invertebrates*

**Protected / Species of Principal Importance (SPI):** some are, but unlikely to be present.

The Site's terrestrial habitats are common and widespread, with the agricultural crop believed to be subject to regular herbicide and pesticide spraying. They are therefore unlikely to support species or a range of invertebrate fauna which is of conservation importance.

### *3.4.2 Amphibians*

**Protected / SPI:** Some are, and may be present.

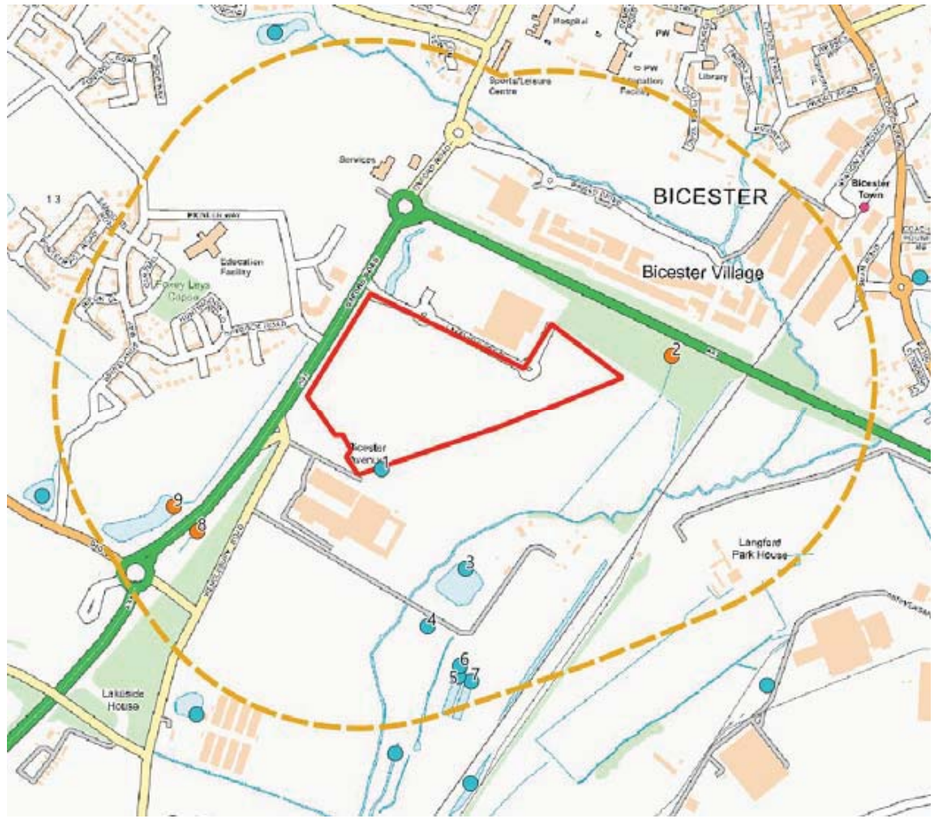
Great crested newts are a European Protected Species (EPS). The newts can travel some distance from their breeding pond. It is best practice to consider whether ponds within 500 m of a development site may support a breeding population of newts, in order to assess the likely risk of harm to newts if they occur on terrestrial habitat at the Site.

Ordinance survey mapping, aerial photos and the site visit were used to identify the presence of ponds within 500 m of the Site. Nine ponds were located (See Plan 1 below).

Pond 1 is immediately adjacent to the Site, it is located within the garden centre and its overflow feeds Ditch 1. Pond 1 scores 0.79 in the HSI (good quality for great crested newts). Pond 2 is a water attenuation pond in an unmanaged field north of the Site. The pond was dry at the time of survey and appears to rarely hold water (based on the vegetation growing within it). Ponds 3,5,6 and 7 are part of the water treatment processes at the Thames Water site. These were not viewed for this survey, but are unlikely to be suitable for newts. Pond 4 is a series of connected ditches and scrapes at the Bicester Wetland Nature Reserve. This feature was not surveyed fully, but observed by binoculars. It has a HSI score of 0.53 (below average quality for great crested newts. Ponds 8 and 9 are new attenuations ponds associated with the development to the west; the former is for road runoff from the new road access and the latter appears to be in what will be public open space. Neither held water at the time of survey, although Pond 9 does have emergent plants indicating it is wet or at least damp for some of the year. HSI data is included in Appendix 2, Table 4.

The HSI survey was undertaken at a time of year when newts lay eggs, but none were observed during the survey.

**Plan 1**
**Pond Locations**




### *3.4.3 Reptiles*

**Protected / SPI:** Yes and possibly present.

The Site's rough field margins and hedgerows are suitable for common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*. All British reptiles are protected from killing or injury (but their habitat is not specially protected) and are SPI. The majority of the Site (the crop) is considered to be of very limited value to reptiles due to the monoculture of the field and lack of basking areas. It is possible that some reptiles are present in the rough vegetation at the boundaries and the log piles, however, it is considered unlikely that there is a significant population present.

The Site may therefore support a small population of common lizard and/or slow worm. Grass snakes may hunt within the Site as part of a much wider home range.

### *3.4.4 Birds*

**Protected / SPI:** Some are, and are **l**ikely to be present.





The hedgerows and trees provide opportunities for birds to nest on the Site. As well as more common birds, several skylark *Alauda arvensis* were also observed singing above the Site – there may be four or more active nests. A single song thrush *Turdus philomelos* was also recorded.

Whilst some red and amber list species are present on Site, the breeding assemblage is not likely to be anything other than typical of the habitats present in the geographic location.

### *3.4.5 Dormouse*

**Protected / SPI:** Unlikely to be present.

Dormice are protected under international legislation. They inhabit hedges, woodland, scrub and sometimes ruderal vegetation. Although the Site includes some of these habitats, typically the species is found in areas of extensive woodland. The Site is poorly connected to woodland and it is considered that dormouse are unlikely to occur at the Site.

### *3.4.6 Badgers*

**Protected / SPI:** Yes.

A number of rabbit warrens were recorded around the Site, under hedgerows. A single larger mammal hole was also recorded. The spoil contained rabbit fur and droppings, and there were rabbit droppings in the entrance. However, the entrance tunnel was of a size and shape typical of badgers. It is possible that this is an outlier sett that is not currently occupied by badgers.

No further evidence of badger was observed on the Site or within 30 m of the Site boundary.

### *3.4.7 Riparian mammals*

The Site's ditches do not hold sufficient water to support a water vole population. Although dry ditches may be used by otters moving between rivers or to foraging areas, the Site is not close to major river systems. Otters and water vole are unlikely to occur at the Site.

### *3.4.8 Bats*

**Protected / SPI:** Possible roosting and foraging.

<u>Foraging and commuting</u>

Although the main body of the Site will be of limited value to bats, the hedgerows and trees are likely to be used by a number of foraging bats. Bat are also likely to use the Site as a route to move across the landscape, for example between roosts in Bicester and foraging at the Bicester Wetland Reserve. The Site is considered to be of medium value to bats according to Bat Conservation Trust classification (Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water – see Appendix 2, Table 2.)

Roosting

Trees

A number of trees were recorded that are suitable for roosting bats (see Appendix 2). These include individual trees on most of the site boundaries.





# 4 Assessment

Relevant legislation and national planning policy is provided in Appendix 1.

## 4.1 Development Proposals and Possible Impacts

The proposals are to develop the Site into business centre with 11 office blocks, a lake and associated car parking.

Vehicle access to the Site will be made from existing access points constructed with the new supermarket; all boundary hedges and trees can be retained within the scheme.

All of the Site's arable land and arable margins are likely to be removed.

The proposals include the creation of a new lake.

## 4.2 Potential Effects for Consideration

The following section will address what is relevant for consideration within the forthcoming Environmental Impact Assessment.

The Site as a whole is not of sufficient intrinsic ecological value to warrant whole-scale protection from development; the majority of the Site's habitats which will be affected by the proposal are common and widespread and are considered to be of low intrinsic biodiversity value.

Features requiring some level of further consideration, which may lead to a requirement for mitigation or compensation, are:

- The Bicester Wetland Nature Reserve
- Ditches
- Great crested newts
- Reptiles
- Birds
- Bats
- Badgers

### *4.2.1 Bicester Wetland Nature Reserve*

The EIA will need to consider whether the reserve is hydrologically connected to the Site and therefore whether additional measures will be required during construction and operation to ensure that it is not impacted e.g. through pollution.

### *4.2.2 Habitat Loss*

The proposed construction on the Site will lead to the loss of Ditch 1, which supports a number of wetland plants. The EIA will need to assess whether this loss is significant and if habitat improvements within the scheme offset this loss.

### *4.2.3 Great Crested Newts*

If great crested newts breed in ponds and ditches close to the Site, the proposed works will lead to a loss in terrestrial and breeding habitat (the southern ditch) for great crested newts.

Ponds local to the Site do not appear to have been directly surveyed for great crested newts. Although a Site based terrestrial survey was undertaken in 2006, this is out of date and further surveys will be required to establish whether those ponds and ditches within 250 m support a crested newt population. The survey season for full pond surveys is mid-March to mid-June, with half of the visits between mid-April and mid-May. This will not be feasible this season, and so an eDNA survey will be more appropriate. This can be undertaken to the end of June, but will only provide a present or absent result, not the size of any population detected.

As the majority of the terrestrial newt habitat within the Site is of low value to newts and a reasonable area is available for mitigation (in undevelopable flood plain) a comprehensive mitigation plan can be put together based on the presence / absence result by making an assumption that there is a large population present, and basing mitigation on this. Loss of breeding Sites and terrestrial habitat could be compensated for within the Site's landscaping scheme or an off-Site receptor could be used to receive newts from the Site. Natural England's new policies on licence applications have changed the way in which mitigation for newts is considered; the approach is more flexible, allows for data to be accepted that doesn't strictly meet best practice in some cases and is more accepting of off-site solutions.

Of most relevant is Policy 4 – 'Appropriate and relevant surveys where the impacts of development can be confidently predicted'

*Natural England will be expected to ensure that licensing decisions are properly supported by survey information, taking into account industry standards and guidelines. It may, however, accept a lower than standard survey effort where: the costs or delays associated with carrying out standard survey requirements would be disproportionate to the additional certainty that it would bring; the ecological impacts of development can be predicted with sufficient certainty; and mitigation or compensation will ensure that the licensed activity does not detrimentally affect the conservation status of the local population of any EPS.*

It would seem reasonable that the ES for an outline application at the site can therefore be based on the results of eDNA surveys, which would be followed up by further survey (if necessary) prior to reserved matters.

### *4.2.4 Reptiles*

Reptiles may be present at the Site. However, the areas of habitat in which they may be found is limited. The EIA should address impacts to reptiles, but it would be reasonable to assume that a small population is present, rather than undertake surveys for this species.

### *4.2.5 Birds*

The EIA will need to address impacts to birds, and specifically skylarks – the only notable species which is likely to suffer habitat loss as part of the project. A survey to better quantify the number of skylark territories would aid the assessment. Although territories are principally established in early spring, skylark have a habit of maintaining their territory through song and so two visits between now and mid July would still be appropriate.





### *4.2.6 Badgers*

The loss of the possible single outlier sett will not be significant to the local badger population; however badger setts are legally protected and further consideration for mitigation and licencing will be required.

### *4.2.7 Bats*

Although trees containing bat roosts are unlikely to be felled, indirect effects may occur due to habitat loss, disruption of commuting routes and lighting.

In order to assess the impact of the scheme, further surveys to quantify bats' use of the Site for commuting and foraging should be undertaken (activity surveys). Where trees are at risk of more direct effects, such as lighting, more detailed tree surveys should be completed.

Following best practice, activity surveys would comprise identifying two transect routes which are walked with bat detectors once per month through the active season. In this case we would undertake surveys between May and September, including one dusk and pre-dawn survey. At each survey period four static bat detectors would be left in suitable locations to record bat activity over at least five continuous nights. After the first three sets of surveys are undertaken, we will review the activity recorded and re-assess whether a whole year's survey is required for this assessment – by then the scheme design will have been further developed, and impacts to bats may have been designed out of the scheme, or we may have demonstrated that the Site is not important for bats.

Tree surveys would involve assessing where impacts to bats are most likely and targeting trees in these areas with a more detailed ground based inspection and, where appropriate, climbing the trees to closely assess features for evidence of bats.

## Appendix 1 - Relevant English Legislation, Policy and Guidance[5]

### Legislation

The Natural Environment & Rural Communities (NERC) Act 2006 places a duty on authorities to have due regard for biodiversity and nature conservation during the course of their operations.

***Common Reptiles***

In Britain there are four relatively widespread native species of reptile - adder, grass snake, common lizard and slow worm. These species are protected via part of Section 9(1) of the Wildlife & Countryside Act 1981 (as amended) against:

- Intentional killing and injuring
- Selling, offering or exposing for sale.

***Nesting Birds***

All wild bird nests are protected under The Wildlife and Countryside Act 1981 (as amended), making it an offence to:

- Intentionally kill, injure or take any wild bird or their eggs or nests (with certain exceptions) and disturb any bird species listed under Schedule 1 of the Act, or its dependent young while it is nesting.

***Great Crested Newts***

Great crested newts are 'European Protected Species (EPS) and are protected under the Conservation of Habitats and Species Regulations 2010, and the Wildlife and Countryside Act 1981, as amended by the Countryside & Rights of Way Act 2000. These pieces of legislation combine to give substantial protection to great crested newts and their breeding ponds and terrestrial habitat, making it an offence to:

- Deliberately capture, injure or kill a great crested newt.
- Intentionally or recklessly disturb[6] a great crested newt in a structure or place that they use for shelter or protection or deliberately disturb a group of a great crested newts.
- Damage or destroy a great crested newt resting place/shelter (even if they are not occupying it at the time).
- Possess or advertise/sell/exchange a great crested newt (dead or alive) or any part of a great crested newt (including eggs and all lifestages).

[5] This legal information is an outline only and intended for general information only. Consult the original legal documents and/or seek legal advice for definitive information.

[6] Disturbance, includes 'in particular any action which impairs the ability of animals to survive, breed, rear their young, hibernate or migrate (where relevant); or which affects significantly the local distribution or abundance of the species'.





- Intentionally or recklessly obstruct access to a great crested newt resting place/shelter.

The Natural Environment & Rural Communities (NERC) Act 2006 places a duty on authorities to have due regard for biodiversity and nature conservation during the course of their operations.

***Bats***

All species of bat in Britain are 'European Protected Species' (EPS) and are protected under the Conservation of Habitats and Species Regulations 2010, and the Wildlife and Countryside Act 1981, as amended by the Countryside & Rights of Way Act 2000. These pieces of legislation combine to give substantial protection to EPS and their habitats, making it an offence to:

- Deliberately capture, injure or kill a bat.
- Intentionally or recklessly disturb[7] a bat in its roost or deliberately disturb a group of bats.
- Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time).
- Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat.
- Intentionally or recklessly obstruct access to a bat roost.

The Natural Environment & Rural Communities (NERC) Act 2006 places a duty on authorities to have due regard for biodiversity and nature conservation during the course of their operations.

***Badgers***

Badgers are protected in the UK under the Protection of Badgers Act (1992), making it an offence to:

- Kill, injure or take a badger;
- Intentionally or recklessly interfere with a badger sett.

Sett interference includes damaging, destroying or obstructing access to a sett and disturbing badgers while they occupy a sett.

