



# Bicester Office Park

## Environmental Impact Assessment

### Volume 1: Environmental Statement

Prepared for:  
Scenic Land Developments Limited

Date:  
December 2017

# Environmental Statement: Table of Contents

## Table of Contents

### Environmental Statement: Volume 1

Chapter 1 Introduction

Chapter 2 EIA Methodology

Chapter 3 Alternatives and Design Evolution

Chapter 4 The Proposed Development

Chapter 5 Construction

Chapter 6 Socio-Economics

Chapter 7 Transport and Access

Chapter 8 Noise and Vibration

Chapter 9 Air Quality

Chapter 10 Buried Heritage (Archaeology) Built Heritage

Chapter 11 Ecology

Chapter 12 Landscape and Visual Impact Assessment

Chapter 13 Water Resources and Flood Risk

Chapter 14 Effects Interactions

Chapter 15 Residual Effects and Conclusions

Glossary of Terms and Abbreviations

# Introduction

## Introduction

- 1.1 This Environmental Statement (ES) has been prepared on behalf of Scenic Land Developments Limited ('the Applicant') in accordance with the statutory procedures set out in the Town and Country Planning (Environmental Impact Assessment) Regulations 2011<sup>1</sup>, as amended in 2015<sup>2</sup> ('the EIA Regulations').
- 1.2 This ES relates to a commercial led development of an area of land located to the south of Bicester Village, in close proximity to the A41, within Cherwell District Council (CDC) ('the site'). This ES accompanies an outline planning application ('the Application') made by the Applicant to CDC in respect of the development proposals ('the Proposed Development') for the site.
- 1.3 Environmental Impact Assessment (EIA) is a process in which the likely significant effects of certain types of development projects on the environment are identified, assessed and reported upon. Mitigation is also identified as part of EIA. The process must be followed for such effects to be considered before a decision is made on whether planning permission should be granted.
- 1.4 The Applicant recognises that the Application falls within Schedule 2, Category 10(b) of the EIA Regulations as an 'urban development project' which, owing to its nature, scale and location, has the potential to give rise to significant effects on the environment. The Applicant has therefore commissioned an EIA for the Proposed Development.
- 1.5 In accordance with the EIA Regulations, this ES reports on the likely significant environmental effects of the Proposed Development. The ES describes the environmental and socio-economic effects of the Proposed Development during site preparation, construction and subsequent completion and operation. The ES is designed to inform readers of the nature of the scheme, the likely environmental effects and the measures proposed to protect the environment.
- 1.6 This process is critical to the development of a comprehensive and balanced ES. Views of key statutory and non-statutory consultees serve to focus the environmental studies and to identify specific issues, which require further investigation. Consultation is also an ongoing process, which enables mitigation to be incorporated as the design of the Proposed Development evolves, thereby limiting adverse effect and enhancing scheme benefits.
- 1.7 The EIA has been carried out by Trium Environmental Consulting LLP ('Trium') and a number of technical specialists. The EIA specialists, in addition to the Applicant's wider design and planning team, are presented in Table 1.2, along with their respective disciplines.
- 1.8 This ES has been undertaken following and in line with the Institute of Environmental Management and Assessment (IEMA) Quality Mark indicator checklist.

## Outline Application

- 1.9 The Application seeks outline permission for a set of parameters that define the use, amount of development, zones of development and scale of development that could come forward on this site. All matters are reserved except for access.
- 1.10 The combined parameter plan for the outline application contains information on:
  - Use – uses proposed for the development (B1(a) and B1(b) Office);
  - Amount of development – the maximum floor area proposed (60,000 square metres (m<sup>2</sup>) Gross External Area (GEA));

- Zones – indicating the maximum floor area and height for buildings within each zone; and
- Scale – an indication of the upper and lower limits for the height of the proposed buildings within the zones.

## Site Background

### Site Location

- 1.11 The site is located at National Grid Reference 457910, 221631, located to the south of Bicester Retail Village, in close proximity to the A41 as shown in Figure 1.1 and Figure 1.2.

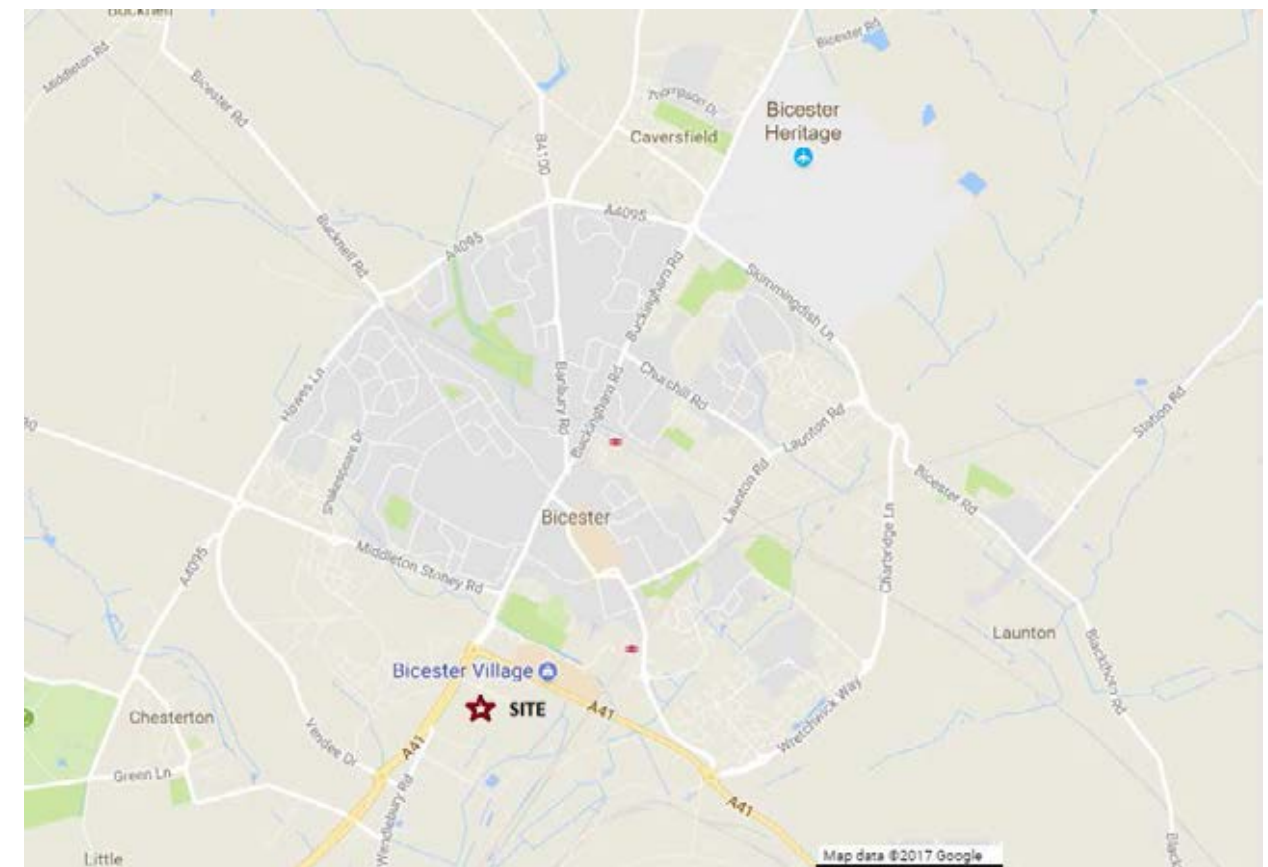


Figure 1.1: Site Location

<sup>1</sup> HM Government, 2011. The Town and Country Planning (Environmental Impact Assessment) Regulations 2011. London: HMSO. SI 2011/1824.

<sup>2</sup> HM Government, 2015. The Town and Country Planning (Environmental Impact Assessment) (Amendment) Regulations. London: HMSO. SI 2015/660.

# Introduction

## 1.12 The site is bound by:

- A Tesco foodstore and associated carparking facilities to the north west and farmland to the north east, with the Bicester Village located further north beyond the A41;
- Farmland to the east, along with the Chiltern Railways railway line;
- Bicester Avenue Garden Centre and farmland fields to the south west and sewage treatment works to the south east; and
- A41 to the west, beyond which lies the Kingsmere Residential Estate (a phased development of 726 homes under construction) as well as a Premier Inn Hotel and the Brewers Fayre Pub and Restaurant.

## Site Description

- 1.13 The land encompassing the site is currently used for agricultural purposes (Grade 4). The site is generally flat, with a slight drop from +68.5 metres above ordnance datum (m AOD) in the north down to +64.5m AOD to the south and east. A drainage ditch runs north / south, from the access road in the north west of the site to the southern boundary, along the north of the drainage ditch is an area used for material storage. This area has plastic and concrete pipework, gravel and wood chippings. Two heaps of wood, comprising tree branches and timber up to 3m high, are located in the south of the site. The site is accessed from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road.
- 1.14 As shown in Figure 1.2 the site is irregular in shape with a loose triangular nature, and occupies an area of approximately 13.1 hectares (ha). In addition, Figure 1.2 shows that the Applicant's Ownership Boundary (blue line) comprises a larger area surrounding the red line boundary of the site extending further to north and south of the site.
- 1.15 The site's south-eastern boundary is located approximately 180m from a watercourse known as the Langford Brook and as a result falls within the flood zone of this watercourse. The majority of the site lies in Flood Zone 1, however, the site lies within Flood Zones 2, 3a and 3b along the south eastern boundary. Areas along the eastern boundary are considered medium and high risk of flooding respectively due to the proximity of Langford Brook to the site. See Figure 4.1 for further detail on the location of the Flood Zone boundaries. The proposed buildings will all be developed within Flood Zone 1, and this is reflected within the submitted parameter plans.
- 1.16 The site is not located within an Air Quality Management Area (AQMA) which are declared under the Environment Act 1995. It is noted that Bicester Town Centre, approximately 1 kilometre (km) to the north of the site, has been declared as an AQMA for exceedances of the annual mean NO<sub>2</sub> objective.

## Planning History

- 1.17 Part of land within the Applicant's Ownership Boundary (see Figure 3.3) was granted outline planning permission in 2010 (Planning Ref: 07/01106-OUT) for the construction of a 60,000m<sup>2</sup> B1 Business Park comprising 53,000m<sup>2</sup> of class B1 office space and a 7,000m<sup>2</sup> class C1 hotel, served by approximately 1,837 car parking spaces. This outline planning application was accompanied by an ES.
- 1.18 Subsequently, detailed planning consent was granted on part of land within the Applicants ownership boundary to the north of the site in November 2013 for the construction of a Tesco foodstore of 8,135m<sup>2</sup> and petrol filling station on part of the consented Business Park site referred to above (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.

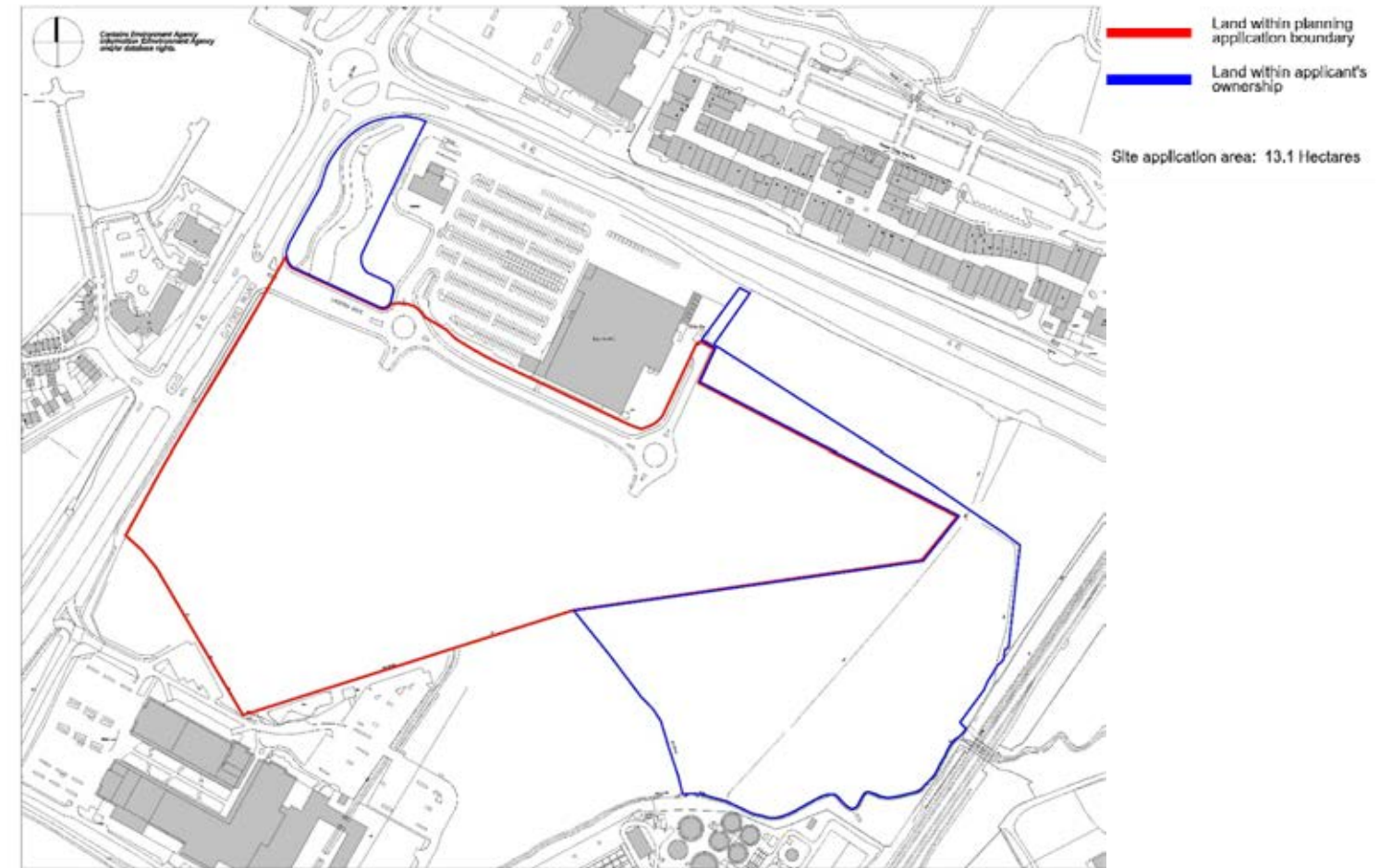


Figure 1.2: Site Redline Boundary and Applicant Ownership Boundary

# Introduction

## The Proposed Development

**1.19** The Proposed Development, comprises the construction of a business park of up to 60,000 m<sup>2</sup> GEA of Class B1(a) and B1(b) office floorspace, parking for up to 2,000 cars and associated highways, infrastructure and earthworks. The Bicester Office Park will be made up of differently sized buildings which will vary in height between 2 and 4 storeys and located within a landscaped space. The site will be accessed from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road.

## Planning Policy Context

**1.20** While the ES is not an assessment on the conformity to planning policy (which is covered in the Planning Statement), it is necessary to consider the Proposed Development against relevant policies and guidance at local, regional and national levels. This ES takes into consideration the National Planning Policy Framework (NPPF) (2012)<sup>3</sup>, which replaces the previous suite of national Planning Policy Statements and Planning Policy Guidance documents. 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. On a national level this ES also takes into consideration the national Planning Practice Guidance (PPG)<sup>4</sup>.

**1.21** On a regional and local level, this ES has taken into consideration the following: 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, which sets out the vision and spatial strategy for Cherwell District; the Bicester Masterplan, Consultation Draft, August 2012, Supplementary Planning Document<sup>5</sup>, which incorporates a detailed set of proposals for connecting the transport and movement, housing, employment, green infrastructure and the town centre actions together.

**1.22** In addition, within the CDC's Adopted Policies Map, the site is identified as land for employment uses (Figure 3.1: Site Context Plan).

## Environmental Statement Structure

### Environmental Statement and Technical Appendices

**1.23** The ES comprises two technical volumes. Volume 1 of the ES is the main body of the ES providing the description of the Proposed Development, the methodology of assessment, technical chapters and conclusions. Volume 2: Technical Appendices provides further detail to support the main ES. These comprise background data, tables, figures and surveys (refer to Chapter 2: EIA Methodology of this ES for further details).

- Volume 1: ES Main Report, comprising the following chapters:

- Table of Contents
- Chapter 1: Introduction
- Chapter 2: EIA Methodology
- Chapter 3: Alternatives and Design Evolution
- Chapter 4: The Proposed Development
- Chapter 5: Construction
- Chapter 6: Socio-Economics

- Chapter 7: Transportation and Access
- Chapter 8: Noise and Vibration
- Chapter 9: Air Quality
- Chapter 10: Buried Heritage (Archaeology) Built Heritage
- Chapter 11: Ecology
- Chapter 12: Landscape and Visual Impact Assessment
- Chapter 13: Water Resources and Flood Risk
- Chapter 14: Effects Interactions
- Chapter 15: Residual Effects and Conclusions
- Glossary of Terms and Abbreviations

- Volume 2: Technical Appendices, comprises the following:

- Appendix 2.1: EIA Scoping Report
- Appendix 2.2: EIA Scoping Opinion
- Appendix 2.2: Phase I Environmental Risk Assessment -Appended to the EIA Scoping Report
- Appendix 6.1: Legislative and Planning Policy Context
- Appendix 6.2: Baseline Conditions
- Appendix 7.1: Transport Assessment (TA)
- Appendix 8.1: Legislative and Policy Context
- Appendix 8.2: Noise and Survey Results
- Appendix 8.3: Construction Noise Calculations
- Appendix 8.4: Road Traffic Noise Calculations
- Appendix 8.5: SoundPLAN Computer Model Output – Site Activity – Peak Hour
- Appendix 9.1: Glossary
- Appendix 9.2: Legislative and Planning Policy Context
- Appendix 9.3: Construction Dust Assessment Procedure
- Appendix 9.4: EPUK & IAQM Planning for Air Quality Guidance
- Appendix 9.5: Professional Experience
- Appendix 9.6: Modelling Methodology
- Appendix 9.7: Construction Mitigation
- Appendix 10.1: Site Gazetteer

<sup>3</sup> Department for Communities and Local Government. 2012. The National Planning Policy Framework. HMSO.

<sup>4</sup> Department for Communities and Local Government (Live Document) Planning Practice Guidance [online] Available: <http://planningguidance.communities.gov.uk/>

<sup>5</sup> Cherwell District Council, 2012. Bicester Masterplan, Consultation Draft, August 2012, Supplementary Planning Document. CDC.

# Introduction



- Appendix 10.2 Setting Assessment Methodology
- Appendix 10.3: Legislative and Planning Policy Context
- Appendix 10.4: Site Walkover
- Appendix 10.5: Plates and Figures
- Appendix 10.6: Written Scheme of Investigation
- Appendix 11.1: Preliminary Ecological Appraisal
- Appendix 11.2: Bat Survey Report
- Appendix 11.3: Great Crested New Survey Report
- Appendix 11.4: Legislative and Planning Policy Context
- Appendix 12.1: Drawings and Photographs
- Appendix 12.2: Legislative and Planning Policy Context
- Appendix 12.3: Assessment Methodology
- Appendix 12.4: Photography Methodology
- Appendix 13.1: Flood Risk Assessment and Drainage Strategy
- Appendix 13.2: Legislative and Planning Policy Context

## Non-Technical Summary

**1.24** A separate summary of the ES is presented in a stand-alone document, providing a concise summary written in non-technical language, of the Proposed Development, alternatives, likely significant environmental effects and mitigation measures.

## Location of Information within the ES

**1.25** The EIA Regulations, Part 1.2 requires that an ES includes “such of the information in Part 1 of Schedule 4 that is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile”. This information and its location within the ES are presented in Table 1.1.

Table 1.1: Location of Required Information within the ES		
Number	Specified Information	Location within ES
<b>Part I</b>		
1	Description of the development, including in particular – <ul style="list-style-type: none"> <li>• a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases;</li> <li>• a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; and</li> <li>• an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the development.</li> </ul>	ES Chapter 4: The Proposed Development ES Chapter 5: Construction

Table 1.1: Location of Required Information within the ES		
Number	Specified Information	Location within ES
2	An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects.	ES Chapter 3: Alternatives and Design Evolution
3	A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.	ES Chapters 6 - 13 of Volume 1 and Appendix 2.2 (Phase I Environmental Risk Assessment)
4	A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from: <ul style="list-style-type: none"> <li>• the existence of the development;</li> <li>• the use of natural resources;</li> <li>• the emission of pollutants, the creation of nuisances and the elimination of waste; and</li> <li>• the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment.</li> </ul>	ES Chapters 6 - 13 of Volume 1
5	A description by the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.	ES Chapters 6 - 13 of Volume 1
6	A non-technical summary of the information provided under paragraphs 1 to 5 of this Part.	Non-Technical Summary
7	An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant or appellant in compiling the required information.	ES Chapter 2: EIA Methodology ES Chapters 6 - 13 of Volume 1
<b>Part II</b>		
1	A description of the development comprising information on the Site, design and size of development.	ES Chapter 4: The Proposed Development
2	A description of the measures envisaged in order to avoid, reduce, and, if possible remedy significant adverse effects.	ES Chapter 5: Construction ES Chapters 6 - 13 of Volume 1
3	The data required to identify and assess the main effects which the development is likely to have on the environment.	ES Chapters 6 - 13 of Volume 1
4	An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects.	ES Chapter 3: Alternatives and Design Evolution
5	A non-technical summary of the information provided under paragraphs 1 to 4 of this Part.	Non-Technical Summary

# Introduction



## Other Documents

**1.26** A number of other documents have been submitted to CDC as part of the Planning Application. These are summarised as follows:

- Completed Application Forms and Ownership Certificates;
- Site Location and Ownership Plan;
- A Single Combined Parameter Plan;
- Design and Access Statement;
- Planning Statement; and
- Transport Assessment (including Appendices / Travel Plan);

## Project Team

**1.27** The key members of the team including their respective roles in relation to the EIA, as relevant, are presented in Table 1.2.

Table 1.2: Project Team	
Company	Role
Scenic Land Developments Limited	The Applicant
Bennetts Associates Architects	Architect
DP9	Planning Consultant
Trium Environmental Consulting LLP	EIA Project Manager and Co-ordinator Author of the non-technical chapters of the ES
Motion	Transport Consultant
Indigo Planning	Socio Economics
Sharps Gayler	Noise and Vibration
Air Quality Consultants	Air Quality
AOC Archaeology	Buried Heritage (Archaeology) Built Heritage
Buro Happold Engineering	Ground Conditions, Water Resources and Flood Risk Assessment, Outline Drainage Strategy
Prime Environment Ltd	Ecology
Highland Edgar Driver	Landscape and Visual Impact Assessment (LVIA)

## ES Availability and Comments

**1.28** CD versions of the ES are available to purchase from Trium.

**1.29** Copies of the planning application and ES are also available for viewing by the public in the Planning Department of CDC during normal office opening hours and on the CDC's website.

**1.30** Comments on the planning application should be forwarded to CDC at the address below:

Bodicote House  
Bodicote  
Banbury  
Oxfordshire  
OX15 4AA

# EIA Methodology

## Introduction

- 2.1** This chapter of the ES sets out the overall approach to the EIA and, in particular, details the response to best practice requirements, the definition of significance within the EIA and the method of assessing environmental and socio-economic impacts and resultant effects and their significance.
- 2.2** Whilst the overall approach and methodology is described in this chapter, further detail on how the methodology has been tailored to each technical aspect of the EIA is presented in the relevant technical assessment chapters of this ES.
- 2.3** This chapter is accompanied by the following technical appendices within ES Volume 2:
- Technical Appendix 2.1: EIA Scoping Report;
  - Technical Appendix 2.2 EIA Scoping Opinion; and
  - Technical Appendix 2.2: Phase I Environmental Risk Assessment (Phase 1), appended to the EIA Scoping Report.

## Environmental Impact Assessment General Approach

- 2.4** EIA Regulations set out the statutory process and requirements for EIA and the contents of an ES. They prohibit the granting of planning permission for EIA developments likely to have significant environmental effects, unless information is provided on those effects and they are considered by the competent authority in reaching its decision on an application.
- 2.5** This ES has been prepared in accordance with current guidance for the preparation of EIAs, together with applicable national and international legislation for the EIA process. In particular, the ES has been prepared with due consideration to:
- HM Government. 2011. The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 HMSO<sup>1</sup>. (as amended in 2015<sup>2</sup>). It is noted that the Scoping Report was submitted before 16 May 2017 when the new 2017 EIA Regulations<sup>3</sup> came into force. Therefore, this EIA and corresponding ES has been prepared under the 2011 EIA Regulations (as updated in 2015).
  - Institute of Environmental Management and Assessment (IEMA), 2004. Guidelines for Environmental Impact Assessment<sup>4</sup>;
  - Institute of Environmental Management and Assessment: Special Report into the State Environmental Impact Assessment Practice in the UK, 2011<sup>5</sup>;
  - DCLG, 2006. Environmental Impact Assessment: A guide to good practice and procedures (consultation paper)<sup>6</sup>; and
  - DCLG, 2014. Guidance for Environmental Impact Assessment. On-line Resource<sup>7</sup>.
- 2.6** This ES has considered the likely impact of the Proposed Development on its surroundings, neighbours, wider area and overall context. Both beneficial and adverse, short and long-term effects have been considered. Where mitigation measures have been identified to either eliminate or reduce the significance of adverse effects, these have been, where appropriate, incorporated into the project design. Other measures may relate

to environmental management controls e.g. throughout construction. In cases where no practical mitigation measure has been identified or are not required, the ES has highlighted remaining or 'residual' effects and classified these in accordance with a standard set of significant criteria (see 'Significance Criteria section below).

## Environmental Statement Requirements

### Screening Requirements

- 2.7** Applications for development that are within the scope of the EIA Regulations are termed 'EIA applications'. Screening of developments to identify whether an EIA is necessary is based on the likelihood of significant effects arising from the project. EIA applications are divided into Schedule 1 and Schedule 2 development under the EIA Regulations.
- 2.8** The need for an EIA for all other projects is determined on the basis of the following set criteria:
- The development is within one of the classes of development stated in Schedule 2 of the EIA Regulations; AND
  - EITHER it exceeds the size threshold for that class of development in Schedule 2; OR it is in a sensitive area; AND
  - it is likely to have significant effects on the environment by virtue of factors such as its nature, size, or location.
- 2.9** These are known as Schedule 2 developments. Given the scale of the Proposed Development and the location of the site, it was accepted by the Applicant that the Proposed Development has the potential to have significant effects on the environment and that it falls within Schedule 2 paragraph 10(b) within the category of 'Urban Development Projects'. Given the size and nature of the Proposed Development, an EIA has been undertaken and the results are reported in this ES. Accordingly, a request for screening to CDC was not considered necessary.

### Scoping Requirements

- 2.10** Scoping is the term used in the EIA Regulations whereby the Applicant can request a formal opinion from the local planning authority on the content of the ES, the methodology for assessments and the extent of the information to be considered in the assessments. The purpose of scoping is to focus the EIA on the environmental issues and potential impacts which need the most thorough attention; to identify those which are unlikely to need detailed study; and to provide a means to discuss methods of impact assessment so as to reach agreement on the most appropriate methodologies.
- 2.11** A Scoping Report was submitted to CDC on 15 May 2017 which requested an EIA Scoping Opinion from CDC and other statutory consultees on the scope of the EIA. The EIA Scoping Report is provided in ES Volume 2: Technical Appendix 2.1, and sets out a description of the emerging Proposed Development at the time of writing; the potential key environmental impacts and likely significant effects to be considered as part of the EIA; as well as the proposed approach that would be adopted for the EIA including the proposed scope and assessment methodology to predict the scale of effects and to assess the significance in each case.

<sup>1</sup> HM Government, 2011. The Town and Country Planning (Environmental Impact Assessment) Regulations 2011. London: HMSO. SI 2011/1824

<sup>2</sup> HM Government, 2015. The Town and Country Planning (Environmental Impact Assessment) (Amendment) Regulations. London: HMSO. SI 2015/660.

<sup>3</sup> HM Government, 2017. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. London: HMSO.

<sup>4</sup> Institute of Environmental Management and Assessment (IEMA), 2004. Guidelines for Environmental Impact Assessment. IEMA.