### Policy

***National Planning Policy Framework (NPPF)***

The National Planning Policy Framework (NPPF) states that the planning system should contribute to and enhance the natural and local environment by:

[7] Disturbance, includes 'in particular any action which impairs the ability of animals to survive, breed, rear their young, hibernate or migrate (where relevant); or which affects significantly the local distribution or abundance of the species'.

- Recognising the wider benefits of ecosystem services.
- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

Other key principles of the NPPF relating to biodiversity are:

- The conservation of International and National statutorily designated sites.
- Protection of ancient woodland and veteran trees.
- The creation, protection, enhancement and management of networks of biodiversity and green infrastructure.
- The preservation, restoration and recreation of priority habitats and ecological networks.
- The recovery of priority species populations.

***Habitats and species of principal importance***

The NERC Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list replaces the UK Biodiversity Action Pans (UKBAP) and has been drawn up in consultation with Natural England, as required by the Act.

The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of NERC Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Habitats of principal importance

Fifty-six habitats of principal importance (HPI) are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. Of most relevance to the Site, they include ponds, open mosaic habitats on previously developed land and lowland heathland.

Species of principal importance

There are 943 species of principal importance (SPI) included on the S41 list. These are the species found in England which were identified as requiring action under the UK BAP and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework.





**Table 2**
**BCT Roost Assessment Criteria[8]**

| *Suitability* | *Description of Roosting habitats* | *Commuting and foraging habitats* |
|---|---|---|
| Negligible | Negligible habitat features on site likely to be used roosting bats. | Negligible habitat features on site likely to be used by commuting or foraging bats. |
| Low | A structure with one or more potential roost sites that could be used by individual bats opportunistically.<br>However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely be suitable for maternity or hibernation).<br>A tree of sufficient size and age to contain PRFs but none seen from the ground or features seen with only very limited roosting potential. | Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or un-vegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by another habitat.<br><br>Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub. |
| Moderate | A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat, but unlikely to support a roost of high conservation status[9]. | Continuous habitat connected with the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens.<br>Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water. |
| High | A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.<br>A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions' and surrounding habitat. | Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge.<br>High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland.<br>Site is close to and connected to known roosts. |

[8] From Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London

[9] With respect to roost type only - the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed.

## Appendix 2 – Survey Data

**Table 3**
**Botanical Species List**

| | | Field Boundaries | Grassland | Ditches | Bare Ground / Disturbed |
|---|---|---|---|---|---|
| *Agrostis stolonifera* | Creeping Bent | | | R | |
| *Alisma plantago-aquatica* | Water-plantain | | | R | |
| *Anthriscus sylvestris* | Cow Parsley | LD | | | |
| *Arctium minus* | Lesser Burdock | R | | | O |
| *Arum maculatum* | Lords-and-Ladies | O | R | R | |
| *Bryonia dioica* | White Bryony | | | R | |
| *Callitriche sp.* | Water-starwort | | | LD | |
| *Cerastium fontanum* | Common Mouse-ear | | | | R |
| *Chamerion angustifolium* | Rosebay Willowherb | | | R | |
| *Cirsium vulgare* | Spear Thistle | R | | R | R |
| *Equisetum palustre* | Marsh Horsetail | | | O | |
| *Festuca pratensis* | Meadow Fescue | O | | | |
| *Galium aparine* | Cleavers | O | | | R |
| *Geranium dissectum* | Cut-leaved Crane's-bill | O | | | R |
| *Juncus inflexus* | Hard Rush | | | R | |
| *Lamium album* | White Dead-nettle | O | | | R |
| *Lemna minor* | Common Duckweed | | | R | |
| *Lolium perenne* | Perennial Rye-grass | | F | 0 | |
| *Myosotis arvensis* | Field Forget-me-not | O | | | R |
| *Picris echioides* | Bristly Oxtongue | R | | R | R |
| *Plantago major* | Greater Plantain | | | | R |
| *Poa pratensis* | Smooth Meadow-grass | | | F | O |
| *Poa trivialis* | Rough Meadow-grass | | F | | |
| *Ranunculus sp.* | Water-crowfoot | | | LD | |
| *Ranunculus ficaria* | Lesser Celandine | | | R | |
| *Ranunculus repens* | Creeping Buttercup | | | R | |
| *Reseda lutea* | Wild Mignonette | | | | R |
| *Rorippa nasturtium-aquaticum* | Water-cress | | | LD | |
| *Sambucus nigra* | Elder | | | R | |
| *Silene latifolia* | White Campion | | | | R |
| *Sinapis arvensis* | Charlock | | | | R |
| *Sisymbrium officinale* | Hedge Mustard | O | | | A |





| | | | | | |
|---|---|---|---|---|---|
| *Stachys arvensis* | Field Woundwort | R | | | |
| *Symphytum officinale* | Common Comfrey | R | | | |
| *Taraxacum officinale* | Dandelion | | | | R |
| *Tussilago farfara* | Colt's-foot | | | | R |
| *Typha sp.* | Bulrush | | | LD | |
| *Urtica dioica* | Common Nettle | LD | R | | R |
| *Veronica beccabunga* | Brooklime | | | R | |
| *Veronica persica* | Common field speedwell | | | | |
| DAFOR scale | | **D**ominant, **A**bundant, **F**requent, **O**ccasional, **R**are (**L** = locally) | | | |

**Table 4**
**Pond HSI**

| Pond ref | Pond 1 | Pond 4 |
|---|---|---|
| SI1 - Location | 1.00 | 1.00 |
| SI2 - Pond area | 0.90 | 0.94 |
| SI3 - Pond drying | 0.90 | 0.50 |
| SI4 - Water quality | 1.00 | 1.00 |
| SI4 - Shade | 1.00 | 1.00 |
| SI6 - Fowl | 0.67 | 0.01 |
| SI7 - Fish | 0.67 | 0.67 |
| SI8 - Ponds | 1.00 | 1.00 |
| SI9 – Terrestrial habitat | 0.67 | 1.00 |
| SI10 - Macrophytes | 0.41 | 1.00 |
| *HSI* | 0.79 | 0.56 |
| | Good | Below average |

**Table 5**
**Hedgerow and Tree Group Descriptions**

| ID | Species | Tree Age | Bat roost features present | Bat roost suitability[10] | Comments |
|---|---|---|---|---|---|
| G1 | Elmus sp., hawthorn, sycamore, ash, salix sp., field maple | Immature | Ivy only | N to L | Opportunities for single bats behind thick stemmed ivy. |
| H1 | Elmus sp., hawthorn, blackthorn, elder | - | - | - | Managed. Two parallel hedges. Gappy with new planting in gaps. |
| H1 standards | Ash | Early mature | Ivy only | 1 x N, 1 x L | Two hedgerow standards. Opportunities for single bats behind thick stemmed ivy. |
| H2 | Hawthorn, elder, goat willow | - | - | - | Unmanaged hedgerow. |
| H2 standards | Oak | Mature to over mature | Splits, wound holes | M to H | Upper canopies not inspectable due to foliage. |
| B1 | Soil bund (see Jo's results) | - | - | - | Vegetated soil bund. Managed (sprayed and strimmed) on aspect facing Tesco. Weeds and grasses on aspect facing site. |
| G2 | White or crack willow, goat willow, ash, elder, hawthorn, Prunus sp., field maple | Immature to early mature | Would holes | N to L | Wound holes in older trees for single bats. |
| G3 | White or crack willow, goat willow, hawthorn, elder | Immature to early mature | None | N | Multiple groups of trees beside drain. |
| H3 | Blackthorn, hawthorn, elder | - | - | - | Unmanaged hedgerow. No standards. |
| H4 | Hawthorn, elder, crab apple, blackthorn, ash | - | - | - | Unmanaged hedgerow. |
| H4 standards | Elmus sp., ash, crack willow, Poplus sp., | Immature to mature | Splits, wound holes, thick ivy stems | N to M | Limited to one crack willow tree. |
| G4 | White or crack willow, ash | Early mature to mature | Splits, wound holes | L to M | Pollarded willow - large hollow in base. 2nd willow with wound holes and splits. |
| G5 | Field maple, hazel, ash, oak, hawthorn, cherry species, crab apple, elder | Immature to mature | Wound holes, splits | N to M | 1 x mature oak - no features noted but of an age to support features and foliage covering upper crown hindering inspection. 1 x mature ash with numerous wound holes and splits. |

[10] Bat roost suitability: N=negligible, L=low, M=medium, H=high, R=roost present



Appendices

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**Table 6**
**Hedgerow Regulations Assessment[11]**

| Ref | Historical | | | | | Protected or rare species | | | Number of Woody species per 50m | | | Associated Features | | | | | | | Qualifies as important?[12] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | a | b | c | 5+ | 6+ | 7+ | a | b | c | d | e | f | g | |
| H1 | U | U | U | U | U | U | U | U | N | N | N | N | N | Y | N | Y | N | N | No |
| H2 | U | U | U | U | U | U | U | U | N | N | N | Y | N | Y | N | Y | Y | N | No |
| H3 | U | U | U | U | U | U | U | U | N | N | N | N | Y | N | N | Y | Y | N | No |
| H4 | U | U | U | U | U | U | U | U | Y | N | N | N | Y | Y | N | Y | Y | N | Yes |

**Criteria**

**Historic**

1. Marks a pre-1850 parish or township boundary
2. Incorporates an archaeological feature
3. Is part of or associated with an archaeological site
4. Marks the boundary of or is associated with a pre-1600 estate or manor
5. Forms an integral part of a pre- Parliamentary enclosure field system

**Protected or rare species**

6. Contains certain categories of animals or plants:

a) Wildlife and Countryside Act Schedule 1 birds / Schedule 5 animals
b) Declining breeder (category 3) in "Red Data Birds
c) Categorised as "endangered", "extinct", "rare" or "vulnerable" in Britain

**Woody Species**

7. Includes:

a) At least 7 woody species, on average, in a 30 m length
b) At least 6 woody species, on average, in a 30 m length and has three associated features
c) At least 6 woody species, on average, in a 30 m length, including a black-poplar tree, or large-leaved lime, or small-leaved line, or wild service-tree
d) At least 5 woody species, on average, in a 30 m length and has at least 4 associated features

**Associated features are:**

a) A bank or wall supporting the hedgerow
b) Less than 10% gaps
c) On average, at least one tree per 50 metres
d) At least 3 species from a list of 57 woodland plants
e) A ditch
f) A number of connections with other hedgerows, ponds or woodland
g) A parallel hedge within 15 m

[11] U=unknown, N=no, Y=yes
[12] Under woody species and associated features only





## Appendix 4 – Figures and Target Notes

| Target Notes | |
|---|---|
| **No.** | Description |
| **1** | Arable field in location that aerial photo implies was rough grassland. |
| **2** | Large log piles crated from clearance of this area of site and ditch banks |
| **3** | Large single mammal hole, likely outlier badger sett not currently occupied by badgers |
| **4** | Spoil heap and area of disturbed ground |

Appendix 3 – Phase 1 Environmental Risk Assessment

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BUROHAPPOLD ENGINEERING

# Bicester Office Park

## Phase I Environmental Risk Assessment

**036269**

11 May 2017

Revision 00





| Revision | Description | Issued by | Date | Checked |
|---|---|---|---|---|
| 00 | FINAL | GP | 11/05/2017 | RF / JW |

O:\036269 Project Bicester Business Park Due Diligence\F9 Ground Engineering - Site Investigation\03 Reports\170511 GP 036269 Phase I Environmental Risk Assessment 00.docx

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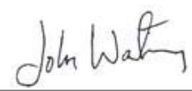
| | |
|---|---|
| Author | **Geoffrey Perrett** |
| Approved | **John Waiting** |
| Signature |  |
| Date | **11th May 2017** |

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# Contents









# Executive Summary


**Background**

BuroHappold Engineering was commissioned by Scenic Land Development to carry out a geoenvironmental desk study and Flood Risk Appraisal of the site referred to as Bicester Office Park and located at Lakeview Drive, Bicester.

**Environmental Setting**

The site is located adjacent to the south of the main conurbation of Bicester. Access to the site is from the west along an access road with a bund to the south of the road. The majority of the site is south and east of the access road and comprises open agricultural land. There was both evidence of grazing (fencing) and cultivation (shallow plough ruts). The proposed development comprises a new commercial development with associated car parking and landscaping.

Adjacent to the north of the access road is a new Tesco superstore, in the north east of this superstore development is a petrol station. Another petrol station (Esso) is located 75m north east (c.200m from centre of site). The south east boundary of the site continues into farmland, with a drainage channel / small stream running south in this area. This stream enters a larger watercourse and continues to flow south. Further east (50m from site) is a mainline railway, 200m south is a sewage treatment works. In the central and southern areas of the site is a line of manhole covers, these appear to flow to the sewage treatment works. Around some of the manhole covers were wet wipes, indicating that these locations have been blocked and cleared out (and possibly overflowed).

Although the site is not within a Source Protection Zone (SPZ), there are four groundwater abstraction licences within 1000m of the site. The nearest is 210m north east, at the petrol station, for pollution remediation, application number WRW/A/1145. The licence is due to expire in 2018. It is assumed that this licence relates to a pollution incident in 2003 classed as Category 4 (no impact). No further information has been provided on either the abstraction or the pollution incident.

**Geoenvironmental Considerations**

The site, historically and presently, is open agricultural land. In recent years (since 2014), the land adjacent to the north has been developed as a food superstore with a petrol forecourt, another petrol forecourt is located 100m north west. The further petrol station appears to have been subject to voluntary remediation, this is assumed to be for a fuel leak to ground (unconfirmed). A sewage treatment works is located 200m south east of the site. A series of manholes showing the path of the trunk sewer, intersect the site leading to the sewage treatment works. There is evidence that the sewers block and possibly overflow (wet wipes around manhole covers). As part of a site investigation for the design of the trunk sewers, four samples were taken for chemical analysis. Although no interpretation was completed in the investigation, this report has screened the results against S4UL values. No samples exceed residential or commercial thresholds.

**Geoenvironmental Risk Assessment**

There is a moderate / low risk to future site users from faecal matter, asbestos and metals from inhalation and ingestion.

There is a moderate / low risk to construction and investigation workers from faecal matter, asbestos and metals from inhalation and ingestion.

There is a moderate / low risk to site neighbours from asbestos and metals through dust generation and inhalation.

**Flood Risk Appraisal**

Part of the site lies within a designated flood zone, the hydrology is understood and the current masterplan has designated land uses that are commensurate with the zone classifications. A revised planning application will need a new flood risk assessment but the constraints posed by the flood risk consideration should be met with standard design solutions.

**Conclusions and Recommendations**

The risk is considered suitably low that no exceptional costs associated with ground remediation are likely to be realised for the proposed development, therefore no further investigation is required for an outline planning application. During construction standard practice such as welfare facilities, good housekeeping, contamination watching brief and PPE should be adopted.

Notwithstanding the above, a site investigation will be required to discharge relevant planning conditions. This will need to assess the geoenvironmental risks associated with the construction of the proposed structures. This investigation will be used to confirm and quantify the potential risks (if any) to site neighbours and future site users and will inform the need for any mitigation or remediation requirements.

# 1 Introduction

## 1.1 General

BuroHappold Engineering was commissioned by Scenic Land Development, to carry out a geoenvironmental desk study and Flood Risk Appraisal of the site referred to as Bicester Office Park and located at Lakeview Drive, Bicester, OX26 1DE centred on the grid reference 457807 221589.

The site is predominantly agricultural land located adjacent to the south of the main conurbation of Bicester, shown by Figure 1-1 and Figure 1-2 below. The proposed development comprises 11no. commercial units with associated car parking and landscaping.