<sup>5</sup> Institute of Environmental Management and Assessment (IEMA), 2011. Special Report into the State Environmental Impact Assessment Practice in the UK, 2011. IEMA.

<sup>6</sup> Department for Communities and Local Government, 2006. Environmental Impact Assessment: A guide to good practice and procedures – a consultation paper. DCLG.

<sup>7</sup> Department for Communities and Local Government, 2014. Guidance for Environmental Impact Assessment. DCLG.



**2.12** CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2. Key consultees involved in the process included:

- CDC;
- Environment Agency;
- Highways England;
- Natural England;
- Thames Water;
- BBO Wildlife Trust;
- Oxfordshire County Council Single Response; and
- The local public.

**2.13** The EIA Scoping process has informed the content of the ES. The potentially significant environmental issues that were identified during the EIA Scoping Process and the resultant Scoping Opinion received from CDC and that have been addressed within this ES are listed below:

- Construction (Chapter 5);
- Socio Economics (Chapter 6);
- Transportation and Access (Chapter 7);
- Noise and Vibration (Chapter 8);
- Air Quality (Chapter 9);
- Buried Heritage (Archaeology) Built Heritage (Chapter 10);
- Ecology (Chapter 11);
- Landscape and Visual Impact Assessment (Chapter 12);
- Water Resources and Flood Risk (Chapter 13); and
- Effects Interactions (Chapter 14).

**2.14** A Phase 1 Environmental Risk Assessment (Volume 2: Technical Appendix 2.3) was prepared to support the EIA Scoping Report and has defined the risks in relation to the redevelopment of the site on human health and the environment, including controlled waters.

**2.15** 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. 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.

**2.16** 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. On this basis, a full ground conditions (including groundwater) impact assessment was scoped out of the EIA.

## The Outline Planning Application and Parameter Based Approach

**2.17** The planning application seeks outline permission for a set of parameters that define the use, amount of development, zones and scale on this site. An outline planning application is considered the most appropriate mechanism for providing a combination of planning certainty whilst maintaining a degree of future flexibility for the Applicant but allowing CDC and stakeholders to fully acknowledge the potential impacts of the Proposed Development.

**2.18** The Applicant has adopted a 'parameter based' approach to ensure that the flexibility required for the outline planning application can be taken into account in the EIA. The approach involves establishing parameters that govern or define the range of development possibilities - and hence the likely significant environmental effects. The development parameters for the Proposed Development site are shown on the "Combined Parameter Plan" that accompanies the Planning Application and cover a range of 'matters'; all matters are 'reserved' for subsequent approval by CDC, except for access. The Parameter Plan contains information on the following matters:

- Use – uses proposed for the development (B1(a) and B1(b) Office);
- Amount of development – the maximum floor area proposed (60,000m<sup>2</sup> GEA);
- Zones – indicating the maximum floor area and height for buildings within each zone;
- Scale – an indication of the upper and lower limits for the height of the proposed buildings within the zones.

**2.19** The Design and Access Statement also explains and justifies the principles behind the intended design of the Proposed Development. The Design and Access Statement explains the context and parameters that the final form of the Proposed Development will need to comply with and within which details (such as appearance) will be approved at a later date pursuant to applications for the approval of reserved matters.

**2.20** Since the final form of the Proposed Development cannot be fully defined at this stage by the very nature of the outline planning application, the EIA assesses a "reasonable worst case". This may be different for each topic considered in the EIA, therefore, each topic identifies its own 'reasonable worst case' for assessment.

## Environmental Impact Assessment Approach

### Baseline Characterisation

**2.21** The purpose of the EIA is to predict how environmental conditions may change as a result of the Proposed Development. The assessment of the scale and significance of a predicted change is undertaken against a reference condition, known as the baseline. In most cases, the baseline represents the environmental condition of the site and the surrounding area at the time of the assessment. However, the Transport, Air Quality and Noise and Vibration assessments also include a future baseline (e.g. future traffic flows), at 2026, which is the projected year of completion of the Proposed Development.

**2.22** As discussed in Chapter 1: Introduction, the site is currently used for agricultural purposes (Grade 4). The site is generally flat, with a slight drop from +68.0m above ordnance datum (m AOD) in the north down to +65.0 m AOD to the south and east. A drainage ditch runs north / south, from the access road in the north west of the site to the southern boundary, along the north of the drainage channel is an area used for material storage. This area has plastic and concrete pipework, gravel and wood chippings. Two heaps of wood, comprising tree branches and timber up to 3m high, are located in the south of the site.

### Sensitive Resources and Receptors

**2.23** The EIA process has included the identification and assessment of impacts to and effects on potentially sensitive receptors resulting from site construction and operational phases of the Proposed Development. The

# EIA Methodology

receptors which may be sensitive to the Proposed Development and for which additional mitigation and protective measures may be required, are detailed below:

- Existing residential properties comprising Langford Farm and Langford Park Farm;
- Existing Commercial Properties comprising: Bicester Village Retail Park, 'Blooms' Garden Centre, Tesco Superstore and the Sewage Treatment Works;
- Existing ecological features comprising Gravenhill Wood ancient/semi natural Woodland, mature trees surrounding the site and protected species;
- Existing Archaeological Resources;
- Pedestrians and cyclists including visitors to Bicester Village Retail Park and recreational users of public rights of way in the area;
- The sites location in Flood Zone 1 and 2, 3a and 3b;
- Local Air Quality;
- Existing transport infrastructure, in particular the local highway network and public transport facilities;
- Landscape views and townscape character areas; and
- Future commercial facility occupants and users of the Proposed Development.

## Impact Assessment

- 2.24** Impact assessments are undertaken for the following stages of the Proposed Development:
- During demolition and construction works - typically assessing the peak construction related activities and vehicle movements to represent a worst-case assessment (it is noted no demolition would take place as part of this Outline Application as the site is not built up and is in use as agricultural land; and
  - Once the Proposed Development is complete and operational.
- 2.25** Detailed methodologies for the assessment of each of the environmental topic areas scoped into the EIA are provided within each technical chapter of this ES Volume, however, in general terms, the assessments have been based upon:
- A review of the current situation at and surrounding the site for the environmental topic area under consideration via various sources of existing information, data and reports;
  - Desk-top studies;
  - Site surveys;
  - Consideration of relevant legislation and relevant planning policies (national, regional and local);
  - Consideration of potentially sensitive receptors that could be affected by the Proposed Development;
  - Identification of likely environmental impacts and effects, with an evaluation of their likely duration, magnitude and significance;
  - Expert opinion;
  - The use of technical guidance and best practice; and
  - Specific consultations with appropriate organisations.
- 2.26** Mitigation is the term used to refer to the process of avoiding, reducing and remedying potential adverse impacts of a development. Mitigation measures can be embedded at design stage or committed to during the construction stage or operation of the completed development. Equally, measures can be proposed in order to enhance aspects of the development to generate positive benefit.
- 2.27** Within each technical chapter of this ES, the assessment of the potential effects that are likely to arise as a consequence of a potential impact/change to environmental receptors from the Proposed Development is initially presented. If any mitigation measures are required, further to that already integrated into the parameters throughout its evolution, these are incorporated and the parameters are reassessed to ascertain the likely residual effects and the likely significant environmental effects. This is reported on within each technical chapter of this ES.
- 2.28** Unless otherwise required by published assessment guidance (e.g. air quality), the EIA has made a distinction between:
- impacts: the change or action; and
  - effects: the result/consequence/outcome of the change.
- 2.29** A range of potential effects are considered - including direct or indirect (or secondary), permanent or temporary, reversible and irreversible, short term or long term, and cumulative:
- Direct effects are those which arise as a direct consequence of a project action, e.g. the loss of habitat or the run-off of surface water to a watercourse;
  - Indirect effects include, for example, the decline in the abundance of a species as a result of the loss of habitat or the damage to aquatic vegetation as a result of water pollution. Other common examples include the effect on air quality and ambient noise as a result of increased traffic movements; and
  - Inter and Intra cumulative effects (refer to paragraph 2.45 onwards).
- 2.30** How the Proposed Development might affect the environment relies on predictions about what impact a certain action will have. Some predictions can be made using mathematical or simulation models, particularly where there are well known relationships between cause and effect. For example, the degree to which noise levels may increase as a result of additional traffic flows can be predicted using a mathematical equation. The level of air pollution from a known traffic flow can also be predicted from a computer-based simulation model. The visibility of a building can be predicted by accurately superimposing its outline and position over a photograph. Other impacts are less easy to predict in quantitative terms; for example, whilst the extent of a loss of a habitat can be measured, the effect on the abundance of individual species is more difficult to predict. In such cases, the EIA attempts to quantify the anticipated scale of impact using empirical experience, literature and professional judgement.
- 2.31** In all cases, the overall approach and specific methods of predicting the likely nature and scale of impact and effect is set out in each of the technical assessments. Where used, recognised specific predictive methods are referenced. Any assumptions or limitations to knowledge are stated. In either case the thought process leading to the conclusions is based on reasonably reliable data and so is considered to be legally prudent and robust.
- 2.32** In the context of the Proposed Development, temporary effects would be typically those associated with the demolition and construction works, and long-term effects would typically be those associated with the completed and operational development. Typically, local effects would be those affecting receptors neighbouring the site, whilst effects upon receptors within the wider CDC boundary are assessed at a district level. Regional effects would be those affecting receptors within Oxfordshire. Effects upon different parts of the country, or England as a whole, are considered to be at a national level. Finally, effects across national boundaries would be considered at an international level (albeit there are no such effects).

## Significance

- 2.33** The assessment of environmental effects is important in that it informs the determination by the planning authority of the overall acceptability of the Proposed Development. Determining significance relies on accepted thresholds and criteria where available or, for situations in which such are not available, expert interpretations and value judgments.
- 2.34** Significance is usually a function of the vulnerability or importance of the resource affected (receptor) and the scale (magnitude and duration) of the potential impact. Importance might be a function of international designation or local relevance. Thus, significance is a concept that can be applied objectively to individual effects. Throughout this ES the same terminology is used to describe these individual effects, unless specific alternative terminology exists in recognised issue specific guidance, for example in ES Chapter 9: Air Quality.
- 2.35** Within this ES, significance has been evaluated with reference to definitive standards, accepted/published criteria and legislation, where available. Where it has not been possible to quantify likely effects, qualitative assessments have been carried out, based on expert knowledge and professional judgement. Where uncertainty exists, it has been noted in the relevant assessment and a prudent or conservative approach has been adopted so that the significance will not be under-estimated.
- 2.36** For transparency, specific conventions have been developed to define significance, wherever possible, using the criteria listed below:
- The sensitivity of the receptor to the change or potential impact, based on a scale of high, medium and low;
  - The magnitude of the potential impact, based on a scale of high, medium, small, neutral and unknown;
  - The likelihood of the effect occurring, based on a scale of certain, likely or unlikely;
  - The duration of the effect, based on a scale of long, medium and short term (temporary);
  - The geographical extent of the effect at local, district, regional, national and international levels; and
  - The reversibility of the effect, being either reversible or irreversible.
- 2.37** In order to provide a consistent approach to the presentation of the significance of effects, the following terminology has been used throughout the ES to describe the type/nature of potential and residual effects:
- **Adverse** - detrimental or negative effect to an environmental resource or receptor;
  - **Neutral** - an effect that on balance, is neither beneficial nor adverse to an environmental resource or receptor; and
  - **Beneficial** - advantageous or positive effect to an environmental resource or receptor.
- 2.38** The scale of the predicted effect has then been classified according to the following scale. The definitions of the scale used follow either that set out below, or, as specified within the individual technical ES chapters:
- **Negligible** - imperceptible effect;
  - **Minor** - slight, very short or highly localised effect;
  - **Moderate** - limited effect (by magnitude, duration, reversibility, value and sensitivity of receptor) which may be considered significant; and
  - **Major** - considerable effect (by magnitude, duration, reversibility, value and sensitivity of receptor) which may be more than of a local significance or lead to a breach of a recognised environmental threshold, policy, legislation or standard).

**2.39** There are some exceptions to this scale due to established terminology for certain topic specific assessments. For example, the Air Quality assessment uses 'slight' instead of 'minor'.

**2.40** Throughout the ES, residual effects have been predicted as either 'significant' or 'not significant'. Significant effects are considered material to the planning decision process. Residual effects of moderate and major scale could be considered significant, but would be dependent on the relevant technical assessment, as well as the existence of published assessment guidance. Where published assessment guidance is not definitive in respect of categorising/determining significant environmental effects, professional judgement would be applied, taking into account the duration, extent and context of the effect, to determine significant effects.

## Intra-Project Cumulative Effects

**2.41** Intra-project cumulative effects from the Proposed Development itself on surrounding sensitive receptors during the construction works and also once the Proposed Development is completed will be considered. It is possible however, that depending on the predicted individual 'completed developments' effects, only the construction work effects will actually be considered as often they generate the greatest likelihood of interactions occurring and hence significant effects. Indeed, construction effects are usually more adverse (albeit on a temporary basis) than effects as a result of a completed development.

**2.42** Dependent on the relevant sensitive receptors, the assessment will focus either on key individual receptors or on groups considered to be most sensitive to potential interacting effects. The criteria for identifying those receptors which are considered to be potentially sensitive would include existing land uses, proximity to the construction works and the site, and likely duration of exposure to impacts.

**2.43** It should be noted that only residual effects that are minor, moderate or major in magnitude in scale will be considered within this assessment, as negligible effects are, by definition, imperceptible in their nature. The results are presented within the ES in a discrete chapter in a matrix table, Chapter 13: Effects Interactions.

**2.44** With regards to the potential for cumulative effects to occur, it is anticipated that standard mitigation measures as detailed in a site-specific Construction and Environmental Management Plan (such as dust suppression measures, use of quiet plant, restrictions on working hours) (as referred to in Chapter 5: Demolition and Construction) can be applied to prevent temporary unacceptable effects from the interaction of effects occurring on-site.

## Inter-Project Effects

**2.45** Inter-project effects arising from the Proposed Development in combination with 'cumulative schemes' during the demolition and construction works and also once the Proposed Development is complete will be considered by the EIA. The EIA Regulations require an assessment of potentially significant cumulative effects of the Proposed Development along with other developments. There are no legislative or policy requirements which set out how a cumulative impact assessment should be undertaken.

**2.46** Each individual ES technical chapter present the assessment of combined effects of the Proposed Development with certain other cumulative schemes. Only schemes which are considered to be reasonably foreseeable will be considered i.e. consented and subject to a high degree of certainty of being delivered (a resolution to grant planning consent but ideally with a signed legal agreements).

**2.47** Spatial and scale of development criteria has been developed based on professional judgement to determine whether cumulative schemes have the potential for cumulative effects when combined with the Proposed Development's effects. The criteria applied to the cumulative schemes is those which are:

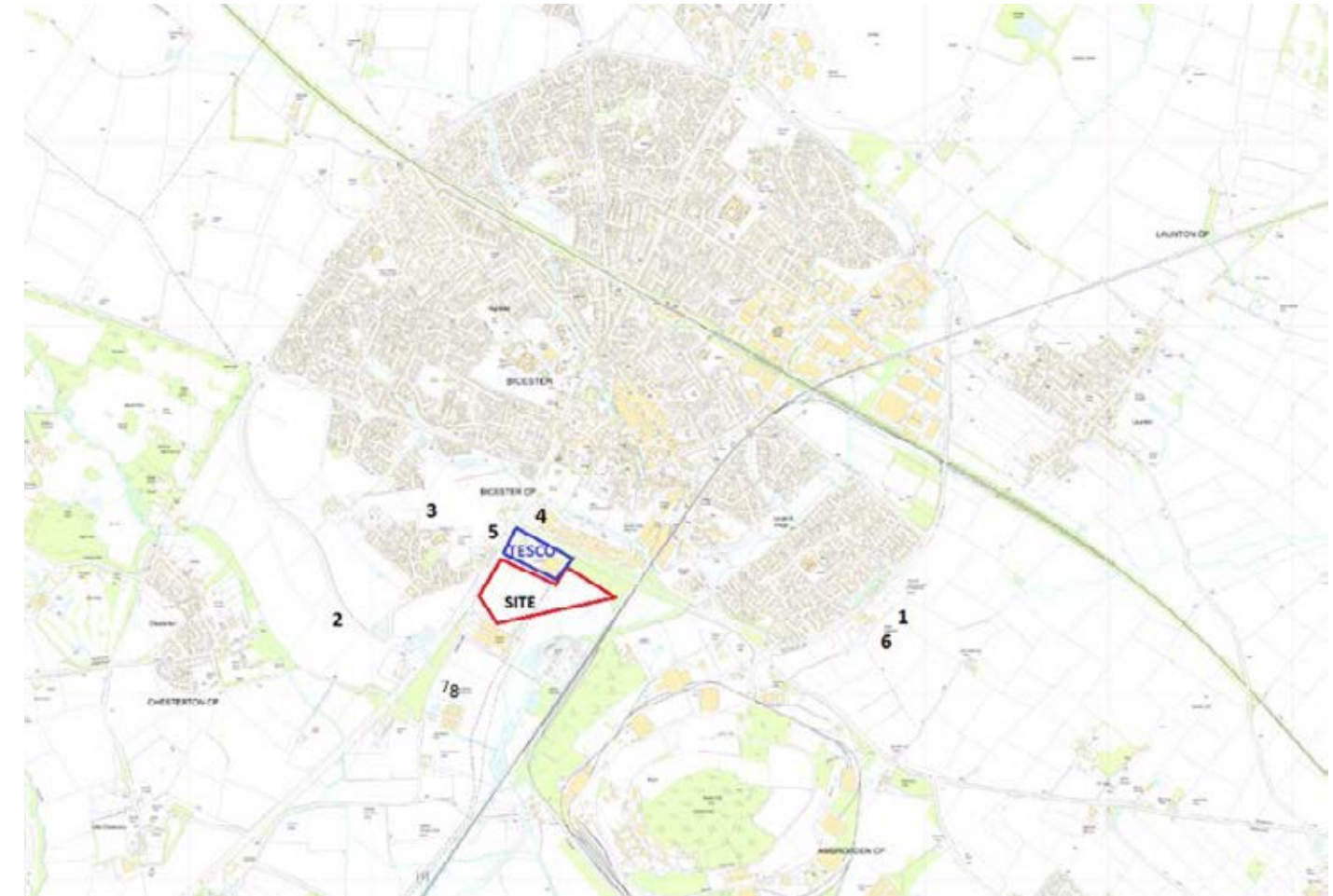
- located within 1 km of the redline boundary of the site; spatially linked to the site by means of the local road network; or visible in views to and from the site; and
- at least 10,000m<sup>2</sup> GEA in floor area or would give rise to > 150 residential units.

# EIA Methodology

**2.48** The list of cumulative schemes that should be incorporated within this ES has been agreed with CDC through the scoping process. Each technical topic area has reviewed the list and included within their individual discipline's assessment those cumulative schemes which have the potential for cumulative effects. It will be clearly stated within each technical chapter what cumulative schemes have been excluded from the assessment and why.

**2.49** The location of each scheme is shown in Figure 2.1 and listed in Table 2.1.

**2.50** An application was submitted in May 2017 on behalf of Tesco Stores Ltd for a drive-thru restaurant (class A3/A5) for McDonald's on the land to the west of Tesco at Lakeview Drive, Bicester. The scheme has not been considered in the cumulative impact assessment as the scheme does not have resolution to grant.



**Figure 2.1: Cumulative Schemes**

**2.51 Table 2.1: Cumulative Schemes**

No.	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	5,181 m <sup>2</sup> 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 (7,840 m <sup>2</sup> GIA); 1 Class A3 unit (435 m <sup>2</sup> GIA); and 1 Class D2 unit (967 m <sup>2</sup> GIA) with car parking area (345 spaces)	Resolution to grant at April 13 <sup>th</sup> committee.	0.8km
6	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
7	Bicester 10 Allocation Site	Site Allocation: Bicester 10; Use classes – B1 Business uses: high tech knowledge industries  Jobs to be created – approximately 3,500. Site constraints may reduce numbers slightly	Site Allocation	0.8km
8	Gateway Office Park (Phase 1 of Bicester 10 Allocation Site)	Phase 1 of the Bicester 10 Allocation Site (therefore fulfilling park of the 3,500 job creation allocation, comprising Class B1 employment buildings (up to 14,972 m <sup>2</sup> GEA); a hotel (up to 149 beds); and associated infrastructure and car parking.	Resolution to grant at April 13 <sup>th</sup> committee.	0.8km

## Assumptions and Limitations

**2.52** The principal assumptions that have been made, and any limitations that have been identified, in undertaking the EIA are set out below. Assumptions specifically relevant to each technical topic have been set out in each technical chapter of the ES.

- Baseline conditions have been established from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions at the site and surrounding land uses may change;
- The assessments contained within each of the ES Volume 1 technical chapters and in ES Volume 2 are based on the assumption that the mitigation measures proposed throughout the ES are implemented;
- The assessments contained within the ES Chapter 8: Noise and Vibration and ES Chapter 9: Air Quality are based on industry-average specifications for construction, mechanical and services plant as project-specific details will be finalised during the construction planning and procurement stages;

# EIA Methodology

# 2

- Construction works across the site would take place substantially in accordance with the programme of works described in Chapter 5: Construction;
- Where detailed information has not been available, reasonable assumptions have been made, and have been clearly set out in each technical chapter to enable assessment of likely significant effects; and
- Consented or reasonably foreseeable cumulative schemes will be implemented in accordance with current available scheme information.

## Structure of Technical Assessment Chapters

**2.53** Each key environmental topic considered in the EIA has been assigned a separate chapter in ES Volume 1 (Chapter 6 to Chapter 13 inclusive). Within each of the ES Volume 1 technical chapters the assessment is presented and reported in the following format:

- Introduction – which provides a brief introduction to the assessment;
- Legislative and Planning Policy Context – which the relevant policy and legislative requirements of relevance to the specific technical area, further information on the planning policy is provided in the relevant technical appendix in Volume 2 of the ES;
- Assessment Methodology – an explanation of the information gathering and assessment methodology as well as an explanation of the approach to defining the significance of likely environmental effects;
- Baseline Conditions - a description of the baseline condition;
- Assessment of Effects – an assessment of the likely significant effects of the Proposed Development without the implementation of mitigation;
- Mitigation and Monitoring - a description of the mitigation and any relevant monitoring that has been incorporated into the Proposed Development's design;
- Residual Effects - an assessment of the likely residual effects of the Proposed Development, assuming implementation of mitigation which are identified in accordance with the significance criteria defined in the respective assessments;
- Cumulative Effects – an assessment of Inter-project Cumulative Effects; and
- Conclusions.

# Alternatives and Design Evolution

# 3

## Introduction

- 3.1 This chapter of the ES describes the background to the Proposed Development and details the site opportunities, constraints and considerations that have influenced the scheme. It provides an illustration of the evolution of the design leading to the current illustrative Bicester Office Park Proposed Development.
- 3.2 The EIA Regulations require the ES to report on the main alternatives studied and to give an indication of the main reasons for the Applicant's choice of the final scheme, whilst taking into account the environmental effects. This chapter of the ES therefore also explores how the Proposed Development has evolved in response to the environmental and planning context within which they are being brought forward.

## Description of the Site and its Surrounds

- 3.3 The site is located at National Grid Reference 457910, 221631, located approximately 1km south of Bicester Village Town Centre. On the northern side of the A41 Boundary Way, between the site and the town centre, is Bicester Retail Village, a factory outlet centre that attracts a large portion of its visitors from outside Bicester. On the southern side of the A41 Boundary Way, adjacent to the north of the site, is a Tesco foodstore with associated car parking facilities. Past developments in Bicester have taken place to the north, east and west of the town and the southern expansion of the built-up area has been less extensive. Therefore, the southern edge of the urban area is currently much closer to the town centre than the northern, eastern and western fringes.
- 3.4 The site is irregular in shape with a loose triangular nature and covers approximately 13.1ha of land, which is currently used for agricultural purposes (Grade 4). The site is generally flat, with a slight drop from +68.0m above ordnance datum (m AOD) in the north down to +65.0m AOD to the south and east. A drainage channel/ditch runs north-south, from the access road in the north west of the site to the southern boundary. Along the north of the drainage channel is an area used for material storage. A description of the site and its surrounds are illustrated in Figure 3.1: Site Context Plan with images of the site presented in Figure 3.6.

## Water Resources and Flood Risk

- 3.5 The site's south-eastern boundary is located approximately 180m from a watercourse known as the Langford Brook and as a result falls within the flood zone of this watercourse. The majority of the site lies in Flood Zone 1, however, the site lies within Flood Zones 2, 3a and 3b along the south eastern boundary. Areas along eastern boundary considered medium and high risk of flooding respectively due to the Langford Brook proximity to the site.

## Transport

- 3.6 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.
- 3.7 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.

- 3.8 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.
- 3.9 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 Pingle Drive offering access to the residential developments to the north as well as Bicester Village to the north east.
- 3.10 Local Cycle Network - The National Cycle Network Route 51, a signed route along Wendlebury Road and Pingle Drive is located within the immediate vicinity of the site. This route connects the area to Oxford to the south and Bedford via Bletchley to the north east.
- 3.11 Local Bus Network - The nearest bus stops to the site are located approximately 500m to the north on Oxford Road and are served by the S5 and X5 services. The S5 operates between Oxford City Centre and Launton, as well as the Bicester Park & Ride facility. The X5 operates between Cambridge Parkside Bus Station and Oxford City Centre via Milton Keynes Railway Station.
- 3.12 A further bus stop is located on Pringle Drive approximately 800m to the north east and is served by the Bicester Village Shuttle operating towards Bicester North Railway Station.
- 3.13 Local Rail Network - The nearest station is Bicester Village Railway Station located approximately 1.4km to the north east of the site. Bicester Village Station is located on the Oxford to London Marylebone line. Bicester North Railway Station is located approximately 1.8km to the north of the site and offers connections to London Marylebone, Banbury and Birmingham Moor Street and Snow Hill.

## Surrounding Building Heights and Land Uses

- 3.14 The Tesco foodstore adjacent to the north of the site and the Garden Centre south of the site are the closest buildings to the site and are the equivalent in height of a two-storey building. Bicester Retail Village north of the Tesco food store is the equivalent height of a three-storey building.
- 3.15 Land uses surrounding the site are predominantly commercial in nature (the Tesco foodstore, the Garden Centre and Bicester Retail Village).

## Heritage

- No designated assets are located within the site. One Scheduled Monument is located within 1km of the site; Alchester Roman site (site 195). One hundred and twelve Listed Buildings stand within 1km of the site. These are all Grade II Listed, with the exception of: Church of St Edburg, Church Street to the north-west, which is Grade I Listed, and The Old Priory and Attached Garden Walls, Priory to the north-east, and The Old Vicarage, Church Street to the north-east which are both Grade II\* Listed. The listed building which lies in closest proximity to the site is the Grade II Listed Langford Park Farmhouse, A41 approximately 460m south west. The remaining Grade II Listed Buildings are all concentrated to the north of the site within Bicester town centre.
- 3.16 The site itself does not fall within a Conservation Area. The Bicester Conservation Area is located 1km to the north of the site.
  - 3.17 There are 83 heritage assets within 1km of the site. These include sites and artefacts dating from the Neolithic to the 20th century. Three records relating to archaeological sites, finds discoveries or events within the site itself. A Mesolithic flint scatter with later prehistoric and Roman features was recorded within the north of the site during an evaluation for Bicester Business Park (Chapter 10: Built Heritage).