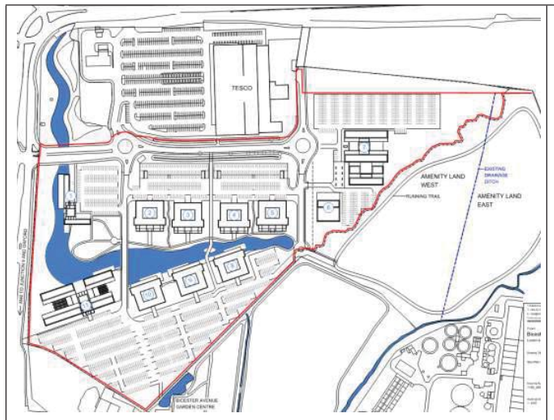



**Figure 1-1 Site boundary plan**

**Figure 1-2 Arial photograph of the site showing study area red line (September 2015)**

## 1.2 Study Aims and Objectives

The overall aim of this study was to carry out a geoenvironmental risk assessment and flood risk appraisal of the site in order to inform the Client's understanding of potential ground-related risks to meet planning requirements.

In relation to ground contamination, this report will provide information relevant to development in accordance with the requirements of the National Planning Policy Framework (NPPF) [1]. The work was carried out in general accordance with the Environment Agency / Department for Environment, Food and Rural Affairs (DEFRA) Model Procedures [2],the relevant British Standard [3], the Environment Agency Guiding Principles [4], Groundwater Protection Policy [5] and other current good practice guidance. The particular objectives were:

- To determine the historical and current use of the site and its surroundings;
- To determine the nature of the ground conditions and the environmental sensitivity of the site;
- To assess the potential location, nature and extent of any ground and groundwater contamination;
- To assess the potential risks to people and the environment (natural and built) associated with ground contamination (solid, liquid or gas) both in the site's existing condition and for the future use;







- To make an initial assessment of any potential flood risk constraints or considerations;
- To construct an Initial Conceptual Model and carry out a preliminary contaminated land risk assessment, in general accordance with the EA/DEFRA Model Procedures for the management of land contamination [2];
- To prepare a report based upon all of the above suitable to support a future planning application in accordance with NPPF [1] and meet the Client's due diligence requirements; and
- To evaluate the potential need for and scope of any subsequent site investigations and/or remedial action or design.

## 1.3 Information Sources

The principal sources of information for this desk study report include: historical and current topographic maps and public register information from the Groundsure report (Appendix D); previous site investigation reports (discussed in Section 5); a site walkover survey; and information available from the Environment Agency website and other online sources.

This report is based upon information obtained from third party sources, together with observations from the site walkover survey. The third party data has been accepted as face value and has not been independently verified. BuroHappold can therefore give no warranty, representation or assurance as to the accuracy or completeness of such information.

# 2 Current land use and proposed development

## 2.1 Site Walkover

A site walkover was undertaken on Wednesday 15th March 2017. Further details are below and with an annotated aerial photograph as Figure 2-1.

### 2.1.1 Site Location and Topography

The site is located within the southern conurbation of Bicester. The site is generally flat, with a slight drop to the south and east. The access is along an access road in the west, the south of this access road is bunded (northern boundary of the agricultural fields). This bund is between 1.5m and 2m. A surface inspection of the bund indicates that it is likely constructed with site won material.

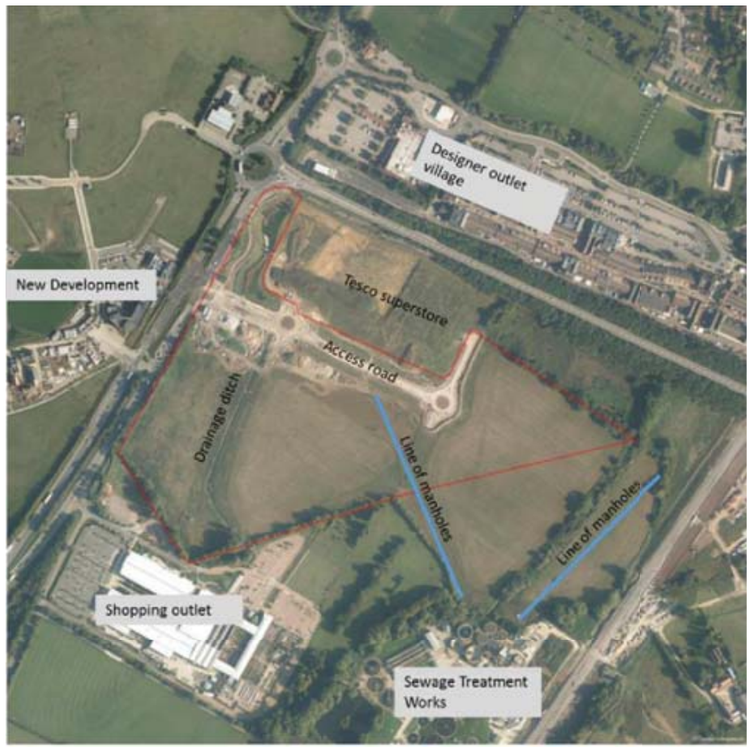



**Figure 2-1 Annotated aerial photograph (base photograph dated 2015)**







### 2.1.2 Current Site Use

Access to the site is along an access road to the west. In the north, and north of the access road, is a manmade pond with associated landscaping. Along the south of the access road is a 1.5m to 2m high bund (Section 2.1.1). The majority of the site is south and east of the access road and comprises open agricultural land. There was both evidence of grazing (fencing) and cultivation (shallow plough ruts). A drainage channel runs north / south, from the access road to the southern boundary, along the north of the drainage channel – near the access road – is an area used for material storage. This area had plastic and concrete pipework, gravel and wood chippings. Two heaps of wood, comprising tree branches and timber up to 3m high, are in the south of the site. In the central and southern areas of the site is a line of manhole covers (Figure 2-1), these appear to flow to the adjacent sewage treatment works (Section 2.2). Around some of the manhole covers were wet wipes, indicating that these locations have been blocked and cleared out (and possibly overflowed).

One substation is present in the west of the site. Two more are adjacent to the north, associated with the Tesco superstore. These substations appear to be modern (<5 years old) and in good condition.

### 2.1.3 Invasive Species

No invasive spices were observed during the walkover.

## 2.2 Current Activities in the Surrounding Area

Adjacent to the north of the access road is a new Tesco superstore, in the north east of this superstore development is an associated petrol forecourt. Another petrol station (Esso) is located 75m north east (c.200m from centre of site, Section 4.2). Further north of the A41 is a shopping centre (Bicester Designer Outlet Village) with Bicester town beyond. The west of the site is bound by a shallow drainage ditch, with the A41 and a new housing development beyond. The housing development, which is still being constructed, incorporates a hotel, pub/restaurant and series of schools. The south is bound by a continuation of the western drainage ditch, which forms a pond near the southern tip of the site. Beyond this is another shopping centre (Bicester Avenue) with farmland beyond. The south east boundary of the site continues into farmland, with a drainage channel / small stream running south in this area. This stream enters a larger watercourse and continues to flow south. Further east (50m from site) is a mainline railway, 200m south is a sewage treatment works. As mentioned in Section 2.1.2, the sewers present on site flow to the sewage treatment works.

### 2.3 Proposed Development

The proposed development comprises a series of commercial units with associated car parking and landscaping. An extract of the masterplan is presented below with the full drawing in Appendix A

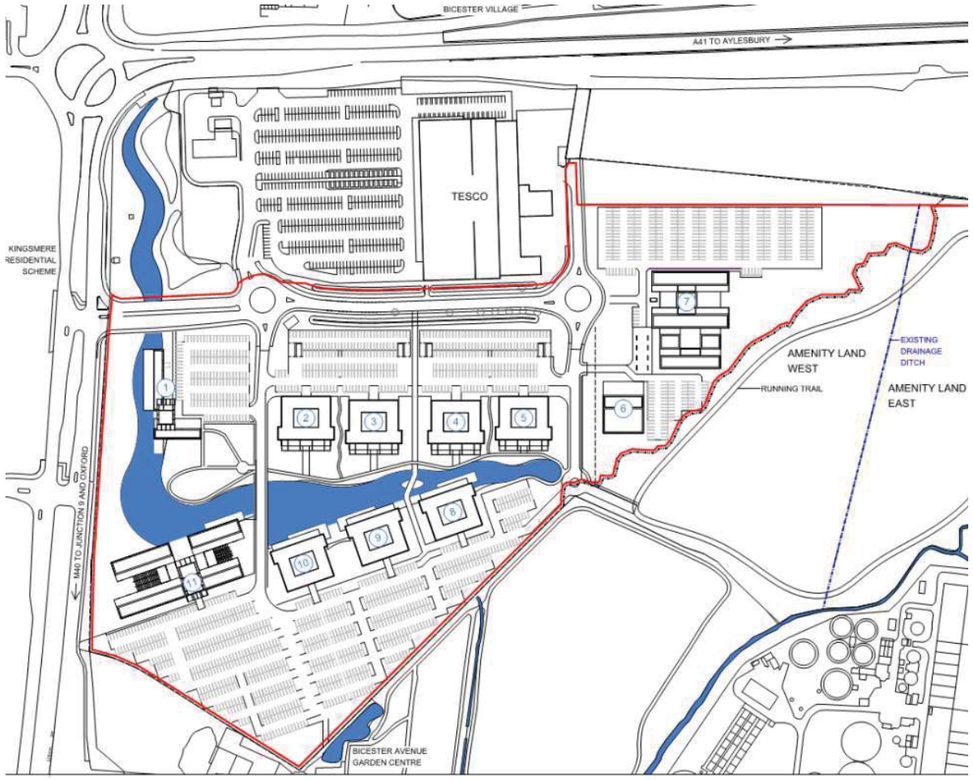



**Figure 2-2 Extract of proposed masterplan. Development site includes red line (south) and access road.**







# 3 Environmental Setting

### 3.1 Geology

The anticipated site geology is summarised in Table 3-1 - Summary of Anticipated Geology below. This has been determined with reference to the relevant BGS map (1:50,000 series, sheet 219, Buckingham. BGS 2002); BGS borehole logs (Appendix B); the Groundsure report (Appendix D) and historic site investigation data (Section 5).

**Table 3-1 - Summary of Anticipated Geology**

| Strata | Description | Depth to top [Thickness] (m) | Aquifer status |
|---|---|---|---|
| Alluvium | Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present. | GL [<3m] | Secondary |
| River Terrace Deposits | Sand and gravel, locally with lenses of silt, clay or peat. | GL [<3] | Secondary |
| Kellaways Formation | Siltstone and mudstone. | GL – 3 [2-3] | Unproductive |
| Cornbrash Formation | Limestone, medium- to fine-grained, generally and characteristically intensely bioturbated and consequently poorly bedded. Generally bluish grey when fresh, but weathers to olive or yellowish brown. (Regionally between 1 to 4m thick) | <5 [2] | Secondary |
| Forest Marble Formation | Silicate-mudstone, greenish grey, variably calcareous. A variety of limestone types occur, of which grey, weathering brown and flaggy, variably sandy medium to coarsely bioclastic grainstone or less commonly, packstone predominates, especially at the base. (Regionally between 2 to 7m thick). | 2.5 - >5 [7] | Unproductive |
| White Limestone Formation | A pale grey to off-white or yellowish limestone, peloidal wackestone and packstone with subordinate ooidal and shell fragmental grainstones. (Regionally between 7 and 18m thick) | 9 [base not proven] | Principle |

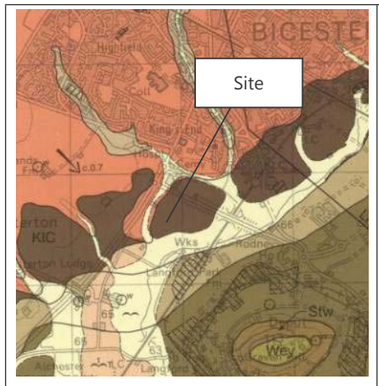



**Figure 3-1 Extract of the BGS geology map for the area.**

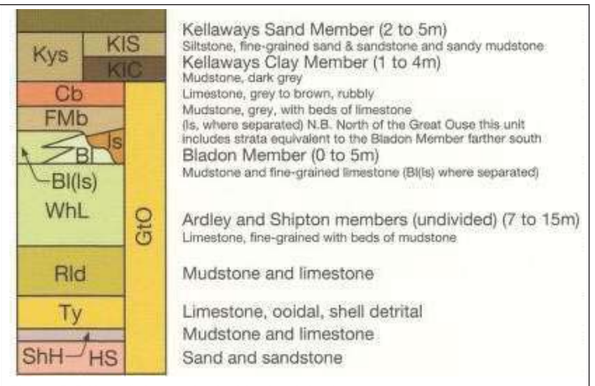



**Figure 3-2 Key of the geological bedrock in the area.**

### 3.2 Hydrogeology

A secondary aquifer associated with the Alluvium and Cornbrash Formation partially underlies the west of the site. A groundwater abstraction well was advanced in 2016 (Appendix B), this borehole struck water at 8.0m below ground level (bgl), and according to the logs, could not seal it off to depth (45m bgl). The water rose to 1.5m above ground level (artesian). Anecdotal evidence from the design team in BuroHappold suggests that this well was drilled to supply the proposed water feature on site, however after development, the waters still contained sediment and so the well was abandoned.

Although the site is not within a Source Protection Zone (SPZ), there are four groundwater abstractions licences within 1000m of the site. The nearest is 210m north east at the petrol station, for pollution remediation scheme. The application number is WRW/A/1145. The licence is due to expire in 2018. It is assumed that this licence relates to a pollution incident in 2003 (Section 4.2) classed as Category 4 (no impact). No further information has been provided on either the abstraction or the pollution incident. The nearest potable license is 812m south west for Bicester Trailer Park, issued in 1987.

### 3.3 Hydrology and Drainage

No natural surface water features are present on site, however a manmade ditch runs north / south in the west of the site (see Figure 2-1). Adjacent to the south and the east of the site are drainage ditches, as shown in Figure 3-3 as light blue features. These a minor tributaries of the larger river (Lanford Brook – dark blue in Figure 3-3).

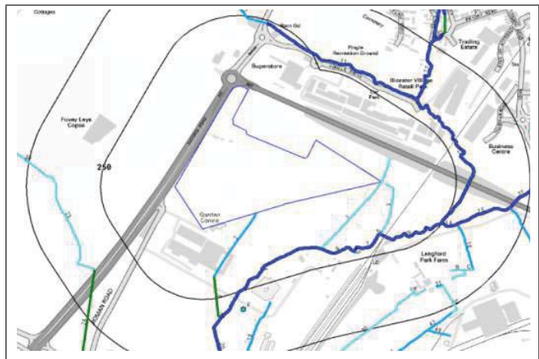



**Figure 3-3 Extract of GroundSure report of surface water features**

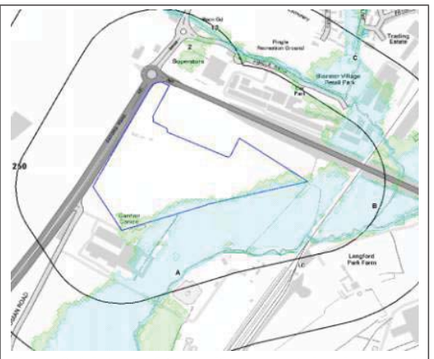



**Figure 3-4 Extract of GroundSure report showing extent of flooding modelled from the Lanford Brook**

A series of manholes were present across the central and southern areas of the site as detailed in Section 8and present on Figure 2-1. These flow to the sewage treatment works about 200m south of the site.