# Alternatives and Design Evolution

# 3

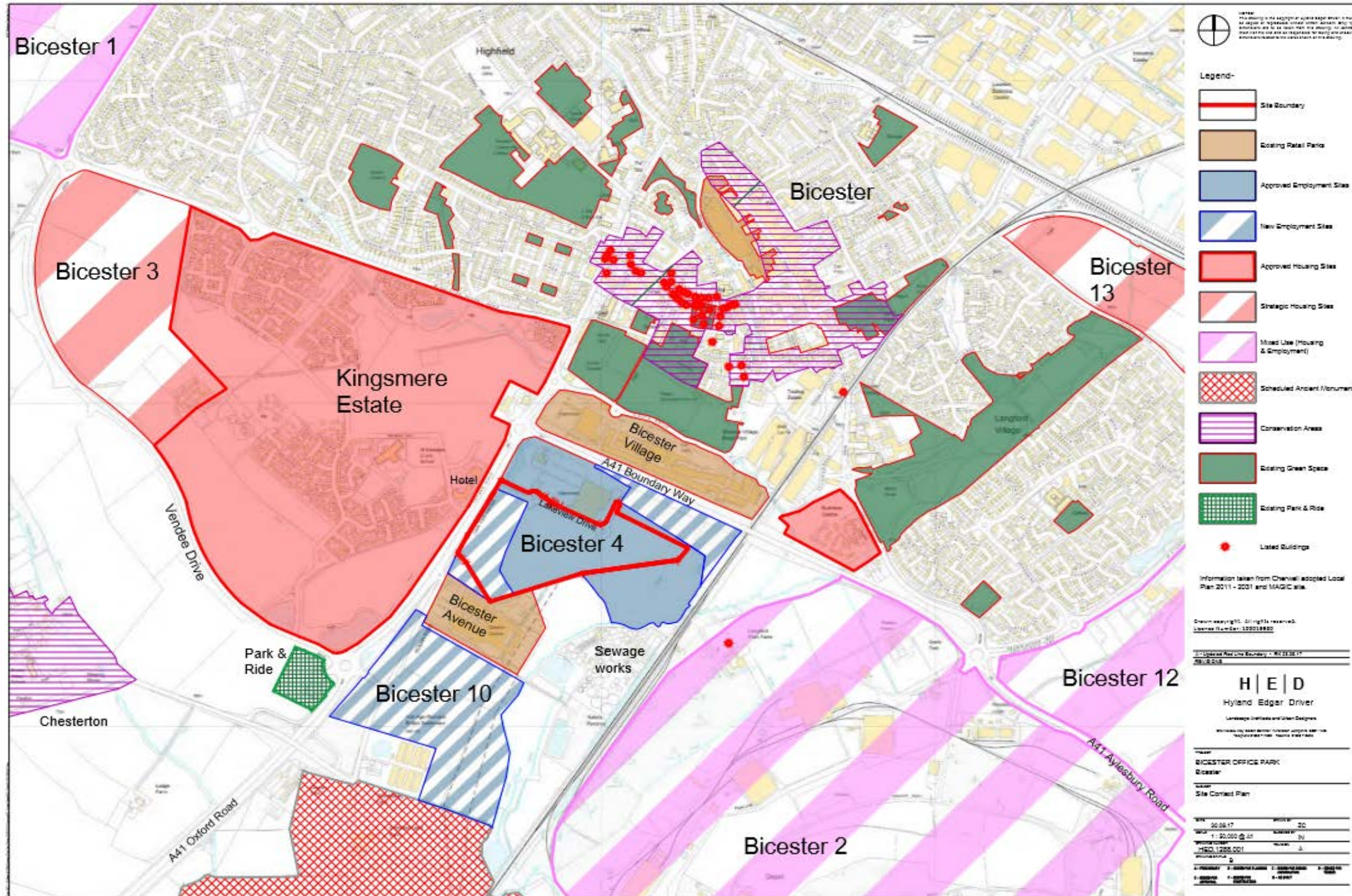


Figure 3.1: Site Context Plan

# Alternatives and Design Evolution

# 3

**3.18** A watching brief for a power line replacement took place on the site, but no archaeological remains were recorded.

**3.19** No World Heritage Sites, Registered Parks and Gardens or Registered Historic Battlefields fall within 1km of the site.

## **Ecology**

**3.20** The site is an arable field with rough grassland margins and hedgerows with trees, as can be seen in Figure 3.6. The site mainly comprises:

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

**3.21** The hedgerows are a habitat within the site which is a species of principal importance.

**3.22** The site is not covered by or immediately adjacent to any statutory designation, and there is only one statutory designated wildlife site (within 2km for local and national sites and 5km for international sites): Bure Park Local Nature Reserve (LNR). The LNR includes grass meadow, young broad-leaved woodland, hedges and scrub, located to the north of the site.

## **Air Quality**

**3.23** CDC monitors concentrations of nitrogen dioxide (NO<sub>2</sub>) using 42 passive diffusion tubes throughout the District. This includes eight locations in Bicester town centre, all within 2km of the site of Proposed Development. Monitoring data for the year 2015 at these locations indicate that annual mean concentrations of NO<sub>2</sub> 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 NO<sub>2</sub> objective (Cherwell District Council, 2016).

## **Planning History and Site Allocation Status**

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

**3.25** Detailed planning consent was subsequently granted on part of the site in November 2013 for the construction of a Tesco foodstore of 8,135m<sup>2</sup> and petrol filling 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.

**3.26** The site is part of a larger parcel of land identified in the Cherwell Local Plan 2011 (Policy H13) for the development of the 'Bicester Urban Extension: South West Bicester'.

## **Assessment Alternatives**

**3.27** Under the EIA Regulations, an ES is required to provide an outline of the main alternatives studied by the Applicant and an indication of the main reasons for the choice of the final scheme, taking into account the environmental effects. The following sections review those alternatives to the Proposed Development that have been considered by the Applicant, including:

- The 'Do Nothing' scenario;
- Alternative sites; and
- Alternative designs and design evolution.

## **Do-Nothing Scenario**

**3.28** The Do-Nothing scenario refers to the option of leaving the site in its current state. In this event, the following opportunities would not be realised:

- The long term economic effects of the Proposed Development created by the Proposed Development has been assessed as a beneficial impact of major significance at the regional level. The Proposed Development will create a major new employment hub which will make a very significant contribution to the delivery of jobs and economic growth for the local, core and wider impact areas for the assessment. The gross, on site employment of 3,769 to 4,900 full-time equivalent permanent jobs created by the Proposed Development represents an increase of between 7.5% and 9.8% in the number of full-time jobs throughout Cherwell District Council (Chapter 6: Socio Economics);
- Given the sites potential to support protected species, the Applicant has committed to agreeing a landscaping strategy, approved by a suitably qualified ecologist, to both protect and promote bat habitats and provide habitats for reptiles and nesting skylarks (see Chapter 11: Ecology); and
- The detailed landscape strategy agreed through a planning condition and will ensure a high quality public realm.

## **Alternative Sites**

**3.29** No alternative sites or locations have been considered for the Proposed Development. The site had outline consent for the provision of office use and is also identified in CDCs local plan as an area suitable for employment use.

## **Design Evolution**

**3.30** The design brief prepared by the Applicant was to provide a regional business park promoting high quality office space, and urban feel, with a landscaping strategy to improve open space and deliver a high quality Proposed Development. The scheme would also need to be capable of being delivered in stages.

**3.31** The site aims to deliver 55,000 - 60,000m<sup>2</sup> GEA of B1(a) and B1(b) employment floorspace. The project is likely to extend over an 8 - 9 year construction period and would provide suitable infrastructure for the Proposed Development and users of the office space.

**3.32** The following sub-sections of this chapter describe the design evolution processes undertaken by the Applicant's design team. It describes site constraints which have influences the parameters for example



# Alternatives and Design Evolution

# 3

neighbouring buildings heights and the nearby floodplain. As the Application is being made in outline, the design process on the parameters which form the basis of the Proposed Development.

**3.33** The site and its surroundings were initially studied in respect of the following criteria (as shown in Figure 3.1 to 3.5):

- Site boundary and entrances: these have been determined by the neighbouring A41, the adjacent floodplain and neighbouring developments (Figure 3.2-3.5);
- Site orientation: the diagrams are oriented north. The sun will pass from east to west during the day, providing east facing morning light, south facing daytime sun and west facing evening light (Figure 3.3);
- Surrounding land uses and neighbouring development: the majority of surrounding land uses are commercial in nature. Figure 3.4 illustrates the sites proximity to Bicester Town Centre to the north (2); the Bicester Village Retail Park (4) and associated parking (3) north of the Tesco foodstore (5) as well as the Garden Centre (6) and Sewage Works (7) to the south of the site. The Tesco foodstore adjacent to the north of the site and the Garden Centre south of the site are the closest buildings to the site and are the equivalent in height of a two-storey building. Bicester Retail Village north of the Tesco food store is the equivalent height of a three-storey building; and
- Water resources and local ecology described in more detail below.

## Water Resources

**3.34** The Applicant's ownership boundary, as shown in Figure 1.2 comprises a larger area surrounding the redline boundary of the site extending further to north and south. The area to the south east of the redline boundary during initial design evolution formed part of the site for this application. However, given the fact that this area is located predominantly in Flood Zone 2, 3a and 3b, where development is not preferred, the Proposed Development focuses on the western and northern parts of the Applicant's ownership boundary. This has led to the final redline boundary for the site as presented in Figures 3.5, which excludes part of the Applicant's ownership boundary to the far south east of the site adjacent to the Langford Brook.

**3.35** A detailed Flood Risk Assessment document by Buro Happold Engineering has been compiled which is included within the Appendix 13.1 of this ES, the FRA is also summarised in Chapter 13: Water Resources.

## Ecology

**3.36** 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 would be affected by the proposal are common and widespread and are considered to be of low intrinsic biodiversity value. However, ecological features which required consideration throughout the design process, including considerations for mitigation and compensation, comprised:

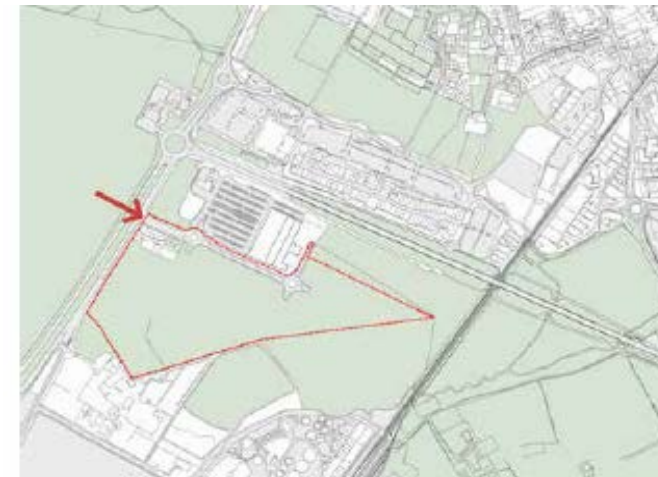
- The Bicester Wetland Nature Reserve located approximately 230m south-south west of the site;
- Ditches;
- Great crested newts;
- Reptiles;
- Birds;

- Bats; and
- Badgers.

**Figure 3.2: Site Boundary and Entrance**



**Figure 3.4: Surrounding Land Uses**



**Figure 3.3: Site Orientation**



**Figure 3.5: Water Resources**



## Illustrative Masterplan

**3.37** An illustrative masterplan has evolved over time and has taken into consideration views of CDC and local stakeholders. Figure 3.7 presents the final indicative Masterplan for the Proposed Development.

**3.38** The illustrative masterplan comprises a development of 60,000m<sup>2</sup> GEA as a business park. This would create a mix of buildings of different sizes located within extensive landscaping. The illustrative plan combines commercial office spaces with leisure use and landscaping. A typical scheme could be laid out with the core of the development focusing around a group of seven primary office buildings each of approximately 4,000m<sup>2</sup> addressing a central, intensively landscaped water feature, with three additional larger buildings located to the west and east. Each building could potentially have its own adjacent dedicated car parking area.

# Alternatives and Design Evolution

# 3

- 3.39 A network of pathways could provide pedestrian access between buildings, encouraging walking and animating the landscape. A road system could also serve the buildings and car parks although there is the potential to keep this to a minimum in the centre of the site around the lake which could provide a relatively car free environment in this area.
- 3.40 Buildings could be orientated to maximise views and pedestrian access onto the central lake and landscaped area with car parking, vehicular drop off and front entrances on the opposite sides of the buildings. There would be no vehicular spaces within the central landscape area. The buildings are orientated in the illustrative masterplan to take full advantage of natural light. Office ground floors could open onto sunny south facing terrace spaces on the northern waterfront or private decks projecting into the water itself on its south side.
- 3.41 Chapter 4: Proposed Development, of this ES, provides further detail on the illustrative masterplan and Parameter Plans for the Proposed Development.



Figure 3.6: Current Conditions On-site



Figure 3.7: Final Illustrative Masterplan

# The Proposed Development

## Introduction

- 4.1** This chapter of the ES provides a description of the Proposed Development for the purposes of identifying and assessing the potential environmental impacts and likely environmental effects of the Proposed Development in the technical assessments of ES Volume 1 (Chapters 6 - 14). In accordance with the EIA Regulations, this chapter sets out the physical characteristics of the Proposed Development.
- 4.2** A general description of the site is provided in ES Chapter 1: Introduction and Chapter 3: Alternatives and Design Evolution. Each technical assessment within ES Volume 1 provides more detailed site descriptions where relevant.

## Proposed Development

- 4.3** The Applicant is seeking outline planning permission for the development of the site illustrated by the red line plan in Figure 1.2. All matters are reserved except for access. The total site area within the red line is 13.1ha. The Applicant's Ownership Boundary is also shown on this plan in blue. The Proposed Development comprises the following:
- 4.4** The construction of a business park of up to 60,000m<sup>2</sup> (GEA) of Class B1 office floorspace; parking for up to 2,000 cars; and associated highways, infrastructure and earthworks. The site will be accessed from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road.

## Outline Parameters

- 4.5** There is one main parameter plan along with a site red line boundary drawing submitted as part of this outline planning application for which planning approval is being sought. The parameter plan establishes the parameters for:
- Use – uses proposed for the development (B1(a) Office and B1(b) Research and development of products and processes);
  - Amount of development – the maximum floor area proposed (60,000m<sup>2</sup> GEA);
  - Zones – indicating the maximum floor area and height for buildings within each zone;
  - Scale – an indication of the upper and lower limits for the height of the proposed buildings within the zones.
- 4.6** Access to the Proposed Development from the north west of the site (Lakeview Drive) has already been constructed. Lakeview Drive is accessed via the signalled controlled junction with the A41 Oxford Road. Access is therefore not being sought via an outline parameter as part of this Application.