There are no surface water abstraction licences are within 1000m of the site.

### 3.4 Ecology

No areas of ecological protection are within 1000m of the site.







# 4 Site Setting

### 4.1 Site History

The site history and that for the surrounding area has been completed using historic maps from 1880 to 2014. A summary of the history is below with the maps reproduced in full in Appendix D.

#### 4.1.1 On site history

Prior to 1880, the site was agricultural land with field boundaries throughout the site. Of particular interest is the western field boundary, which remained constant throughout the mapping and is now the drainage ditch running through the site. A single, small building was present in the west of the site (Figure 4-1). Prior to 1898, a second small building has been constructed in the west of the site. These building were removed by 1950. Prior to 1985 two different buildings were constructed in the west of the site and a new drain had been laid in the central to the site running north / south, and by 2002 a third building had been constructed (Figure 4-2). This layout was present up and including the 2014 map.

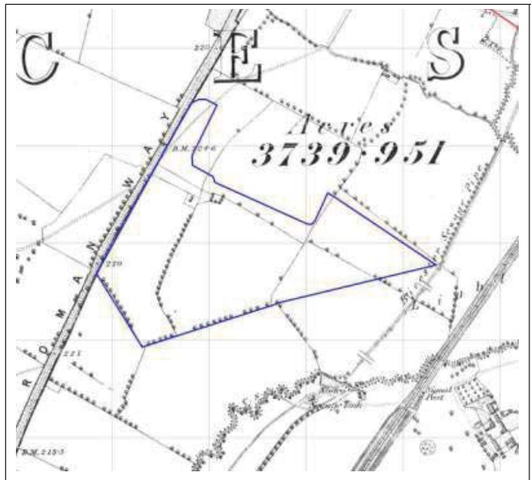



**Figure 4-1 Extract of the 1880 map**

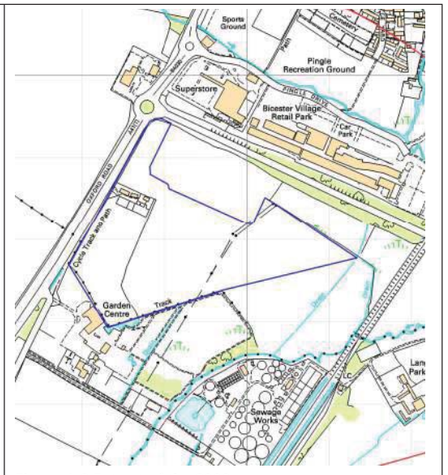



**Figure 4-2 Extract of the 2002 map**

#### 4.1.2 Off site history

Prior to 1880, the site was surrounded by agricultural land that was noted as 'Liable to Floods'. Roman Way bound the west of the site. Adjacent to the eastern corner of the site was Bicester Sewage Pipe, flowing 200m south to a sewage tank. 50m east was the Oxford Main line. The edge of Bicester was 500m north. Prior to 1960 new railway sidings and depots were constructed from 250m south around Graven Hill. By 1970, Bicester had expanded west, and Roman Way was straightened and renamed to Oxford Road, a Sewage Farm was constructed 200m south. 50m north was a new building, part of a farm, and a well. This well appears to be the source of the water, which enters the drainage ditch intersecting the site (it is assumed the well was present before this, just unlabelled). By 1985 Bicester had expanded further west, the sewage farm (now Sewage Works) also expanded. The field boundary / drainage ditch was no longer present adjacent to the north. A Nursery was constructed adjacent to the south. By 1995 the A41 was constructed adjacent to the north of the site running east, beyond this was a new commercial area with recreation grounds beyond. The nursery to the south also expanded.

## 4.2 Regulatory Data

Regulatory data relating to potentially contaminative uses is summarised in Table 4-1 below. This information was obtained from the Groundsure report, presented in full in Appendix D.

**Table 4-1 - Summary of Regulatory Data**

| Item | Location [on/off site] | Information | Potential to Impact |
|---|---|---|---|
| ***Environmental Permits, Incidents and Registers*** | | | |
| List 2 Dangerous Substances | 4 [215m S] | All four licences relate the discharge of various metals to Langford Brook by Haul Waste Disposal Ltd | No |
| Past A(2) and Part B Activities | 2 [125m NW, 228m NE] | Petrol filling stations associated with Tesco and Esso respectively. | Yes |
| Discharge Consents | 2 [98m NE] | Bicester retail park for the discharge to surface water of miscellaneous | No |
| | 9 [215m S] | Sewage Treatment licences for storm overflow and treated effluent. 7 revoked, 2 remain. | No |
| | 4 [From 262m] | Service station and Business centre, sewage treatment works – all revoked. | No |
| Environment Agency Recorded Pollution Incidents | 1 [5m S] | 2002: Microbial to water | No |
| | 3 [45m N] | 2001: Various contaminants to land | No |
| | 1 [217m SE] | 2002: Sewage to water | No |
| | 1 [243m NE] | 2003: Petrol – no impact recorded | No |
| There are no records of the following in 500m of the site; IPC or IPPC authorisations, red list discharge consents, list 1 dangerous substances, radioactive substances, water industry referrals, planning hazardous substance consents, COMAH & NIHHS sites, sites determined Contaminated Land under Part 2a. | | | |
| ***Landfill and Other Waste Sites*** | | | |
| Environment Agency licenced waste sites | 2 [480 and 500m NE] | McGregor Railway Services, metal recycling. One surrendered in 2009, once active for between 25000 and 75000 tonnes. | No |
| There are no records of the following within 500m of the site; Environment Agency current or historic landfills, BGS non-operational landfills, Local Authority landfills or waste treatment, transfer or disposal sites. | | | |

## 4.3 Radon

The Groundsure report and Indicative Atlas of Radon for England and Wales [6] indicates that the site is not within a Radon Affected Area, as less than 1% of the properties are above the action level. Therefore, no radon protective measures are necessary.

## 4.4 Mining

There are no records of mining (coal, non-coal or brine) within 50m of the Site based on records from the Coal Authority (Appendix D).







## 4.5 Natural Hazard

Regulatory data relating to ground stability is summarised in Table 4-2 below. This information is from the Groundsure report, presented in full in Appendix D.

**Table 4-2 Potential natural hazards based on BGS Geosure data**

| Potential Hazard | Identified risk |
|---|---|
| Shrink swell | Moderate |
| Landslide | Very Low |
| Soluble Rocks | Low |
| Compressible Ground | Moderate |
| Collapsible Rocks | Very Low |
| Running Sand | Low |

## 4.6 Unexploded Ordnance

A Preliminary UXO Risk Assessment has been carried out by BuroHappold in accordance with CIRIA C681 [7] and is included in Appendix C. Consideration of the potential for aerial delivered UXO and to the potential mitigation factors, namely: (i) the extent of post-war development; and (ii) the extent of proposed intrusive works. The assessment concluded that the risks associated with UXO are low, therefore no specific precautions are required for below ground works.

# 5 Previous Site Investigations

## 5.1 Publically available records

In August 2012, permission was granted to construct a foodstore and petrol filling station by Cherwell District Council on land adjacent to the A41 (Ref. 12/01193/F). Prior to this, in June 2012 Delta-Simons completed a Phase 1 Desk Study. The Desk Study did not identify any potentially contaminative land uses on site, however the adjacent sewage treatment works, railway line and the petrol filling station were identified as potential sources of off-site contamination. The source-pathway-receptor risk assessment concluded that a pollution linkage was unlikely. The report concluded that a ground investigation should be undertaken to provide waste classification data and confirm background [baseline] soil and groundwater chemical concentrations. The Desk Study concluded the site to be low to moderate risk in terms of planning conditions.

No further contaminated land investigations were provided to support the planning permission.

## 5.2 BuroHappold site investigation

In 2014, BuroHappold commissioned Structural Soils to complete a Site Investigation to provide information on a proposed trunk sewer, access road and ornamental lake. The data was combined with an investigation from 2008. The 2008 works comprised five cable percussion boreholes, a rotary cored borehole and five machine dug trial pits. In 2014, an additional cable percussive borehole and five mechanical trial pits were completed. The exploratory holes extended to a maximum depth of 11.70m below ground level (bgl) in the rotary borehole. The logs are reproduced in Appendix B.

Typically, from ground level to about 1-2m bgl there were superficial deposits. In the east, the Kellaways Clay Member were present up to 4.9m bgl, underlying the superficial deposits. The Kellaways Clay Member thins to the west and was not present in the far west. The Cornbrash Formation was encountered in all locations beneath the Kellaways Clay Member (where present) or the Superficial Deposits where the Kellaways Clay Member is not present. The base of the Cornbrash Formation was only proven in BH2, where the formation extended to 2.25m bgl. The Forest Marl Formation was proven between 2.25m bgl and 9.40m bgl, under the Forest Marl Formation the White Limestone was present to the base of the hole (11.70m bgl).

In 2014, chemical analysis was completed on four soil samples from the exploratory holes from between 0.5 and 1.3m bgl in the superficial deposits, no geoenvironmental interpretation was undertaken. As part of this report, BuroHappold have reassessed this data comparing to LQM Suitable for Use Levels (S4UL). All the samples chemical concentrations are below both the S4UL residential and commercial usage scenario thresholds. No asbestos testing was undertaken.







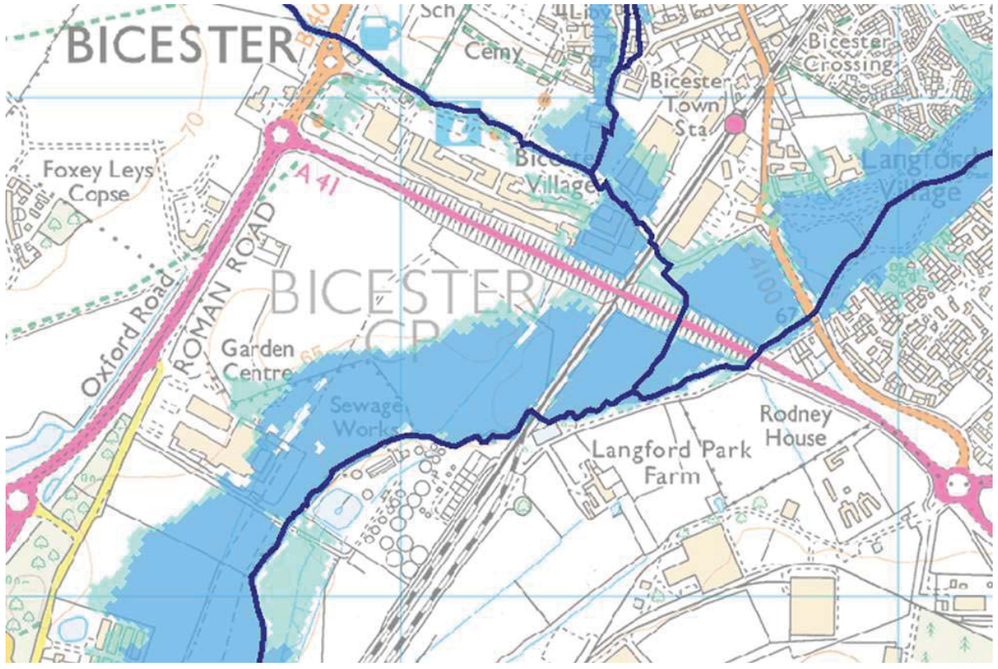
# 6 Flood Risk Appraisal

The site's south eastern boundary is adjacent to a watercourse known as the Langford Brook and as a result falls within the flood zone of this watercourse. A number of flood studies have been carried out since the initial planning application for the site in 2007 so the flood characteristics are well understood.

The Environment Agency currently has a flood classification system based on 3 zones as follows

- Zone 3-High risk of flooding with flood return events of less than 1in 100 years
- Zone 2-Medium risk of flooding with flood return events of between 1 in 100 and 1 in 1000 years
- Zone 1-Low risk of flooding with flood return events greater than 1 in 1000 years

The zone boundaries on the Bicester site have been adjusted since 2007 to take account of the changing weather patterns and the projected effects of climate change. The EA guidance was most recently updated in February 2016 and the current EA flood map is shown below.




The dark blue area is zone 3 and light blue zone 2. All other areas are within zone 1. It should be noted that the whilst the EA regularly update the flood maps the boundary between the zones are approximate and tend to be conservative. A flood risk assessment that will be required in support of a revised planning application would identify the zones more accurately.

The plan shows that the south eastern part of the site falls within zones 2 and 3 with the majority of the area being zone 3. The current outline Masterplan for the site has recognised this and no buildings or essential surface infrastructure was planned to be located within zones 2 or 3. The proposed land uses are acceptable for zone 3 i.e. open space and nature conservation area.

Due to the site topography zone 2 is a relatively narrow area and if necessary non critical infrastructure can be located in this area provided that the proposed level are at or below current ground levels.

Development within zone 1 will be permitted and buildings and infrastructure within zone 1 will be at a low risk of flooding. There will be a need to set the building floor levels so that they have a freeboard above the 1 in 100 year flood level. The freeboard will also account for the predicted increase in 1 in 100 year flood level due to climate change. In addition the site will be subject to planning restrictions which will limit the surface water runoff to current 'greenfield' runoff rates. However both of these requirements were met by the current outline planning proposals and should not present any undue constraints to a revised planning application. It should be noted that it is likely that the minimum floor levels will have increased by 200/300 mm from the previous agreed levels due to increased climate change allowances. There is a possibility that the line of the zone 2/zone 1 boundary may have moved and have slightly reduced the area of zone 1. If the new flood risk assessment shows that this is the case the masterplan layout shown in figure 2-2 may require modifying. However this can be achieved by adjusting the landscaped areas whilst maintaining the building floor space and quantum of parking proposed.

This note deals with the risk of fluvial flooding. There was a minor flood event from the public sewerage network that crosses the site and is connected to the sewage treatment works which is located on the other side of the Langford Brook. The flooding from the sewers occurred at the point in the network immediately adjacent to the sewage treatment works. This area is within flood zone 3 and it not proposed to be developed. Therefore in addition to the flood event being an isolated occurrence, should it reoccur it will not impact the proposed development. To the best of our knowledge the public foul sewer located under the access road has not flooded and is not currently overloaded.

In conclusion, whilst part of the site lies within a designated flood zone, the hydrology is understood and the current masterplan has designated land uses that are commensurate with the zone classifications. A revised planning application will need a new flood risk assessment but the constraints posed by the flood risk consideration should be met with standard design solutions.







# 7 Preliminary Geoenvironmental Risk Assessment

## 7.1 General Approach

In the UK, the assessment of risk from contamination follows the source-pathway-receptor approach. If one of these three elements is absent, it is considered that there is no risk of harm. If, however, there is considered to be a linkage between any given source and any given receptor, then a risk-based approach is used to assess the significance or impact of any such linkage.

Risks are defined as the probability of an event occurring combined with the severity of the consequence of that event. Particularly, to assess the risks to site end users posed by any given source, the sensitivity of each receptor is considered. For example, the concentration of contamination acceptable at a site to be developed as a residential property with a garden used to grow vegetables and accessible to young children is set lower than that for a commercial site where soil is exposed only in minor areas of landscaping and the only long-term users of the site are adults. Similarly, a site overlying a Principal Aquifer supplying potable water to a large population will be considered more stringently than a site overlying an impermeable geology with only minor seepages of groundwater.