## Developable Area and Use Class

- 4.7** The applicant is seeking outline permission for employment (B1(a) and B1(b) floorspace, with a maximum quantum of development of 60,000m<sup>2</sup> GEA. B1(b) floorspace will not exceed 15,000m<sup>2</sup> of the total 60,000m<sup>2</sup> floorspace proposed.
- 4.8** The parameter plan identifies a series of six development zones (A-F), within which more detailed proposals will come forward as part of the future reserved matters submissions. Each development zone does not define individual building envelopes or boundaries, but buildings would be designed in compliance within the parameters of these broad massing envelopes. There are six main development zones (A to F) covering the majority of the site.
- 4.9** The illustrative masterplan (Figure 4.3) provides an indicative layout that could be developed in accordance with the parameters, however it should be noted that this is provided for illustrative purposes only and the parameter plans form the basis of assessment. Whilst the buildings could be developed anywhere in the

location of the development zones (in the defined developable areas) as shown in Figure 4.1, the floorspace would not exceed 60,000 m<sup>2</sup> GEA. All car parking spaces would also be located within the development zones.

## Maximum Building Heights

- 4.10** The parameter plan shows the maximum heights of the building zone, these heights are set out in mAOD at the top of roof level, within which the buildings would be designed in detail and constructed. Within each zone, there may be buildings of differing heights, although none will exceed the maximum height permitted for the development zone. The actual height of buildings within each zone along with their design will be determined at the Reserved Matters stage. The maximum heights proposed for each zone are included in Table 4.1 below.

## Site Access

- 4.11** The site has two vehicular access points from Lakeview Drive via the signalled controlled junction with the A41 Oxford Road. 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 Pingle Drive offering access to the residential developments to the north as well as Bicester Village to the north east.
- 4.12** Signal controlled pedestrian crossing facilities are provided across the site access road, Lakeview Drive and across the northern Oxford Road arm of the site access junction. Further signal controlled pedestrian crossing facilities are provided at the junction between the A41 Oxford Road and Kingsmere Residential Estate, a short distance south of the site.
- 4.13** Where appropriate pedestrian and vehicular routes through the site would be differently treated to clearly identify the transition. Pedestrian access from existing public transport nodes into each development zone would be provided, as would cycle paths throughout the site.
- 4.14** The Proposed Development will maximise access to all parts of the site, its facilities and services for people who are occupants, visitors and members of staff regardless of disability and as required by relevant legislation and local, regional and national policy. The development will be designed to ensure that required standards for accessibility are met at the outset and as part of mainstream inclusive design wherever possible.
- 4.15** A wide range of diverse means of transport will be provided for the Proposed Development:
- Car parking will be provided in accordance with CDC policy and will include disabled spaces, immediately adjacent to the various key access points serving the buildings on the park;
  - Provision will be made bicycle parking throughout the Proposed Development in accordance with local policy;
  - Separate car parking will be provided for each individual building with main access provided from the north west corner of the site from the A41 Oxford Way.
  - A new shuttle bus from Bicester North railway station will be provided as an integral part of the Proposed Development, and will encourage the use of public transport by offering a convenient, modern and safe facility; and
  - The proposed design will ensure clear, unimpeded routes without possible trip hazards throughout the Proposed Development.

# The Proposed Development

# 4

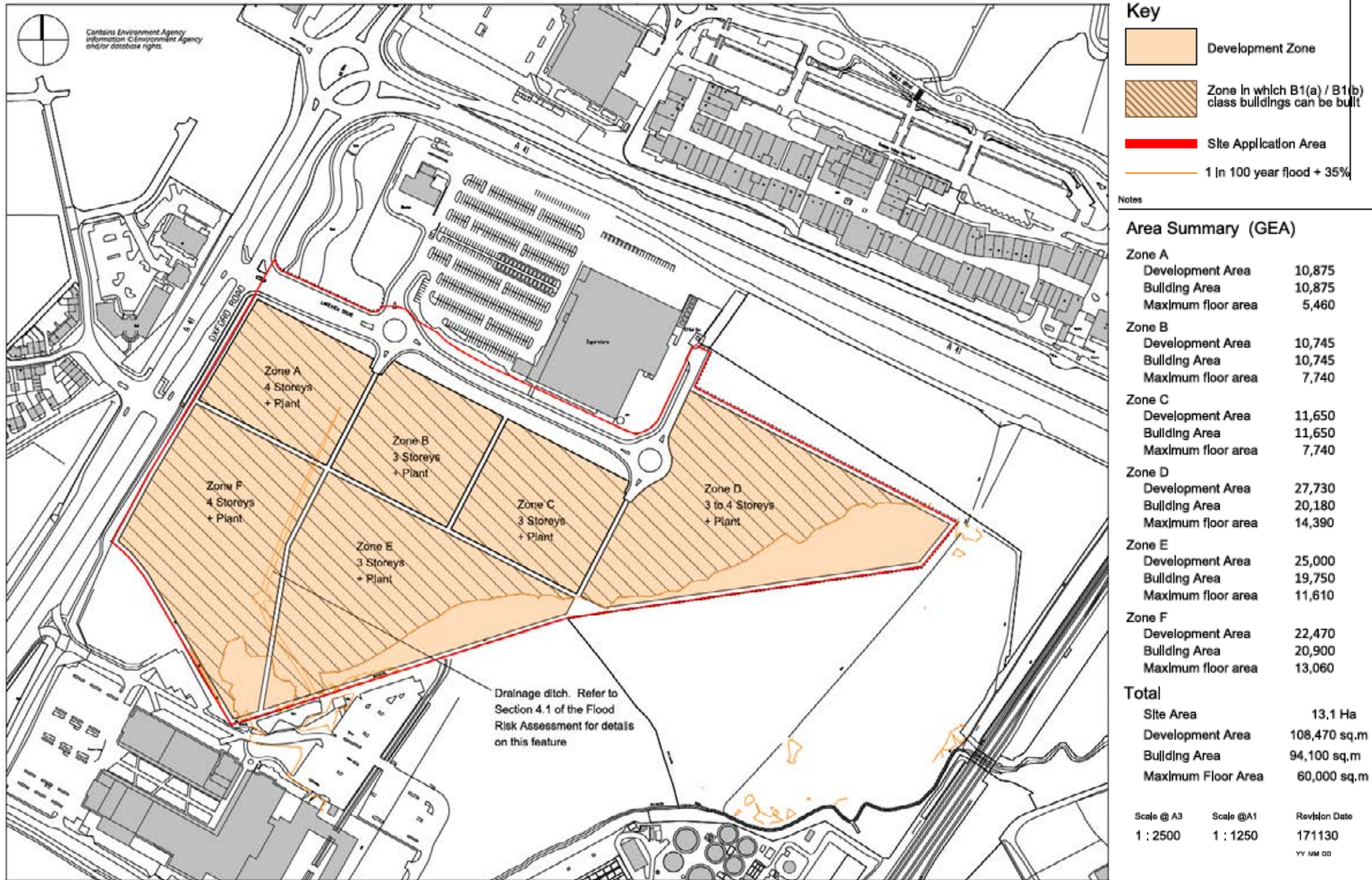


Figure 4.1: Combined Parameter Plan

# The Proposed Development

**Table 4.1 – Maximum Building Heights**

	M AOD (Top of Roof Level)	Metre above Ground	Storeys	Maximum Floorspace (m <sup>2</sup> GEA)
Zone A	85.75	20	(4 Storeys)	5,460
Zone B	83.0	16	(3 Storeys)	7,740
Zone C	82.50	16	(3 Storeys)	7,740
Zone D	85.50	16-20m	(3 – 4 Storeys)	14,390
Zone E	82.00	16m	(3 Storeys)	11,610
Zone F	85.0	20m	(4 Storeys)	13,060

## Landscaping and Public Realm

**4.16** The landscape proposals are based on the following principles:

- To integrate the Proposed Development into the landscape setting, drawing on the existing character of the site and its surroundings;
- To retain and protect key mature trees and boundary vegetation on boundaries of the site to maintain visual amenity and landscape character; and
- To provide ecological enhancement through the creation of range of new habitats, including meadows, waterways and native planting.

**4.17** In order to retain flight corridors for bats across the site to the wider landscape an east – west and north-south bat corridor has been identified (this has been included in the Proposed Development design evolution based on the outline plan as shown in Figure 4.3). The corridors will include a vegetated path along hedge and ditches which will be subject to careful control of lighting and will be approved by a suitably qualified ecologist.

**4.18** A strip of wildflower meadow will be created between the site and the flood zone to the south east (green area of the plan) to provide habitat for reptiles and nesting skylark. Two log pile habitats (using logs from the piles within the site) will be created to provide habitat for invertebrates and hibernating reptiles. In addition, the landscape strategy will include a water feature which includes no less than 600m<sup>2</sup> of shallow margins planted with native aquatic and semi-aquatic species.

**4.19** The Proposed Development landscape design strategy will look to retain all of the existing site boundary vegetation and develop a management plan to enhance the boundaries by reinforcing the existing trees and improving their current management regimes. This will include retaining all of the existing trees and hedges along the western, eastern and southern boundary of the site.

## Drainage

**4.20** The primary water supply and drainage infrastructure to serve the Proposed Development was constructed and completed in December 2015. The anticipated water demand for the Proposed 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 Store to the north of the site. Therefore, there is excess capacity to serve the size and type of development proposed.

**4.21** 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.

**4.22** The Drainage Strategy (Appendix 13.1) includes more detail regarding proposals for surface water drainage and associated demands from the Proposed Development. A summary of the proposals is provided here:

- “Store rainwater for later use”. It is proposed to use rainwater harvesting within the Proposed Development.
- “Use infiltration techniques, such as porous surfaces in non-clay areas”. French drains and infiltration trenches are proposed. Permeable pavement is recommended for all car parking areas. It is not suitable for servicing/waste storage areas;
- “Attenuate rainwater by storing rainwater in ponds or open water features for gradual release”. Ponds or water features could be incorporated into the landscape proposals. The system would provide temporary storage required during storm events and promote pollutant removal; and
- “Attenuate rainwater by storing in tanks or sealed water features for gradual release”. The surface water attenuation system will be designed for 1 in 100 year storm event + 20% climate change and to adopt the Greenfield runoff rate of 9.47 L/s/ha.

## Resources and Emissions

**4.23** In line with the EIA Regulations this ES also provides an estimate, by type and quantity, of expected residues and emissions resulting from the operation of the Proposed Development. A full description and estimate of these residues and emissions can be found in technical chapters 6 – 13, Volume 1, of this ES.

## Operational Management Controls

**4.24** A number of environmental operational management controls have been proposed and **would** be secured by a planning condition. They include but are not limited to:

- Commercial Framework Travel Plan;
- The noise level from commercial plant should not exceed the existing background sound level. This will be imposed by way of a planning condition if necessary to limit the plant noise emissions from the Proposed Development as a whole;
- The delivery of training opportunities will be monitored operation of the Proposed Development. This monitoring will take the form of an Employment and Skills Plan agreed between Cherwell District Council and key employers at the office park; and
- A Habitat Management Plan.

# The Proposed Development

4

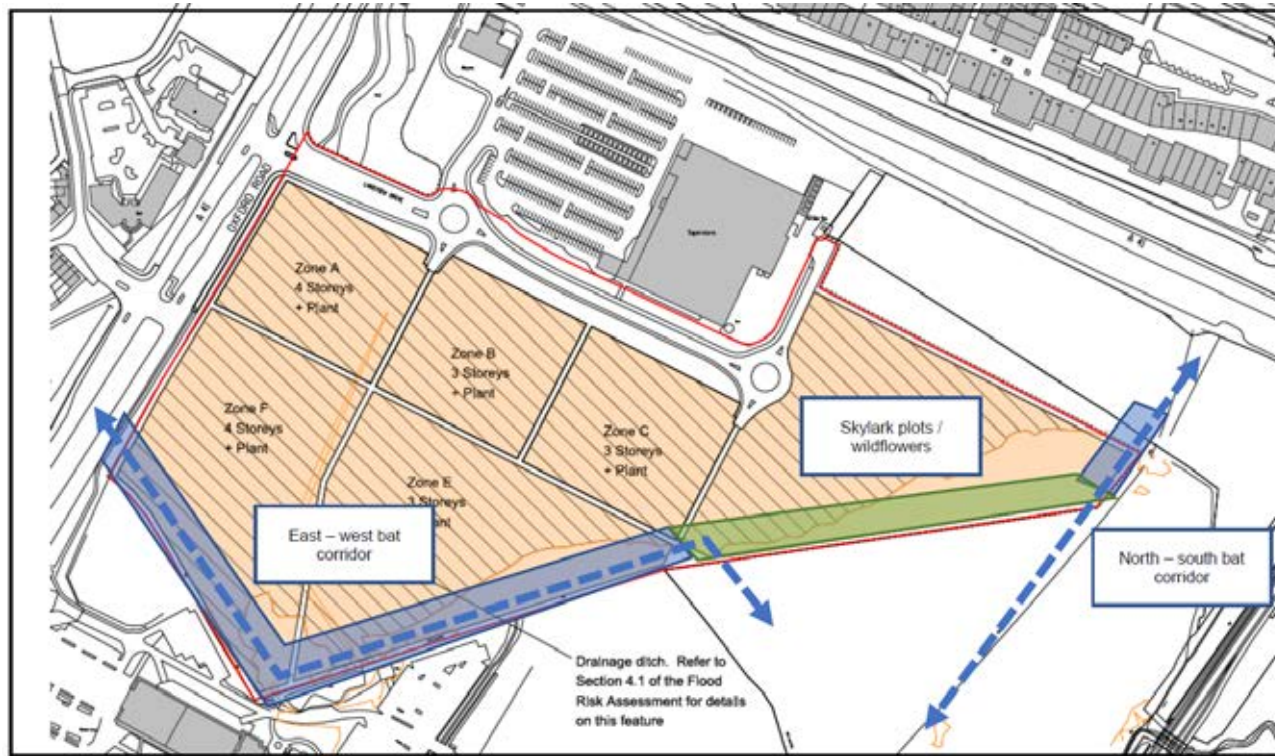


Figure 4.3: Landscaping Ecological Measures

## Indicative Masterplan

4.25 The indicative masterplan comprises 60,000m<sup>2</sup> GEA of commercial office space in a variety of stand-alone buildings in order to demonstrate a potential layout which is in accordance with the parameters. Figure 4.4 illustrates an indicative Masterplan for illustrative purposes only.



Figure 4.4: Final Indicative Masterplan

# Construction

# 5

## Introduction

- 5.1** This chapter of the ES describes the proposed construction programme and key activities for construction works. Potential impacts are identified and, where necessary, appropriate mitigation measures are described.
- 5.2** Planning for construction is necessarily broad at this stage and may be subject to modification during the reserved matters application stage, and/or during detailed construction planning. For this reason, the following assessment is based on reasonable assumptions in the construction programme and the collective experience of the consultant team.
- 5.3** Although the detailed construction method statements and specifications have not yet been prepared and lead/main construction contractor, sub-contractors and trade contractors not yet appointed to undertake the works required, it is possible to establish the potential broad environmental impacts associated with the works and to determine a framework for the management of these impacts to ensure there are no significant environmental effects. The framework would form the basis for a Construction Environmental Management Plan (CEMP) to be implemented during the construction works. A detailed CEMP would be secured by means of an appropriately worded planning condition, requiring this.
- 5.4** The CEMP would define relevant policies, legislative requirements, thresholds/limits, procedures, roles and responsibilities for the implementation of environmental and management controls throughout the duration of the works. The CEMP would be discussed and agreed with CDC in advance of works commencing on-site.
- 5.5** An outline of all the anticipated environmental issues and necessary management controls that would be covered within the CEMP is provided within this chapter.
- 5.6** It is important to note that this chapter does not assess the magnitude of potential impacts, nor the significance of likely effects during the construction works, as this is addressed within individual technical assessments within ES Volume 1 (Chapters 6 - 13). The principle of the CEMP set out in this chapter are considered within each technical assessment to enable the assessment of construction effects within a particular technical assessment.

## Programme of Works

- 5.7** As the site is predominantly greenfield there is no requirement for the demolition of any buildings on site.
- 5.8** The construction programme would be phased over an 8 to 9 year period. The outline construction programme assume that the buildings are built sequentially and in accordance with the phasing scenario outlined below and in Figure 5.1: Combined Parameter Plan:
- Phase 1 – Zones B and C;
  - Phase 2 – Zone A;
  - Phase 3 – Zone D; and
  - Phase 4 - Zones E and F.

## Development Zones and Phasing

- 5.9** The Proposed Development comprises a total of six Development Zones (A-F) as shown in Figure 5.1. It is anticipated that the development programme will span 8 – 9 years with construction occurring in phases and completing in 2026.
- 5.10** The first phase of development will take place on the northern extent of the site adjacent to the Tesco Superstore, with Zones B and C being developed. This will use the established main access to the site from the north-western corner.

- 5.11** Prior to construction, a number of investigations and surveys will need to be undertaken to further define the ground conditions for construction (see the Phase 1 Environmental Risk Assessment in Appendix 2.1) and will include intrusive archaeological investigation to fully define the archaeological resource across the site.
- 5.12** Following the development of Zone B and C, development of Zone A will occur, this would complete the development of the north-western section of the site and the areas closest to the main access road. Zone D will be the next zone to be developed, located in the north-eastern corner of the site, completing the full northern development of the site. The last zones to be developed will be Zones E and F, located at the south of the site, adjacent to Zones A, B and C.

## Description of Works

- 5.13** The construction programme will be designed to minimise disruption to local residents, the general public, and the environment. Works will include:
- Initial site preparation, including setting up of designated construction areas and contractors parking;
  - Installation of site hoarding, security measures, signage of entrance and exit;
  - Construction of internal road system and speed restriction signage;
  - Earthworks;
  - Onsite infrastructure works, including foul and storm sewers, maintenance and inspection chambers;
  - Construction of new buildings including piling, laying foundations, connection to services and addition of superstructure;
  - Land profiling, landscaping and public realm works; and
  - Site completion, including removal of construction compounds.

## Substructure & Superstructure Construction

- 5.14** The first phase of development will take place on the north-western section of the site. This will connect to the existing main access to the site, and comprise a number of office buildings. The busy A41 main road is screened by existing planting.
- 5.15** In most cases, pile formation would be augured and cast in reinforced concrete. This would employ mobile piling rigs, craneage and trucks to remove pile arisings, either for reuse on site or removal from site.
- 5.16** While it is generally to be avoided, limited percussive piling may be required. A rotary bored piling rig and attendant plant will be employed.
- 5.17** Groundwater beneath the site is designated as a non-aquifer to minor aquifer, with low soil permeability. As such, it is likely that de-watering will be required for deep excavations. Where ground water is encountered, it will be pumped and disposed of in an appropriate manner in line with legislative requirements.
- 5.18** Each Development Zone will incorporate one or more building(s). The sequence for the superstructure construction for each building would be as follows:
- Erection of concrete columns;
  - laying of concrete floors floor slabs would typically be concrete placed in situ on either profiled metal decking (steel frame) or formwork tables (concrete frame) though some pre-cast slabs may also be used; In all cases this would involve placing concrete at high level, which would typically be done using skips or concrete pumps; and
  - External cladding will be installed from the ground floor up. As with the substructure, emphasis will be on pre-assembly and prefabrication wherever practical. This will include toilet modules, electrical and mechanical riders and prefabricated plant rooms.

# Construction

# 5

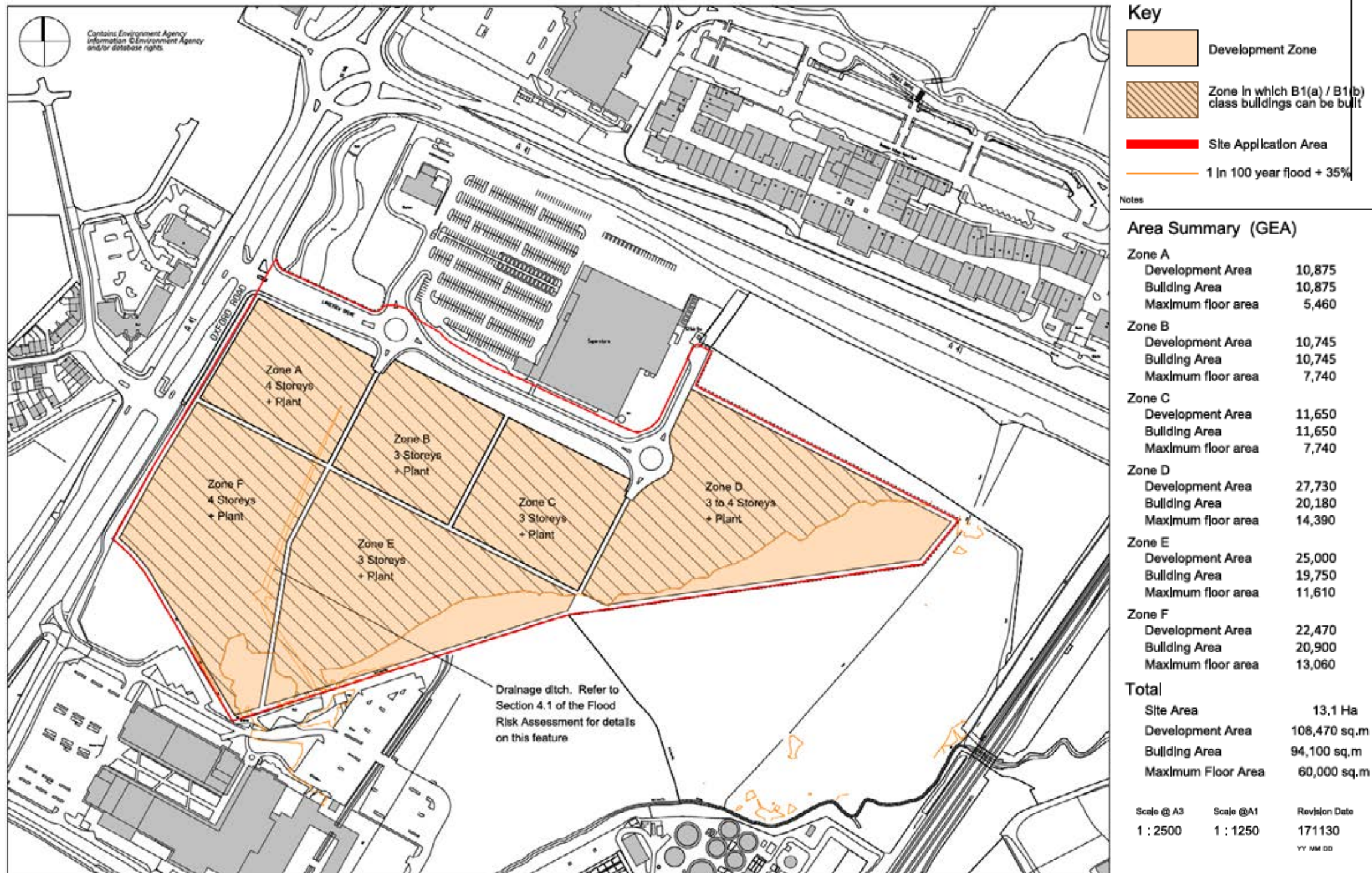


Figure 5.1: Combined Parameter (with Phasing)



# Construction

# 5

## Fit Out

5.19 All fit-out activities will be undertaken inside the buildings, with access via external hoists and goods lifts within the buildings.

## Landscaping

5.20 Landscape works (planting and seeding) will be implemented in the first planting season following completion of the relevant phase of development.

5.21 All the external landscape works, including planting, seeding and turfing will be undertaken in the first planting season following completion of the relevant phase of development or occupation of the building whichever is the sooner.

## Material and Resource Use

### Earthworks

5.22 The site is generally flat, with a slight drop from +68.0m AOD in the north down to +65.0m AOD to the south and east. As a result the Proposed Development will work with the natural contours of the land so avoiding the requirements for significant earth working. It is estimated that a maximum of 21,000 m<sup>3</sup> material would need excavating across the site.

### Construction

5.23 Throughout the project, prefabrication techniques will be used wherever feasible to reduce the number of vehicle movements required for the project. Vehicle movements associated with the construction phase are detailed in the Traffic Management, Site Access and Egress section below.

5.24 Wherever possible, materials will be recycled and re-used. Measures outlined in Waste Management section below will also be implemented to minimise the quantity of materials used and maximise recycling.

### Plant and Equipment

5.25 Consideration has been given to the types of plant that are likely to be used during the construction works. The plant and equipment associated with the construction process is set out in Table 5.1 below.

### Hours of Works

5.26 It is anticipated that the core working hours for construction works will be as set out below:

- 07:00 – 18:00 hours weekdays;
- 07:30 – 14:00 hours Saturday; and
- Working on Sunday will be subject to reasonable notice.

5.27 All work outside these hours would be subject to prior agreement, and/or reasonable notice given to CDC. It is understood that CDC may impose certain restrictions on working hours to avoid public nuisance. Although Sunday and night-time working will not normally be undertaken, it is expected that some deliveries and heavy lifts may take place at these times and that certain works may have to be done during this period for safety reasons.

Plant	Site Preparation	Substructure	Superstructure	Fit-out
Tracked / Wheeled 360 Degree Excavators	✓	✓	✓	
Breakers	✓	✓	✓	
Crushers	✓	✓		
Dumpers	✓	✓	✓	
Concrete Crushing Plant	✓	✓		
Mobile Craneage / Tower Cranes	✓	✓	✓	
Muck Away Trucks	✓	✓		
Air Compressors	✓	✓	✓	✓
Diamond Tipped Cutting Tools / Saws	✓	✓	✓	
Power Tools	✓	✓	✓	✓
Hand / Power Tools	✓	✓	✓	✓
Wheel Washing Plant	✓	✓		
Piling Rigs	✓	✓		
Scaffold	✓	✓	✓	✓
Mobile Access Platforms	✓	✓	✓	✓
Delivery Trucks	✓	✓	✓	✓
Skips and Skip Trucks	✓	✓	✓	✓
Forklift Trucks	✓	✓	✓	✓

✓ Indicates plant will be used during this stage of works

# Construction

# 5

**5.28** A review has been undertaken of the potential sources of adverse impacts associated with construction works. The results of this are presented in Table 5.2.

Table 5.2: Potential Impacts during Construction	
Noise	Increased road noise levels from vehicles. Increased noise levels from plant during site preparation, piling and general construction works e.g. from the use of all compressors and diamond cutters.
Vibration	Increased vibration levels from vehicles. Increased vibration levels from plant during site preparation, piling and general construction works e.g. from piling rigs attached to cranes.
Dust / Air Quality	Windblown dust from ground surfaces, stockpiles, vehicles, work faces and cutting and ground of materials. Exhaust emissions from lorries and plant delivering and removing materials including dust and particulates.
Waste	Waste generation and its disposal.
Water	Increased sediment loadings to stormwater system. Potentially contaminated stormwater runoff.
Traffic	Traffic congestion caused by site traffic and traffic associated with road diversions and deliveries. Increased vehicle movements mainly consisting of HGVs. Transfer of mud and material from vehicles onto the public highway. Disruption from abnormal or hazardous loads. Exhaust emissions. Construction impacts on severance, delay, amenity, fear and intimidation and accidents and safety.
Storage of fuels and construction materials	Accidental spills, discharges, to drains/stormwater systems, contamination to ground.
Pedestrian access	Restrictions on pedestrian access to walkways, footpaths and road.
Hazardous materials and contaminated land	Exposure of the workforce to deleterious / hazardous materials and contaminated land, mobilisation of any source contaminants and creation of pathway from source to ground water.
Ecology	Water / mud runoff into the drains. Loss of habitats during site works such as log pile habitats on site. Disturbance to some species of bat through lighting, and reduced foraging habitat over fields.
Energy usage	Indirect impacts associated with energy consumption such as CO2 emissions, depletion of natural resources, air pollution etc.
Water usage	Natural resources depletion and associated indirect impacts on aquatic ecology and resource availability etc.
Landscape and Visual, Views	Impacts to the landscape character comprising impacts on: topography and drainage; vegetation; and visual effects. Views impacted and / or impeded from construction equipment, particularly cranes.
Archaeology	Disturbance to buried archaeology sites and artefacts within the site.