## 7.2 Sources, Receptors and Pathways

Potential contamination sources have been identified and are summarised in Table 7-1 below. The 'Contaminants of Concern' in this risk assessment are based primarily on information from the review of historical information, reference to DEFRA R&D Publication CLR 8 'Priority Contaminants for the Assessment of Land' and relevant Industry Profile reports published by the Department of Environment. Site specific pathway-receptor linkages have been identified in Table 7-2 with respect to the sources outlined in Table 7-1 and with respect to the anticipated future uses.

**Table 7-1 - Summary of Potential Contamination Sources**

| Potential Source | Location | Likely Age | Potential Contaminants of Concern |
|---|---|---|---|
| Current on site activities (agriculture, evidence of overflowing sewer) | On site | <150 years | Fertilisers and nutrients<br>Faecal matter<br>Metals |
| Current on site use (bund and material storage on site) | On site | <5 years | Asbestos*<br>Metals |
| Adjacent contaminative uses (petrol filling stations – former pollution incident associated with this) | Off site (adjacent to NE) | <10 years | Hydrocarbons (petrol, diesel, oils) |
| Adjacent contaminative uses (sewage treatment works) | Off site (adjacent to SW) | <50 years<br>(>150 years for former 'sewage pipe') | Fertilisers and nutrients<br>Faecal matter<br>Metals |

* No potentially asbestos containing materials observed in the bund during the site visit.

**Table 7-2 - Summary of Receptors and Pathways**

| Receptor | | Pathway |
|---|---|---|
| Human Health | Construction / Maintenance Workers | Direct contact, ingestion, inhalation |
| | Future Site Occupants | Direct contact, ingestion, inhalation |
| | Site Neighbours | Soil and dust ingestion |
| Controlled Waters | Secondary and Principal Aquifers | Migration through granular strata |
| | Surface Waters | Surface water run-off and drainage/sewerage network |
| Ecology | On site flora and fauna | Root uptake |
| Built Environment | Water supply pipes / building fabric | Direct contract |

## 7.3 Results of Risk Assessment

The details of the Preliminary Risk Assessment are presented in Table 7-3 overleaf and the results discussed in Section 8.1.





**Table 7-3 - Preliminary Risk Assessment**

| Source | | | **Receptor**/ Pathway | **Risk assessment** (following CIRIA C552) | | | Comment on hazard realisation. |
|---|---|---|---|---|---|---|---|
| Origin | Contaminants of concern | Zone affected | | Consequence | Probability | Risk | |
| Current site use (agriculture, overflowing sewer, bund and material storage) | Fertilisers and nutrients<br>Faecal matter<br>Metals<br>Asbestos | On site | **Description of source: The site, historically and presently, is open agricultural land. Since 2014 the land adjacent to the north has been developed as a food superstore with a petrol forecourt, another petrol forecourt is located 100m north west. The further petrol station appears to have been subject to voluntary remediation (Section 3.2), assumed to be for a fuel leak to ground (unconfirmed). A sewage treatment works is located 200m south east of the site. A series of manholes showing the path of the trunk sewer, intersect the site leading to the sewage treatment works. There is evidence that the sewers block and possibly overflow (wet wipes around manhole covers). An access road and associated bund contain the north of the site, some areas in the north of the site are also used for storage of building materials. As part of a site investigation for the design of the trunk sewers, four samples were taken for chemical analysis. Although no interpretation was completed in the investigation, this report has screened the results against S4UL values. No samples exceed residential or commercial thresholds. No potentially asbestos containing material observed in bunded material.** | | | | |
| | | | **Site neighbours**<br>Soil and dust ingestion | Medium | Low likelihood | **Moderate / Low** | Residential properties adjacent to site could be impacted from dust generated from site. Limited potential in normal use, with increased potential during any earthworks.<br>Risk is mainly associated with potential of asbestos in bund material / material storage. If this is further quantified/managed then mitigation of potential risks can be achieved by good construction practice. |
| | | | **Investigation and construction workers**<br>Soil and dust ingestion, dermal contact | Medium | Low likelihood | **Moderate / Low** | Potential for exposure during investigations/ earthworks. Period of exposure dependent on construction timescales. Standard Health and Safety precautions likely to be used by workers.<br>Mitigation of potential risks can be achieved by appropriate investigation and good construction practice. |
| | | | **Future site users**<br>Dermal uptake, soil and dust ingestion, ingestion of contaminated water supplies | Medium | Low likelihood | **Moderate / Low** | Proposed future use is for commercial use with significant landscaping. Potential for direct contact and ingestion limited by proposed soil cover.<br>Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / mitigation measures including encapsulation. |
| | | | **Degradation of Water quality [Principal and Secondary Aquifers and surface water]**<br>Migration via permeable strata | Mild | Low Likelihood | **Low** | Secondary Aquifer discontinuous across site as thins to west, underlying Principal Aquifer not protected. Made Ground is limited in thickness and does not appear to be grossly contaminated, however risk from development / construction could be detrimental to the site.<br>Mitigation of potential risks could be achieved by appropriate investigation / design and implementation of remediation / mitigation. |
| | | | **Root uptake**<br>Detrimental effects (stunted grown, die back) on plant life | Mild | Unlikely | **Very Low** | Vegetation on site did not show any adverse effects however limited to short grasses across majority of site and semi-mature trees around perimeter. Potential for uptake in any areas of soft landscaping.<br>Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / restoration. |

| Source | | | **Receptor**/ Pathway | **Risk assessment** (following CIRIA C552) | | | Comment on hazard realisation. |
|---|---|---|---|---|---|---|---|
| Origin | Contaminants of concern | Zone affected | | Consequence | Probability | Risk | |
| | | | **Buildings/services - permeation of water supply pipework, degradation of concrete**<br>Direct contact/, aggressive attack/ below ground structures | Medium | Unlikely | **Low** | Potential for direct contact on redevelopment site. No record of derogation to water supply.<br>Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation. |
| **Adjacent sewage treatment works and petrol filling stations** | Faecal matter<br>Metals<br>Hydrocarbons | On site | **Description of source: Adjacent sites are possible contamination sources. Petrol forecourt appears to be undertaking voluntary remediation, however associated pollution incident categorised as No Impact. Main pathway is groundwater. Groundwater flow assumed to follow topography to south (although not proven at this stage). Sewage works downstream from the site.** | | | | |
| | | | **Investigation and construction workers**<br>Groundwater ingestion, dermal contact | Mild | Unlikely | **Very Low** | Potential for exposure during investigations/ earthworks. Period of exposure dependent on construction timescales. Standard Health and Safety precautions likely to be used by workers.<br>Mitigation of potential risks can be achieved by appropriate investigation and good construction practice. |
| | | | **Future site users**<br>Dermal uptake, groundwater ingestion, inhalation of vapours ingestion of contaminated water supplies | Medium | Unlikely | **Low** | Proposed future use is for commercial use with significant landscaping. Potential for contaminants to enter on site water feature or release of gas/vapour from degradation of contaminants. Any such impact likely to be quickly identified and dealt with.<br>Mitigation of potential risks can be achieved by appropriate investigation / design and implementation of remediation / mitigation measures including encapsulation. |







# 8 Conclusions and Recommendations

## 8.1 Geoenvironmental risk summary

The following risks have been identified above low and will require further investigation:

| Receptor | Source [Pathway] | Resultant Risk |
|---|---|---|
| Site neighbours, construction workers and future site users | Asbestos, metals, Fertilisers and nutrients<br>Faecal matter<br>[dust/inhalation] | Moderate / Low |

## 8.2 Flood risk considerations

Part of the site lies within a designated flood zone the hydrology is understood and the current masterplan has designated land uses, which are commensurate with the zone classifications. A revised planning application will need a new flood risk assessment but the constraints posed by the flood risk consideration should be met with standard design solutions.

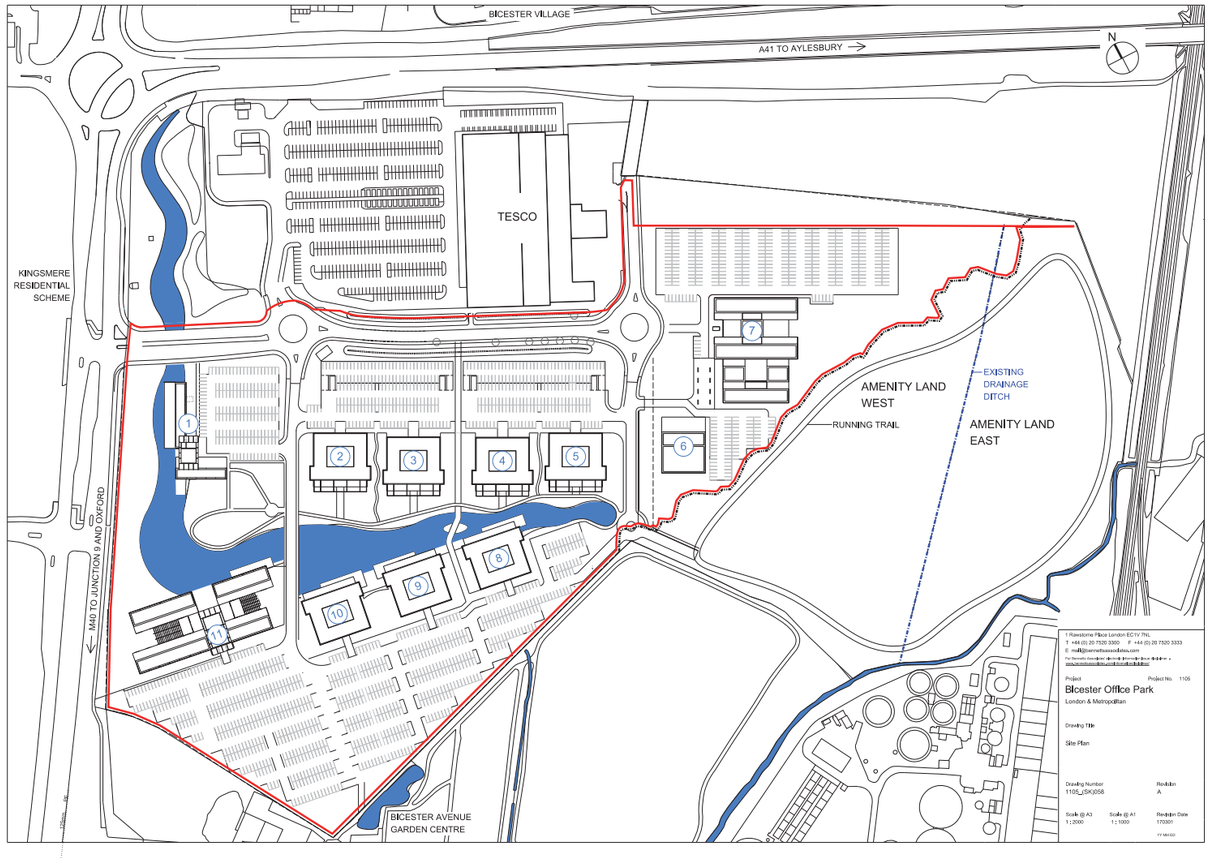
## 8.3 Recommendations

The risk is considered suitably low that no exceptional costs associated with ground remediation are likely to be realised for the proposed development, therefore it is unlikely that further investigation is required for outline planning permission.

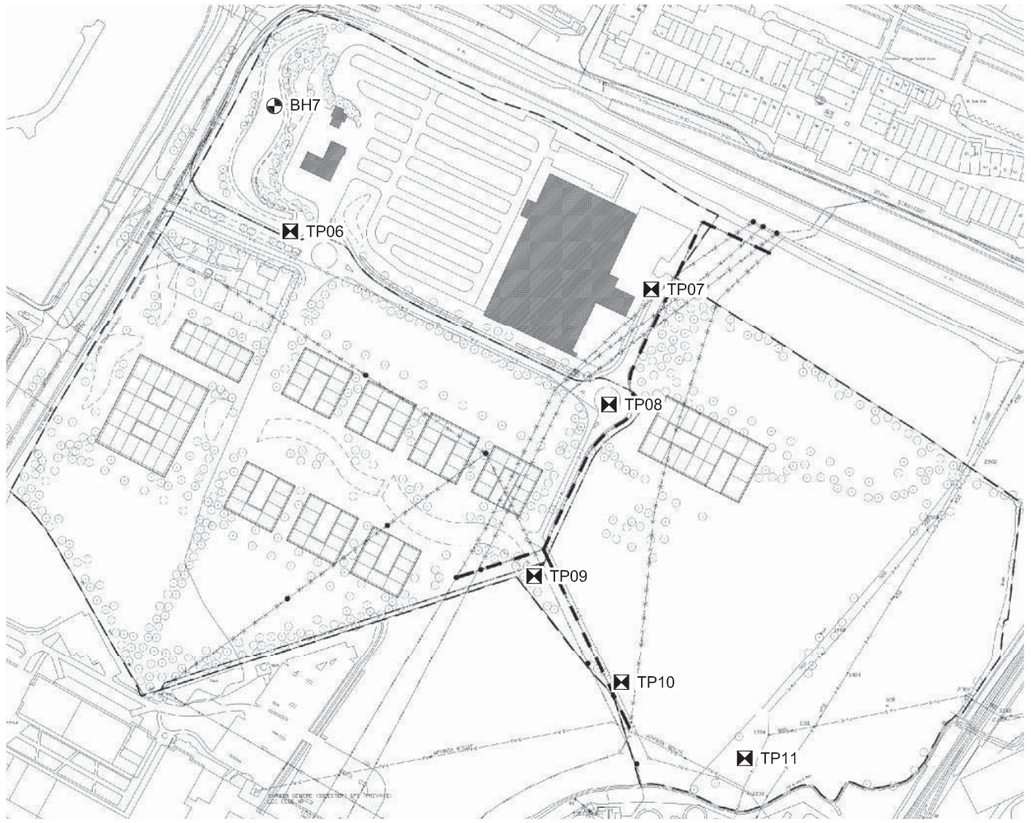
A site investigation will be required to meet planning conditions. This will need to assess the geoenvironmental risks associated with the construction of the proposed structures. This investigation will be used to confirm and quantify the potential risks to site neighbours and future site users and will inform the need for any mitigation or remediation requirements.

During construction standard practice such as welfare facilities, good housekeeping, contamination watching brief and PPE should be adopted.

# Appendix A – Relevant figures



# Appendix B - Relevant investigation and BGS borehole logs




LEGEND

- Borehole Location
- Trial Pit Location

STRUCTURAL SOILS LIMITED

The Old School
Stillhouse Lane
Bedminster
Bristol BS3 4EB

Tel: 0117 947 1000
Fax: 0117 947 1004
ask@soils.co.uk
www.soils.co.uk

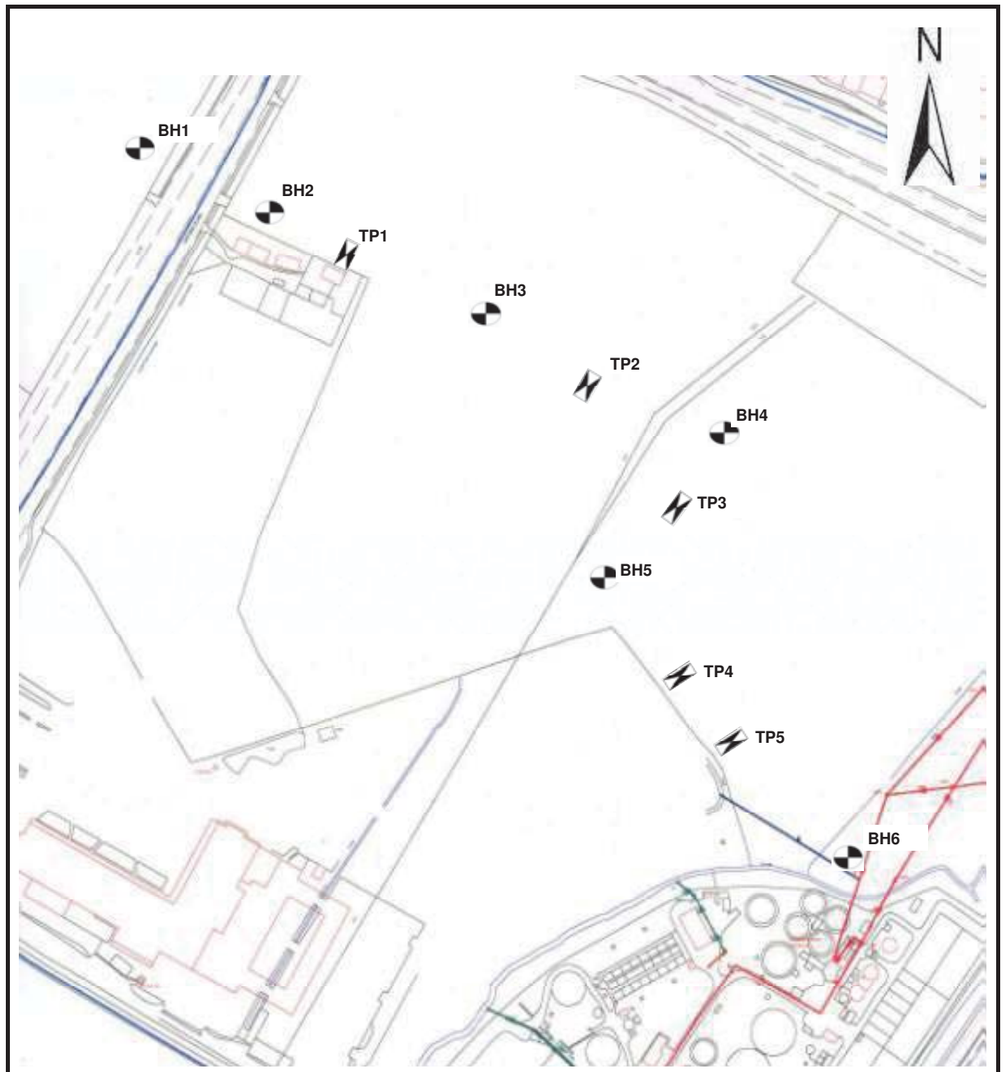
| REV. | DATE | DESCRIPTION | BY | CHD. | APR. |
|---|---|---|---|---|---|
| 00 | 29.01.2014 | - | MW | WH | - |

CLIENT: London and Metropolitan International Developments LTD

PROJECT: Bicester Business Park

TITLE: EXPLORATORY HOLE LOCATION PLAN

| DIMENSION | SCALE | DRAWING STATUS | JOB NO. | SCALE BAR | ORIGIN SIZE | FIGURE |
|---|---|---|---|---|---|---|
| m | NTS | - | 728724 | Not To Scale | A4 | 2 |




Borehole

Trial Pit

## EXPLORATORY HOLE LOCATION PLAN

| | | | |
|---|---|---|---|
| **Structural Soils Limited**<br>**The Old School**<br>**Stillhouse Lane**<br>**Bedminster**<br>**BS3 4EB** | Site<br>**7RWG - Whitelands Farm**<br>**Oxford Road FAS**<br>**Diversion, Bicester** | Job no.<br>721026<br>Drawing no.<br>2<br>Date<br>Feb-08 | |
| | Client<br>**Thames Water Utilities Ltd** | Drawn by<br>TB | |

**APPENDIX B**

(i) Key to Exploratory Hole Logs

(ii) Borehole Logs

(iii) Trial Pit Logs and Photographs

## KEY TO EXPLORATORY HOLE LOGS - SUMMARY OF ABBREVIATIONS

SAMPLING

*Sample type codes*

| | | |
|---|---|---|
| B | = | Bulk disturbed sample. |
| D | = | Small disturbed sample. |
| DSPT | = | Small disturbed sample originating from SPT test. |
| LB | = | Large bulk disturbed sample (for earthworks testing). |
| U | = | Undisturbed driven tube sample - Number of blows indicated. % recovery reported. |

*Undisturbed sample detail codes*

| | | |
|---|---|---|
| $U_{(100)}$ | = | 100mm diameter undisturbed sample. |

IN-SITU TESTING

| | | |
|---|---|---|
| SPT | = | Standard Penetration Test using split spoon sampler. ($SPT_{(NR)}$ indicates 'No Sample Recovery'). |
| V | = | Field Vane Test. Peak value ($c_u$) & Residual value ($c_r$), given as shear strength in kPa. |

ADDITIONAL NOTES

1. All soil and rock descriptions and legends in general accordance with BS EN ISO 14688-1, 14688-2, 14689-1, and BS5930:1999 including Amendment 2 (2010).
2. Material types divided by a broken line (- - - ) indicates an unclear boundary.
3. The data on any sheet within the report showing the AGS icon is available in the AGS format.

GINT_LIBRARY_V8_05.GLB!GrfcText G - LEGEND - 1 OF 2 | 728724_BICESTER_BUSINESS_PARK.GPJ - v8_05 | 01/04/14 - 17:09 | AML
Structural Soils Ltd, Head Office - Bristol: The Old School, Stillhouse Lane, Bedminster, Bristol, BS3 4EB. Tel: 0117-947-1000, Fax: 0117-947-1004, Web: www.soils.co.uk, Email:admin@soils.co.uk.

STRUCTURAL SOILS

Contract Reference: **728724**

## KEY TO EXPLORATORY HOLE LOGS - SUMMARY OF GRAPHIC SYMBOLS

### WATER COLUMN SYMBOLS

First water strike, second water strike etc.

Standing water level following first strike, standing water level following second strike etc.

Seepage.

Standing water level recorded at documented date.

### MATERIAL GRAPHIC LEGENDS

Clayey sandy GRAVEL

Sandy clayey GRAVEL

Silty gravelly CLAY with COBBLES and BOULDERS

MADE GROUND

Possible MADE GROUND

Sandy CLAY

Gravelly sandy CLAY

Sandy gravelly CLAY

### INSTRUMENTATION SYMBOLS

Backfill

GINT_LIBRARY_V8_05.GLB!GrfcText G - LEGEND - 2 OF 2 | 728724_BICESTER_BUSINESS_PARK.GPJ - v8_05 | 01/04/14 - 17:10 | AML
Structural Soils Ltd, Head Office - Bristol: The Old School, Stillhouse Lane, Bedminster, Bristol, BS3 4EB. Tel: 0117-947-1000, Fax: 0117-947-1004, Web: www.soils.co.uk, Email:admin@soils.co.uk.

STRUCTURAL SOILS

# BOREHOLE LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH1** |

| Job No | Start | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **16.01.08** End **16.01.08** | **67.98** | **E:457638.5 N:221775.4** | **1** of **1** |

| Samples and In-situ Tests: Depth | No | Type | Blows | Water | Instrumentation | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|---|
| 0.20-0.50<br>0.30<br>0.50 | 1<br>2<br>ES<br>3<br>ES | B | | 1.1 | | Soft light brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is fine to coarse angular to subrounded of limestone. Cobbles of limestone up to 100mm diameter.<br>(Superficial Deposits) | 67.58 | 0.40 | |
| | | | | | | Very strong yellow grey medium to coarse bioclastic LIMESTONE.<br>(Cornbrash Formation) | 67.18 | 0.80 | |
| | | | | | | Borehole terminated at 0.8m depth on rockhead. | | | |

| Boring Progress and Water Observations: Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
|---|---|---|---|---|---|
| 16/01/08 | 14:30 | 0.40 | 0.00 | 150 | 0.40 |

| Chiselling: From | To | Duration (hh:mm) |
|---|---|---|
| 0.40 | 0.80 | 01:15 |

## General Remarks

1. Inspection pit hand dug to refusal at between 0.40-0.50m depth.
2. Water struck and standing at 0.40m depth in inspection pit.
3. Borehole progressed by chiselling between 0.40-0.80m depth (1.25hrs).

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:50** | **Cable Percussion** | **MR** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - CABLE PERCUSSION LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:32

STRUCTURAL SOILS

# WINDOW SAMPLE LOG

| Contract | Client | Window Sample No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH2** |

| Job No | Date | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **13.02.08** | **66.72** | **E:457708.3 N:221739.5** | **1** of **4** |

| Progress: Window Run (size (mm)) | Samples / Tests: Depth | No | Type | Results | Water | Instrumentation | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.00-0.30 | 1 | B | | | | MADE GROUND: Dark brown slightly clayey slightly sandy GRAVEL. Gravel is angular to subangular fine to coarse of concrete flint and limestone. | 66.22 | 0.50 | |
| 0.50 - 1.50<br>(110)<br>100 % rec | 0.50-0.60<br>0.60-0.80 | 2<br>3 | B<br>D | | | | Dark brown slightly clayey slightly sandy GRAVEL with some cobbles. Gravel is angular to subangular fine to coarse of limestone. Cobbles of limestone up to 150mm diameter.<br>(Cornbrash Formation) | 66.12 | 0.60 | |
| | 1.00-1.20 | 4 | D | | | | Green brown clayey slightly sandy GRAVEL. Gravel is angular to subangular medium to coarse of limestone.<br>(Cornbrash Formation) | 65.22 | 1.50 | |
| | | | | | | | *Window sample hole continued using rotary coring techniques from 1.50m depth.* | | | |

## General Remarks

1. Inspection pit hand dug to refusal at maximum 0.60m depth.
2. Borehole drilled using dynamic ('window') sampling techniques to 1.50m depth, then extended by rotary coring.

| All dimensions in metres | Method | Logged By | Checked By |
|---|---|---|---|
| Scale **1:25** | **Comacchio MC300** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - WINDOW SAMPLE LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:32

STRUCTURAL SOILS

# ROTARY LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH2** |

| Job No | Start | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **13.02.08** End **14.02.08** | **66.72** | **E:457708.3 N:221739.5** | **2** of **4** |

| Depth | Test | W | TCR | SCR | RQD | If (mm) | Instrumentation | Water | Description of Strata | Reduced Level | | Legend |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | *Borehole continued using rotary coring techniques from 1.50m depth.* | 65.22 | 1.50 | |
| 1.50-1.70<br>1.50-1.70 | Core<br>D | | 200 | | | | | | Moderately strong light grey coarse grained LIMESTONE recovered as: light grey GRAVEL with occasional cobbles. Gravel and cobbles of limestone. Cobbles up to 75mm diameter.<br>(Cornbrash Formation) | 65.02 | 1.70 | |
| 1.70-2.00<br>1.70-2.00<br>1.70 | Core<br>D<br>$c_u$=50/62.5 | | 100 | | | | | | Firm light green brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of limestone.<br>(Cornbrash Formation) | 64.57<br>64.47 | 2.15<br>2.25 | |
| 2.00-2.20<br>2.15-2.25<br>2.20-2.60<br>2.20 | Core<br>D<br>Core<br>$c_u$=62.5/75 | | 100<br>50 | 0 | 0 | | | | Firm grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of calcareous mudstone.<br>(Cornbrash Formation) | 64.12 | 2.60 | |
| 2.60-3.00<br>2.60 | Core<br>C | | 51 | 0 | 0 | | | | Moderately strong thinly laminated dark grey coarse grained MUDSTONE. Discontinuities are very closely spaced undulating rough horizontal open infilled with sandy clay.<br>(Forest Marble Formation) | 63.82 | 2.90 | |
| 3.00-4.00<br>3.20 | Core<br>C | W | 20 | 0 | 0 | | | | Moderately weak very thinly bedded light grey coarse grained LIMESTONE. Discontinuities are medium spaced undulating rough open to very open infilled with slightly sandy gravelly clay.<br>(Forest Marble Formation) | 63.32 | 3.40 | |
| | | | | | | | | | Very stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of limestone.<br>(Forest Marble Formation) | 63.27 | 3.45 | |
| | | | | | | | | | Very stiff dark grey slightly sandy CLAY.<br>(Forest Marble Formation) | 62.97 | 3.75 | |
| | | | | | | | | | Very stiff dark grey slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of limestone.<br>(Forest Marble Formation) | 62.72 | 4.00 | |
| 4.00-5.50<br>4.00 | Core<br>C | | 80 | 53 | 0 | | | | Strong thinly laminated grey coarse grained LIMESTONE. Discontinuities are very closely spaced undulating rough horizontal open infilled with sandy clay.<br>(Forest Marble Formation) | | | |
| | | | | | | | | | *Description on next sheet* | | (1.20) | |

| Drilling Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
| 14/02/08 | 13:00 | 11.70 | 3.00 | 101 | 0.00 |

## General Remarks

1. Borehole extended by rotary coring below 1.50m depth using PWF barrel, PDC core bit and water flush. Temporary casing installed to 3.00m depth.
2. Groundwater standing at G.L. (14/02/08), hole at 8.90m depth, casing at 3.00m depth.
3. Artisian groundwater between 8.9m and 11.7m depth. Head of 1.38m above G.L.
4. Borehole backfilled with bentonite on completion.

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:26** | **Comacchio MC300** | **JB** | **TB** | |

STRUCTURAL SOILS

# ROTARY LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH2** |

| Job No | Start | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **13.02.08** End **14.02.08** | **66.72** | **E:457708.3 N:221739.5** | **3** of **4** |

| Depth | Test | W | TCR | SCR | RQD | If (mm) | Instrumentation | Water | Description of Strata | Reduced Level | | Legend |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.80 | C | | | | | | | | Strong thinly bedded light grey coarse grained LIMESTONE. Discontinuities are very closely spaced undulating rough horizontal occasionally subhorizontal open no infill (possibly removed by drilling flush).<br>(Forest Marble Formation) *(stratum layer from previous sheet)* | 61.52 | 5.20 | |
| 5.40-6.40 | Core | | 100 | 0 | 0 | | | | Very stiff dark grey slightly sandy CLAY with occasional angular fine gravel of limestone and shell fragments.<br>(Forest Marble Formation) | | | |
| 5.60 | C | | | | | | | | . . . band of lignite at 6.00m depth. | 60.42 | (1.10)<br>6.30 | |
| 6.50-7.70 | Core | | 33 | 8 | 0 | | | | Very stiff very light grey and dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine of limestone.<br>(Forest Marble Formation) | | | |
| 6.70 | C | W | | | | | | | | 59.37 | (1.05)<br>7.35 | |
| 7.70-8.15<br>7.70 | Core<br>C | | 64 | 64 | 0 | | | | Strong very thinly bedded very light grey/off white medium grained LIMESTONE. Discontinuities are closely spaced undulating rough horizontal open infilled with slightly sandy gravelly clay.<br>(Forest Marble Formation) | | (0.75) | |
| 8.10-8.90 | Core | | 100 | 0 | 0 | | | | Very stiff dark grey slightly sandy SILT.<br>(Forest Marble Formation) | 58.62 | 8.10 | |
| 8.30 | C | | | | | | | | . . . band of sandy clay between 8.75m and 8.80m depth. | 57.82 | (0.80)<br>8.90 | |
| 8.90-10.20 | Core | | 54 | 54 | 0 | | | | Very stiff dark blue grey CLAY.<br>(Forest Marble Formation) | 57.72 | 9.00 | |
| | | | | | | | | | *Description on next sheet* | | | |

| Drilling Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
| | | | | | |

## General Remarks

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:26** | **Comacchio MC300** | **JB** | **TB** | |

STRUCTURAL SOILS

# ROTARY LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH2** |

| Job No | Start / End | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | Start **13.02.08** End **14.02.08** | **66.72** | **E:457708.3 N:221739.5** | **4** of **4** |

| Drilling Records Depth | Test | W | Mechanical Log TCR | SCR | RQD | If (mm) | Instrumentation | Water | Description of Strata | Reduced Level | | Legend |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Firm dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of limestone. (Forest Marble Formation) *(stratum layer from previous sheet)* | 57.32 | 9.40 | |
| | | | | | | | | | Moderately strong very thinly bedded very light grey coarse grained LIMESTONE. Discontinuities are undulating rough horizontal. (White Limestone Formation) | 57.12 | 9.60 | |
| | | | | | | | | | Weak thinly laminated very light grey fine grained LIMESTONE. Discontinuities are extremely closely spaced undulating rough horizontal tight infilled with slightly sandy clay. (White Limestone Formation) | 56.82 | 9.90 | |
| 10.20-11.70 | Core | | 87 | 80 | 0 | | | | Very stiff very light grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of limestone. (White Limestone Formation) | 56.72 | 10.00 | |
| 10.50 | C | W | | | | | | | Moderately weak to moderately strong medium bedded light grey coarse grained LIMESTONE. Discontinuities are medium spaced undulating rough horizontal open to very open infilled with gravelly clay. (White Limestone Formation) | | (1.70) | |
| 11.50 | C | | | | | | | | | 55.02 | 11.70 | |
| | | | | | | | | | Borehole terminated at 11.7m depth. | | | |

| Drilling Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
| | | | | | |

## General Remarks

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:26** | **Comacchio MC300** | **JB** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - ROTARY LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:33

STRUCTURAL SOILS

# BOREHOLE LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH3** |

| Job No | Start / End | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | Start **06.02.08** End **06.02.08** | **67.86** | **E:457853.9 N:221675.0** | **1** of **1** |

| Samples and In-situ Tests Depth | No | Type | Blows | Water | Instrumentation | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of limestone. | 67.46 | 0.40 | |
| 0.40-0.80 | 1 | D | | | | Firm mottled light grey, orange brown and green brown slightly sandy CLAY. (Superficial Deposits) | | (0.70) | |
| 1.10-1.30 | 2 | D | | | | | 66.76 | 1.10 | |
| 1.20 | | HP | $c_u$=75/100 | | | Stiff dark grey with occasional partings of orange brown slightly sandy CLAY. Occasional gravel subangular to subrounded fine to medium limestone. (Superficial Deposits) | | | |
| 1.50-2.00 | 3 | U | 30 | | | . . . becoming firm below about 1.50m | | (1.00) | |
| 2.00-2.10 | 4 | D | | | | | 65.76 | 2.10 | |
| 2.10-2.55 | 5 | SPT | N=8 | | | Firm thinly laminated dark grey with some partings of yellow cream slightly sandy CLAY. (Kellaways Clay Member) | | (0.70) | |
| 2.80 | 6 | D | | | | | 65.06 | 2.80 | |
| 3.00-3.50 | 7 | U | 60 | | | Stiff dark grey with occasional slightly sandy partings of dark orange brown and cream CLAY. Occasional medium to coarse gravel size gypsum crystals present. (Kellaways Clay Member) | | (0.90) | |
| 3.50-3.75 | 9 | SPT | N=150* | | | . . . increase in gravel content below 3.50m. | 64.16 | 3.70 | |
| 3.50-3.60 | 8 | D | | | | Moderately weak dark grey LIMESTONE. (Cornbrash Formation) | 64.06 | 3.80 | |
| 3.50-3.60 | 10 | D | | | | | | | |
| 3.60-3.80 | 11 | D | | | | | | | |
| 3.80-3.80 | 12 | $SPT_c$ | N=15000* | | | Borehole terminated at 3.80m depth on very strong limestone. | | | |

| Boring Progress and Water Observations Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
|---|---|---|---|---|---|
| 06/02/08 | 11:00 | 1.50 | 1.50 | 150 | DRY |
| 06/02/08 | 16:00 | 3.80 | 1.50 | 150 | DRY |

| Chiselling From | To | Duration (hh:mm) |
|---|---|---|
| 3.70 | 3.80 | 01:00 |

## General Remarks

1. Inspection pit hand dug to 1.2m depth.
2. No groundwater encountered.
3. Borehole progressed by chiselling between 3.40-3.50m depth (1.00hrs).
4. 1 no. 50mm diameter standpipe installed to 3.8m depth (response zone 1.0-3.8m depth).

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:50** | **Cable Percussion** | **AL** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - CABLE PERCUSSION LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:32

STRUCTURAL SOILS

# BOREHOLE LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH4** |

| Job No | Start | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **07.02.08** End **07.02.08** | **66.06** | **E:458017.0 N:221590.5** | **1** of **1** |

| Samples and In-situ Tests: Depth | No | Type | Blows | Water | Instrumentation | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MADE GROUND: Soft brown slightly sandy slightly gravelly clay TOPSOIL. Gravel is angular to subangular fine to coarse of flint red brick and cornbrash limestone. Some fossils present. | 65.76 | 0.30 | |
| 0.30-0.60 | 1 | D | | | | Soft light orange brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone. (Superficial Deposits) | | (0.70) | |
| 0.30 | 1A | ES | | | | . . . becoming firm from 0.5m depth. | 65.06 | 1.00 | |
| 0.50 | 2A | ES | | | | Firm, becoming soft with depth light bluish grey and orange brown mottled slightly sandy CLAY. (Kellaways Clay Member) | | (0.80) | |
| 0.60-0.90 | 2 | B | | | | | 64.26 | 1.80 | |
| 1.00 | 3A | ES | | | | Soft thinly laminated dark grey with occasional partings of orange brown slightly sandy CLAY with occasional gravel subrounded fine of very weak limestone. (Kellaways Clay Member) | | (0.70) | |
| 1.30-1.80 | 3 | U | 50 | | | | 63.56 | 2.50 | |
| 1.80-2.25 | 5 | SPT | N=5 | | | Firm thinly laminated dark blue grey CLAY. (Kellaways Clay Member) | | (0.80) | |
| 1.80-1.90 | 4 | D | | | | | 62.76 | 3.30 | |
| 2.50 | 6 | D | | | | Very stiff dark bluish grey sandy CLAY with occasional medium to coarse sand sized deposits of calcium carbonate. (Kellaways Clay Member) | 62.66 | 3.40 | |
| 2.80-3.30 | 7 | U | 50 | | | Moderately weak light blue grey LIMESTONE. (Cornbrash Formation) | 62.56 | 3.50 | |
| 3.30-3.40 | 8 | D | | | | Borehole terminated at 3.50m depth on very strong limestone. | | | |
| 3.40-3.46 | 9 | $SPT_c$ | N=1500* | | | | | | |
| 3.40-3.50 | 10 | D | | | | | | | |
| 3.50-3.52 | 11 | $SPT_c$ | N=3000* | | | | | | |

| Boring Progress and Water Observations: Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
|---|---|---|---|---|---|
| 07/02/08 | 11:00 | 0.70 | 0.00 | 150 | 0.60 |
| 07/02/08 | 11:20 | 0.70 | 0.00 | 150 | 0.55 |
| 07/02/08 | 12:30 | 1.20 | 1.20 | 150 | DRY |
| 07/02/08 | 16:00 | 3.50 | 1.60 | 150 | DRY |

| Chiselling: From | To | Duration (hh:mm) |
|---|---|---|
| 3.40 | 3.50 | 01:00 |

## General Remarks

1. Inspection pit hand dug to 1.2m depth.
2. Groundwater strike at 0.6m depth.
3. Borehole progressed by chiselling between 3.40-3.50m depth (1.00hrs).
4. 1 no. 50mm diameter standpipe installed to 3.5m depth (response zone 1.0-3.5m depth).

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:50** | **Cable Percussion** | **AL** | **TB** | |



STRUCTURAL SOILS

# BOREHOLE LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH5** |

| Job No | Start | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **08.02.08** End **08.02.08** | **65.28** | **E:457963.2 N:221510.9** | **1** of **1** |

| Samples and In-situ Tests: Depth | No | Type | Blows | Water | Instrumentation | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of limestone. Occasional pottery and shell fragments. | 64.98 | 0.30 | |
| 0.30 | 1A | ES | | | | Soft mottled light brown and grey slightly sandy CLAY. (Superficial Deposits) | 64.78 | 0.50 | |
| 0.50 | 1 | D | | | | Soft light green brown with partings of light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone. (Superficial Deposits) | | (0.90) | |
| 0.50 | 2A | ES | | | | | 63.88 | 1.40 | |
| 1.00 | 2 | D | | | | Soft orange brown with partings of light grey slightly sandy CLAY with occasional gravel subangular to subrounded fine to medium of limestone. (Superficial Deposits) | | (0.70) | |
| 1.00 | 3A | ES | | | | | 63.18 | 2.10 | |
| 1.40 | 3 | D | | | | Firm dark grey with partings of orange brown slightly sandy CLAY. Occasional gravel subangular to subrounded fine to medium limestone. (Kellaways Clay Member) | | (1.30) | |
| 1.50-2.00 | 4 | U | 50 | | | | | | |
| 2.00-2.10 | 5 | U+ | | | | | | | |
| 2.00 | 7 | D | | | | | | | |
| 2.10-2.55 | 6 | SPT | N=7 | | | | | | |
| 2.50 | 8 | D | | | | | | | |
| 3.00-3.30 | 9 | U | | | | | | | |
| 3.30-3.40 | 10 | D | | | | | 61.88 | 3.40 | |
| 3.40-3.43 | 11 | $SPT_c$ | N=3000* | | | Moderately weak dark blue grey LIMESTONE. (Cornbrash Formation) | 61.78 | 3.50 | |
| 3.40-3.50 | 12 | D | | | | Borehole terminated at 3.50m depth on very strong limestone. | | | |
| 3.50-3.53 | 13 | $SPT_c$ | N=3000* | | | | | | |

| Boring Progress and Water Observations: Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth |
|---|---|---|---|---|---|
| 08/02/08 | 10:15 | 1.50 | 1.50 | 150 | DRY |
| 08/02/08 | 11:45 | 3.30 | 1.50 | 150 | DRY |
| 08/02/08 | 12:45 | 3.50 | 1.50 | 150 | DRY |

| Chiselling: From | To | Duration (hh:mm) |
|---|---|---|
| 3.30 | 3.50 | 01:00 |

## General Remarks

1. Inspection pit hand dug to 1.20m depth.
2. Groundwater seepage at 1.40m depth.
3. Borehole progressed by chiselling between 3.40-3.50m depth (1.00hrs).
4. 1 no. 50mm diameter standpipe installed from to 3.5m depth (response zone 1.0-3.5m depth).

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:50** | **Cable Percussion** | **AL** | **TB** | |

STRUCTURAL SOILS

# BOREHOLE LOG

| Contract | Client | Borehole No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **BH6** |

| Job No | Start | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **11.02.08** End **11.02.08** | **64.57** | **E:458104.9 N:221329.9** | **1** of **1** |

| Samples and In-situ Tests | | | | Water | Instrumentation | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Blows | | | | | | |
| | | | | | | Soft light grey mottled light brown slightly sandy CLAY. Rare shell fragments present. (Alluvium) | | | |
| 0.50 | 1 | D | | | | | | (1.10) | |
| | | | | | | | 63.47 | 1.10 | |
| 1.10 | 2 | D | | | | Soft dark grey brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone. (Alluvium) | 63.37 | 1.20 | |
| 1.20-1.50 | 3 | D | | | | | 63.07 | 1.50 | |
| 1.20-1.70 | 5 | B | | | | Loose light brown clayey slightly gravelly SAND. Gravel is subangular to subrounded fine to medium of limestone. (Alluvium) | | | |
| 1.50-1.95 | 4 | SPT | N=4 | | | | | | |
| 1.70-2.00 | 6 | D | | | | Soft grey brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone. (Superficial Deposits) | | (1.50) | |
| 2.30 | 7 | D | | | | | | | |
| 2.50-3.00 | 8 | U+ | | | | | | | |
| | | | | | | | 61.57 | 3.00 | |
| 3.00-3.45 | 10 | SPT | N=9 | | | Firm dark grey CLAY. Occasional gravel sized pockets of grey silt present at 3.0m depth. (Kellaways Clay Member) | | | |
| 3.00 | 9 | D | | | | | | | |
| 3.00-3.10 | 11 | D | | | | | | | |
| 3.50 | 12 | D | | | | | | (1.80) | |
| 4.00 | 13 | D | | | | . . . becoming very stiff below 4.0m depth. | | | |
| 4.00-4.50 | 14 | U | 95 | | | | | | |
| 4.50-4.60 | 15 | D | | | | | | | |
| 4.60-4.86 | 16 | SPT | N=136* | | | | 59.77 | 4.80 | |
| 4.80 | 17 | D | | | | Very stiff dark grey slightly sandy CLAY. (Kellaways Clay Member) | 59.67 | 4.90 | |
| 4.90-5.00 | 18 | D | | | | | 59.57 | 5.00 | |
| 5.00-5.02 | 19 | $SPT_c$ | N=15000* | | | Very stiff dark grey varying to light grey slightly gravelly CLAY. Gravel is subangular to subrounded fine of limestone. (Cornbrash Formation) | | | |
| | | | | | | Borehole terminated at 5.00m depth on very strong limestone. | | | |

| Boring Progress and Water Observations | | | | | | Chiselling | | | General Remarks |
|---|---|---|---|---|---|---|---|---|---|
| Date | Time | Borehole Depth | Casing Depth | Casing Diameter | Water Depth | From | To | Duration (hh:mm) | 1. Inspection pit hand dug to 1.20m depth.<br>2. Groundwater strike encountered at 1.20m depth.<br>3. 50mm diameter standpipe installed to 1.50m depth (response zone 1.00m to 1.50m depth) and 19mm piezometer installed to 4.50m depth (response zone 4.00m to 5.00m depth). |
| 11/02/08 | 16:00 | 5.00 | 1.90 | 150 | Dry | 4.90 | 5.00 | 01:00 | |

| All dimensions in metres | Method | Drilled By | Logged By | Checked By |
|---|---|---|---|---|
| Scale **1:50** | **Cable Percussion** | **AL** | **LB** | |



STRUCTURAL SOILS

# BOREHOLE LOG

| Contract: | Client: | Borehole: |
|---|---|---|
| **Bicester Business Park** | **London and Metropolitan International Developments Ltd** | **BH07** |

| Contract Ref: | Start: | Ground Level: | Co-ordinates: | Sheet: |
|---|---|---|---|---|
| **728724** | **27.01.14** End: **27.01.14** | **---** | **---** | **1** of **1** |

| Samples and In-situ Tests | | | | Water | Backfill | Description of Strata | Depth (Thickness) | Material Graphic Legend |
|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Results | | | | | |
| 0.00-0.20 | 1 | B | | | | Firm brown slightly sandy CLAY. Sand is fine to coarse. (TOPSOIL) | 0.20 | |
| 0.20-0.80 | 2 | B | | | | Firm light yellowish brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular argillaceous limestone. | (1.65) | |
| 1.20-1.65 | 3 | $U_{(100)}$ | 100 blows 95% recovery | | | . . . below 1.2m slightly gravelly. | | |
| 1.65-1.75 | 4 | D | | | | | 1.85 | |
| 1.80-2.00 | 5 | B | | | | | | |
| 2.00-2.24 | 6 | SPT | N=120* | | | Firm light brown very sandy CLAY. Sand is fine to coarse. | 2.20 | |
| 2.30 | 7 | D | | | | Light brown weathered LIMESTONE. Recovered as very clayey gravel, gravel is fine to coarse angular limestone. | 2.50 | |
| 2.50-2.64 | 8 | SPT | N=250* | | | Borehole terminated at 2.50m depth. | | |

| Boring Progress and Water Observations | | | | | | Chiselling / Slow Progress | | | General Remarks |
|---|---|---|---|---|---|---|---|---|---|
| Date | Time | Borehole Depth | Casing Depth | Borehole Diameter (mm) | Water Depth | From | To | Duration (hh:mm) | 1. Inspection pit hand dug to 1.20m depth.<br>2. Borehole remained dry.<br>3. Soakaway test carried out at 2.5m depth.<br>4. Borehole backfilled with arisings upon completion.<br>5. SPT hammer EQU185-2013 ($E_r$ = 64.38%) used. |
| 27/01/14 | 12:00 | 2.50 | 2.30 | 150 | Dry | 2.20 | 2.50 | 01:00 | |

| All dimensions in metres | Scale: | Method Used: | Plant Used: | Drilled By: | Logged By: | Checked By: |
|---|---|---|---|---|---|---|
| | **1:50** | **Cable percussion** | **Dando 2000** | **MR** | **WHunter** | AML |

STRUCTURAL SOILS

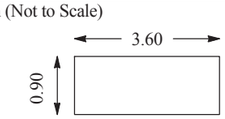
# TRIAL PIT LOG

| Contract | Client | Trialpit No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **TP1** |

| Job No | Date | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **12.02.08** | **66.22** | **E:457790.5 N:221707.8** | **1** of **1** |

| Samples and In-situ Tests | | | | Water | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Results | | | | | |
| 0.00-0.30 | 1 | B | | | MADE GROUND: Soft dark brown slightly sandy slightly gravelly clay TOPSOIL with occasional cobbles. Gravel is angular to subrounded fine to medium of limestone and red brick. Cobbles of limestone up to 65mm. Organic matter present. | 65.72 | (0.50) 0.50 | |
| 0.50-0.70 | 2 | B | | | Firm dark orange dark slightly sandy CLAY with some cobbles of limestone up to 75mm diameter. (Superficial Deposits) | 65.52 | 0.70 | |
| 0.70-0.85 | 3 | B | | | Firm light yellow/orange brown slightly sandy slightly gravelly CLAY with some cobbles. Gravel is angular to subangular fine to coarse of limestone. Cobbles up to 110mm diameter of bioclastic limestone. (Superficial Deposits) | 65.37 | 0.85 | |
| 0.85-1.00 | 4 | D | | | Moderately weak to moderately strong light yellow grey coarse grained bioclastic LIMESTONE, moderately weathered. Occasional stronger core stones within weathered mass, up to very strong. Bedding discontinuities very closely spaced subhorizontal 0-5° stepped rough open 0-2mm infilled with stiff sandy clay. Joints medium spaced subvertical undulating rough open 0-2mm infilled with stiff sandy clay. (Cornbrash Formation) | | (1.55) | |
| 2.00-2.20 | 5 | D | | | | 63.82 | 2.40 | |
| | | | | | Trial pit terminated on very strong limestone at 2.40m depth. | | | |

Plan (Not to Scale)




No Bearing Taken

## General Remarks

1. No groundwater encountered.
2. Stable, no shoring required.
3. 19mm diameter disused metal pipe encountered at 0.20m depth (redundant water pipe?). Trial pit relocated 1.50m east.
4. Slow progress below 1.00m depth - excavator generally 'ripping' up limestone along discontinuties.

| All dimensions in metres | Method | Logged By | Checked By |
|---|---|---|---|
| Scale **1:25** | **360° Tracked Excavator** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - TRIALPIT LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:38

STRUCTURAL SOILS

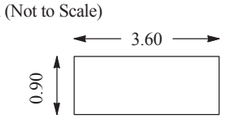
# TRIAL PIT LOG

| Contract | Client | Trialpit No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **TP2** |

| Job No | Date | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **12.02.08** | **67.37** | **E:457929.0 N:221633.9** | **1** of **1** |

| Samples and In-situ Tests | | | | Water | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Results | | | | | |
| 0.00-0.30 | 1 | B | | | TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium of limestone. | 66.82 | (0.55) 0.55 | |
| 0.50-0.70 | 2 | B | | | Stiff orange brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium of limestone. (Superficial Deposits) | 66.57 | 0.80 | |
| 0.70 | | V | $c_u$=100/110/120 | | Stiff mottled light blue grey and orange brown slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of limestone. (Superficial Deposits) | 66.37 | 1.00 | |
| 0.80-1.00 | 3 | D | | | Stiff light blue grey with frequent partings of orange brown slightly sandy CLAY with frequent coarse sand size calcium carbonate deposits. (Superficial Deposits) | | (0.70) | |
| 1.00 | | V | $c_u$=116/140/120 | | | 65.67 | 1.70 | |
| 1.20-1.40 | 4 | D | | | Stiff mottled blue grey and orange brown slightly sandy CLAY. (Kellaways Clay Member) | | | |
| 1.70-2.00 | 5 | D | | | | | | |
| 2.00-2.20 | 6 | D | | | . . . becoming blocky from 2.2m depth. | | (1.00) | |
| | | | | | | 64.67 | 2.70 | |
| 2.70-2.90 | 7 | D | | | Stiff mottled blue grey, orange brown and cream slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of limestone. (Kellaways Clay Member) | | (0.30) | |
| | | | | | | 64.37 | 3.00 | |
| 3.00-3.10 | 8 | D | | | Stiff blocky dark blue grey CLAY. (Kellaways Clay Member) | | | |
| 3.30-3.50 | 9 | D | | | | | (1.00) | |
| 3.70-3.80 | 10 | D | | | | | | |
| | | | | | | 63.37 | 4.00 | |
| | | | | | Trial pit terminated at 4.00m depth (excavator's maximum reach). | | | |

Plan (Not to Scale)




No Bearing Taken

## General Remarks

1. No groundwater encountered.
2. Stable, no shoring required.
3. Pit stepped at 1.0m depth, initially 2.0m wide.

| All dimensions in metres | Method | Logged By | Checked By |
|---|---|---|---|
| Scale **1:25** | **360° Tracked Excavator** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - TRIALPIT LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:38

STRUCTURAL SOILS

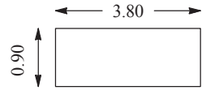
# TRIAL PIT LOG

| Contract | Client | Trialpit No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **TP3** |

| Job No | Date | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **12.02.08** | **65.81** | **E:457988.9 N:221547.9** | **1** of **1** |

| Samples and In-situ Tests | | | | Water | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Results | | | | | |
| 0.00-0.30 | 1 | B | | | TOPSOIL: Soft dark brown slightly sandy CLAY with occasional gravel. Gravel is subangular to subrounded fine to coarse of limestone. Organic matter present. | 65.51 | (0.30) 0.30 | |
| 0.30-0.60 | 2 | B | | | Firm light orange brown slightly sandy CLAY with occasional gravel. Gravel is subrounded to rounded fine to medium of limestone. (Superficial Deposits) | 65.21 | (0.30) 0.60 | |
| 0.70-1.00 | 3 | B | | | Stiff light blue grey with frequent partings of light brown CLAY. (Superficial Deposits) | | | |
| 0.80 | | V | $c_u$=116/110/120 | | | 64.61 | (0.60) 1.20 | |
| 1.20-1.40 | 4 | B | | ≈ | Stiff light blue grey CLAY with frequent pockets of light orange brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone. (Superficial Deposits) | | | |
| | | | | | | 63.91 | (0.70) 1.90 | |
| 1.90-2.10 | 5 | B | | | Stiff dark blue grey slightly sandy CLAY with frequent coarse sand size deposits of calcium carbonate. (Kellaways Clay Member) | | | |
| 2.50-2.70 | 6 | D | | | . . . calcium carbonate deposits becoming occasional from 2.5m depth. | | (1.10) | |
| | | | | | | 62.81 | 3.00 | |
| 3.00-3.30 | 7 | D | | | Stiff blocky dark grey CLAY. (Kellaways Clay Member) | | | |
| | | | | | | | (0.60) | |
| 3.50-3.60 | 8 | B | | | . . . frequent shells and shell fragments of fine to coarse gravel size from 3.5m depth. | 62.21 | 3.60 | |
| | | | | | Terminated at 3.60m depth on very strong planar obstruction (limestone). | | | |

Plan (Not to Scale)




No Bearing Taken

## General Remarks

1. Seepage at 1.3m depth.
2. Stable, no shoring required.
3. Pit stepped at 1.0m depth, initially 2.1m wide.

| All dimensions in metres | Method | Logged By | Checked By |
|---|---|---|---|
| Scale **1:25** | **360° Tracked Excavator** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - TRIALPIT LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:38

STRUCTURAL SOILS

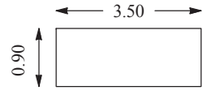
# TRIAL PIT LOG

| Contract | Client | Trialpit No |
|---|---|---|
| **Whitelands Farm, Oxford Road FAS, Bicester** | **Thames Water Utilities Limited** | **TP4** |

| Job No | Date | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| **721026** | **11.02.08** | **64.50** | **E:457989.8 N:221457.9** | **1** of **1** |

| Samples and In-situ Tests | | | | Water | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Results | | | | | |
| 0.00-0.30 | 1 | D | | | TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone with frequent shell fragments. | 64.10 | (0.40) 0.40 | |
| 0.40-0.70 | 2 | D | | | Stiff mottled light grey and brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of limestone and frequent shell fragments. (Superficial Deposits) | | (0.30) | |
| 0.60 | | V | $c_u$=108/80/140 | | | 63.80 | 0.70 | |
| 0.70-0.90 | 3 | D | | ≈ | Soft orange brown sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of limestone. Fine to medium size gravel of ash. (Superficial Deposits) | | (0.30) | |
| 1.00-1.20 | 4 | D | | | | 63.50 | 1.00 | |
| 1.00 | | V | $c_u$=100/110/110 | | Stiff light blue grey CLAY with lenses of orange brown slightly sandy CLAY. (Kellaways Clay Member) | | | |
| 1.80-2.00 | 5 | B | | | | | (2.00) | |
| 2.30-2.50 | 6 | D | | | . . . becoming darker blue grey from 2.3m depth. | | | |
| 2.70-2.90 | 7 | D | | | | | | |
| | | | | | | 61.50 | 3.00 | |
| | | | | | Trial pit terminated on very strong planar obstruction throughout the pit at 3.00m depth (limestone). | | | |

Plan (Not to Scale)




No Bearing Taken

## General Remarks

1. Seepage at 1.0m depth.
2. Instability between G.L. and 2.0m depth.
3. Pit stepped at 1.0m depth, initially 2.0m wide.

| All dimensions in metres | Method | Logged By | Checked By |
|---|---|---|---|
| Scale **1:25** | **360° Tracked Excavator** | **TB** | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - TRIALPIT LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:38

STRUCTURAL SOILS

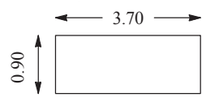
# TRIAL PIT LOG

| Contract | Client | Trialpit No |
|---|---|---|
| Whitelands Farm, Oxford Road FAS, Bicester | Thames Water Utilities Limited | TP5 |

| Job No | Date | Ground Level | Local Grid Co-Ordinates | Sheet |
|---|---|---|---|---|
| 721026 | 11.02.08 | 64.43 | E:458025.1 N:221409.2 | 1 of 1 |

| Samples and In-situ Tests | | | | Water | Description of Strata | Reduced Level | Depth (Thickness) | Legend |
|---|---|---|---|---|---|---|---|---|
| Depth | No | Type | Results | | | | | |
| 0.00-0.40 | 1 | D | | | TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium of weak limestone. | 64.03 | (0.40) 0.40 | |
| 0.40-0.70 | 2 | D | | | Firm light grey brown with some partings of orange brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to medium of limestone. (Superficial Deposits) | 63.43 | (0.60) 1.00 | |
| 0.50 | | V | $c_u$=110/140 | | | | | |
| 1.00-1.20 | 3 | B | | | Soft light grey brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of limestone. (Superficial Deposits) | 63.23 | 1.20 | |
| 1.20-1.40 | 4 | B | | | Soft light grey slightly sandy gravelly CLAY. Gravel is subangular to rounded fine to coarse of limestone and flint. (Superficial Deposits) | 62.63 | (0.60) 1.80 | |
| 1.80-2.00 | 5 | D | | | Stiff dark grey CLAY. (Kellaways Clay Member) | | | |
| 2.00 | 6 | W | | | | | | |
| 2.00 | | V | $c_u$=92/110 | | | | | |
| | | | | | . . . becoming blocky from 3.0m depth. | | (1.80) | |
| 3.20-3.50 | 7 | D | | | | | | |
| 3.50-3.60 | 8 | D | | | | 60.83 | 3.60 | |
| | | | | | Trial pit terminated at 3.60m depth on very strong planar obstruction (limestone). | | | |

Plan (Not to Scale)




No Bearing Taken

## General Remarks

1. Groundwater seepage from between 1.0-1.4m depth.
2. Some instability between 0.5m and 2.0m depth.

| All dimensions in metres | Method | Logged By | Checked By |
|---|---|---|---|
| Scale 1:25 | 360° Tracked Excavator | TB | |

STRUCTURAL_SOILS_V6_02.GLB - V8 - TRIALPIT LOG | 721026_WHITELANDS_FARM_BICESTER.GPJ - STRUCTURAL_SOILS_V6_02.GDT | 04/06/08 - 11:38

**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

**PHOTOGRAPHS OF TRIAL PIT 1**

| TP1 | G.L – 2.40m | |
|---|---|---|

| TP1 | G.L - 1.20 m | |
|---|---|---|

**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

| PHOTOGRAPHS OF TRIAL PIT 1 | | |
|---|---|---|
| **TP1** | **0.85 – 2.40 m** | |

| | | |
|---|---|---|
| **TP1** | **SPOIL** | |




**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

| PHOTOGRAPHS OF TRIAL PIT 2 | | |
|---|---|---|
| **TP2** | **G.L – 3.00 m** | |

| | | |
|---|---|---|
| **TP2** | **G.L – 1.70 m** | |

721026 Trial pit photo Rev.1

**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

| PHOTOGRAPHS OF TRIAL PIT 2 | | |
|---|---|---|
| **TP2** | **2.00 – 4.00 m** | |

| | | |
|---|---|---|
| **TP2** | **SPOIL** | |




**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

| PHOTOGRAPHS OF TRIAL PIT 3 | | |
|---|---|---|
| **TP3** | **G.L – 3.00 m** | |

| | | |
|---|---|---|
| **TP3** | **G.L – 1.20 m** | |

721026 Trial pit photo Rev.1

**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

| PHOTOGRAPHS OF TRIAL PIT 3 | | |
|---|---|---|
| **TP3** | **1.60 – 3.60 m** | |

| | | |
|---|---|---|
| **TP3** | **SPOIL** | |




**CONTRACT:**
**GROUND INVESTIGATION FOR WHITELANDS FARM, OXFORD ROAD FAS BICESTER**

**CONTRACT NUMBER: 721026**

| PHOTOGRAPHS OF TRIAL PIT 4 | | |
|---|---|---|
| **TP4** | **G.L – 3.00 m** | |

| | | |
|---|---|---|
| **TP4** | **G.L – 1.20 m** | |

721026 Trial pit photo Rev.1