## Mitigation

### Construction Environmental Management Plan

- 5.29** A Principal Contractor will be appointed by the Applicant to develop and implement a CEMP, through which mitigation and compliance with the requirements of the Building Control department at CDC will be achieved.
- 5.30** The CEMP will be a contractual document outlining the different procedures to be undertaken in order to complete the various works. Individual trade contracts will incorporate requirements for environmental control, based on good working practice, such as careful programming, resource conservation, adhering to health and safety regulations and quality procedures. In this way those involved with construction works, including trade contractors and site management, will be committed to adopt the agreed best practice and environmentally sound methods.
- 5.31** The CEMP will be prepared in consultation with CDC and will be presented to the Council at least 28 days prior to the commencement of works on site for approval.
- 5.32** The trade contractors will be required to demonstrate how they will meet the targets of the CEMP and how the potential impacts will be offset, reduced or minimised.
- 5.33** The CEMP will include the following main items:
- The construction programme;
  - A broad plan of the construction works, highlighting the various stages and their context within the project, including a full schedule of materials and manpower resources, as well as plant and equipment schedules;
  - Detailed site layout arrangements (including requirements for temporary works), plans for storage, accommodation, vehicular movements, delivery and access;
  - Prohibited or restricted operations (locations, hours, etc);
  - Details of operations that are likely to result in disturbance, with an indication of the expected duration of each phase with key dates, including a procedure for prior notification of CDC and relevant statutory and non-statutory (including neighbours) parties so that local arrangements can be agreed;
  - Site working hours;
  - Responsibilities under any CDC codes of practice for deconstruction and construction sites/ Considerate Contractors Scheme (or equivalent);
  - A procedure to ensure communication is maintained with CDC and the local community to provide information on any operations likely to cause disturbance (through, for example, meetings and newsletters);
  - Provisions for affected parties to register complaints and the procedures for responding to complaints,
  - Provisions for reporting to the Applicant and CDC;
  - Details of access to the site and proposed routes for HGVs travelling to and from the site;
  - Details of all works involving interference with the public highway, including temporary carriageway closures, realignment and diversions and movement of wide loads where relevant, and
  - Housekeeping procedures.
- 5.34** Matters concerning site activities during site preparation and construction that relate to environmental issues will be discussed and agreed with CDC in advance of works commencing and the site will be managed in accordance with best practice. The CEMP will include:
- A commitment to environmental protection (all Consultants and Trade Contractors will be invited to declare their support for this at the tender stage);

## Construction

- Document planning provisions. This section would provide background information and considerations on impact types to help the project team plan both their activities in relation to environmental issues and their control measures. References of any planning conditions with environmental elements that need to be complied with will also be included;
- Detail on control measures and activities to be undertaken to minimise environmental impacts;
- Monitoring and record-keeping requirements;
- Establishment of baseline levels for noise, vibration and dust;
- Details of a dedicated point of contact during both normal working hours and after hours, with responsibility to deal with environmental issues if they arise; and
- Commitment to a periodic review of the CEMP and regular environmental audits of its implementation.

### Considerate Contractor's Scheme

5.35 The site would be registered with a "Considerate Contractors Scheme", a scheme that aims to encourage contractors to carry out their operations in a safe and considerate manner, with due regard to passing pedestrians and road users.

### Neighbour and Public Relations

- 5.36 A key aspect of the successful management of the project will be the maintenance of good relations with site neighbours and the general public. To successfully develop and implement a 'Neighbour and Public Relations Strategy', the following actions will be undertaken:
- Initial contact once planning consent has been obtained, formal contact will be established with nearest neighbours and those who would be affected by the scheme; and
  - Contact during works period - A single point of contact will be established, with a senior member of the project staff nominated for the role. This person would usually be the Construction or Logistics Manager. Outside normal working hours, site security will act as the main point of contact via a dedicated phone number. Security will alert the Construction or Logistics Manager if necessary (available 24 hours). Any complaints will be logged, fully investigated and reported to the relevant department of CDC as soon as possible. The complainant will be informed as to what action has been taken.
- 5.37 Contact with neighbours and the general public throughout the construction period will be pro-actively maintained with regular update meetings, on a quarterly basis and the issuing of a brief newssheet on progress.

### Site Staff and Contractors

- 5.38 Table 5.3 identifies the approximate number of on-site staff and subcontractors for the first 18 month period (Phase 1). The approximate number of on-site staff and contractors required for this Phase is representative of the further phases of development.
- 5.39 Individual contractors (for example for waste removal will incorporate relevant requirements in respect of environmental control, based largely on the standard of 'good working practice' as outlined in the CEMP as well as statutory requirements. Potential Trade Contractors will be required to demonstrate how they will achieve the provisions of the CEMP, how targets will be met and how potential effects will be minimised.

### Traffic Management, Site Access and Egress

- 5.40 Estimated numbers of construction related vehicles for Phase I are shown in Table 5.4 across the estimated 18-month construction period. For the purposes of outline planning, all deliveries are assumed to be HGVs. The approximate number of construction related vehicles required for this Phase is representative of further Phases of development.
- 5.41 As part of the procurement process, successful contractors will be issued with a project route map and delivery schedule that they must pass on to their delivery drivers. This will help to ensure that deliveries have the minimum impact on the locality and are made smoothly and on time. Specific time slots will be allocated to contractors for the use of cranes and hoists, to ensure that the main plant will be utilised efficiently. Deliveries will need to be planned to match their allocated access slots.
- 5.42 It is anticipated that access to the site will use the existing site access from the A41 Oxford Road. All vehicles above 7.5 tonnes will be restricted to the primary road network and full details of the routes to be taken and access arrangements will be agreed with CDC.
- 5.43 It is proposed that during the piling, substructure and superstructure works, a circular one-way system on-site will be implemented to ensure ease of traffic flow and avoidance of congestion. Loading and unloading during these stages will take place within the site, further minimising the likelihood of congestion. Strict monitoring and control of all vehicles entering, exiting and travelling across the site will also be maintained including:
- The setting of specific delivery and collection times;
  - Consolidation of deliveries wherever possible;
  - The requirement for prior authorisation when visiting the site via vehicle. This will be managed by the Logistics Manager; and
  - Pedestrian access will be maintained adjacent the works at all times.

Table 5.3: First 18 Month Site Staff, Subcontractors, Daily Visitors and Daily Deliveries

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18
Site Staff	8	9	11	12	15	15	15	15	15	15	15	15	15	15	15	15	15	12
Subcontractors	15	23	30	60	90	120	120	120	120	120	120	135	135	150	150	105	75	75
Total	23	32	41	72	105	135	135	135	135	135	135	150	150	165	165	120	90	87
Daily Visitors	8	8	8	15	15	15	15	23	23	23	23	30	30	30	30	23	15	15
Daily Deliveries	8	15	23	30	45	45	45	45	45	45	45	60	60	60	45	30	23	15
Total	16	23	31	45	60	60	60	68	68	68	68	90	90	90	75	53	38	30

# Construction

# 5

## **Road Closures and Conversions**

- 5.44** Whilst no long-term road closures are envisaged, weekend closures of local roads may potentially be required in order to deliver large items of building plant. This will be agreed with CDC prior to commencement.
- 5.45** Notices regarding any planned closures and diversions of either roads or footpaths shall be given by the principal contractor to CDC, police, fire brigade and other emergency services sufficiently in advance of the required closure or diversion.

## **Car Parking and Travel to Site**

- 5.46** There will be a general policy of restricting on-site car parking to a minimum and the site labour force will be encouraged to use public transport. Unapproved parking on public roads will not be allowed. Provisions will be made within the site for essential on-site parking only. Any local traffic management measures for site access will be agreed with CDC.

## **Off-Site Facilities**

- 5.47** It is the intention to maintain sufficient space on site for portable cabins/site offices, material and waste stock piling and toilet/welfare facilities etc. However, should there be a requirement for off-site facilities, the locations of these will be agreed prior to their installation with CDC.

## **Road Cleanliness**

- 5.48** To minimise mud on roads, the CEMP will prescribe measures to include the provision of suitable facilities for wheel wash at site exits. This will include the use of a suitable means to clean all highways in the vicinity of the site. Collected debris will be disposed of as controlled waste at a waste disposal facility.

## **Management of Noise, Vibration and Dust**

- 5.49** Full assessments of activities with the potential to generate high levels of dust or noise and vibration are presented in Chapter 8: Noise and Chapter 9: Air Quality respectively. Best practicable means of preventing, reducing and minimising noise and air quality pollution will be adopted in agreement with CDC.
- 5.50** Good practice procedures will be followed in order to mitigate noise, vibration and air pollution (e.g. through dust and fume-generation) impacts. Measures currently planned include:
- Use of hoarding around the entire perimeter of the site to assist in the screening of noise and dust generation from low-level sources;
  - Hydraulic construction to be used in preference to percussive techniques where practical;
  - All plant and equipment to be used for the works will be properly maintained, silenced where appropriate, and operated to prevent excessive noise and switched off when not in use and where practicable;
  - Plant will be certified to meet relevant current legislation and Noise and Vibration Control on Construction and Open Sites (BS 5228) Standards<sup>1</sup>;
  - All Trade Contractors will be made familiar with current noise legislation and the guidance in BS 5228 which will form a prerequisite of their appointment;
  - Threshold vibration limits will be set and monitoring equipment established at locations outside the site which are deemed sensitive;

- Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around site will be conducted in such a manner as to minimise noise generation and where practical will be conducted away from noise sensitive areas;
- Deviation from approved method statements will be permitted only with prior approval from the Principal Contractor and other relevant parties. This will be facilitated by formal review before any deviation is undertaken;
- Noise complaints, or exceedances of action levels will be reported to the Contractor and immediately investigated;
- Brushing and water spraying of heavily-used site hard surfaces and access points as required;
- Wherever possible, plant and equipment will be switched off when not in use;
- Vehicles transporting materials, capable of generating dust, to and from site will be suitably sheeted on each journey to prevent the release of materials and particulate matter; and
- Effective wheel/body washing facilities will be provided and used as necessary.

- 5.51** A programme for noise and dust monitoring will be prepared as part of the CEMP and agreed with CDC prior to the commencement of works on site.

## **Waste Management**

- 5.52** The disposal of all waste or other materials removed from the site will be in accordance with current requirements and legislation.
- 5.53** A principal aim during construction will be to reduce the amount of waste generated and exported from site. This approach complies with the waste hierarchy whereby the intention is first to minimise, then to treat at source or compact and, finally, to dispose of off-site as necessary.
- 5.54** All relevant contractors will be required to investigate opportunities to minimise and reduce waste generation, such as:
- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
  - Implementation of a just in time material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
  - Attention to material quantity requirements to avoid over-ordering and generation of waste materials;
  - Re-use of materials wherever feasible, e.g. re-use of excavated soil for landscaping, re-use of internal equipment and plant from existing buildings. Concrete will be taken off site for crushing and re-use. The Government has set broad targets of the use of reclaimed aggregate, and in keeping with best practice, contractors will be required to maximise the proportion of materials recycled;
  - Segregation of waste at source where practical; and
  - Re-use and recycling of materials off-site where re-use on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing).
- 5.55** Skips will be covered to prevent dust and debris blowing around the site and will be cleared on a regular basis.
- 5.56** Burning of wastes or unwanted materials will not be permitted on-site.

<sup>1</sup> British Standards Institution, BS 5228, 'Code of Practice for Noise and Vibration Control on Construction and Open Sites Standards. BSI.

# Construction

- 5.57** All hazardous materials including chemicals, cleaning agents, solvents and solvent containing products will be properly sealed in containers at the end of each day prior to storage in appropriately protected and bunded storage areas.
- 5.58** As the new buildings become enclosed, the rubbish will be collected in lightweight floor-based wheeled skips that can manoeuvre around the configuration of the units. The skips will then be taken to ground floor level by hoist, and either decanted into larger skips, or if suitable, placed into a compactor to reduce the volume of the waste before it is taken off-site.

## **Protection of Archaeological Resources**

- 5.59** A programme of strip, map and record will be undertaken to establish the extent of any surviving archaeological remains that might be damaged during construction of the site. Further to that an archaeological watching brief will take place on areas not included in the strip, map and record. This will be secured as a condition of planning.
- 5.60** With the mitigation outlined above being undertaken, this would ensure preservation by record of the known heritage assets within the site and would enable identification and preservation by record of any hitherto unrecorded archaeological remains. The exact scope of any further investigations and / or mitigation would need to be agreed with Oxfordshire County Archaeological Services on behalf of the planning authority.

## **Protection of Water Resources**

- 5.61** The protection of water resources is detailed in Chapter 13 Water Resources and Flood Risk and includes measures to ensure the appropriate storage of oils, and prevention of the leakage of contaminants into the existing drainage network. The CEMP will ensure that construction activities will be undertaken in accordance with good practice guidance, including the Pollution Prevention Guidelines (PPG) formerly published by the EA, particularly 'PPG1 General guide to the prevention of water pollution', 'PPG2 Above ground oil storage tanks', 'PPG 5 Works in, near or liable to affect watercourses', and 'PPG 6 Working at construction and demolition sites', and other good construction guidance such as CIRIA 'Guidance C532 control of water pollution from construction sites'.

## **Ecological Protection**

- 5.62** All retained trees and hedgerows will be protected in accordance with BS 5837:2012. If works are required to trees for health and safety or to clear overhanging branches, these will be subject to individual bat tree assessments to ensure that bat roosts are not directly affected. Fencing in accordance with BS 5837: 2012 will also protect, at least initially, arable margins and most habitat suitable to support reptiles.
- 5.63** Before any works in areas that may support reptiles begin (arable margins, log piles, any other ruderal, scrub or tall grassland habitats other than arable crop) the area will be cleared of vegetation in a staged manner. The vegetation will be cut to 200mm, left over night, then cut to ground level. Movement of operators with brush cutters will be from west to east so that any animals disturbed will move away from the site into the flood plain area (which will not be developed).
- 5.64** The large mammal hole will be monitored for 21 days prior to construction. Monitoring may be using a camera trap, or with hair traps and sand (to capture paw prints). If no badger activity is observed, the hole can be soft closed (filled with loose soil) without a licence. If badgers are recorded a Natural England licence will be obtained to lawfully close the sett with a staged closure.

## **Protection of Ground Conditions**

- 5.65** A Phase 1 Environmental Risk Assessment (Technical Appendix 2.3) was prepared to support the EIA Scoping Report and has defined the risks in relation to the redevelopment of the site on human health and the environment, including controlled waters.

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

## **Energy and Water Usage**

- 5.67** All relevant contractors will be required to investigate opportunities to minimise and reduce the use of energy and water, such as:
- Use of alternatives to diesel / petrol powered equipment where possible;
  - The incorporation of sources of renewable energy to offset the use of main utilities;
  - Selection and specification of energy efficient plant and equipment;
  - Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both on-site and within site offices encouraging a paper-reduced office and encouraging double-sided printing and photocopying;
  - Use of recycling water systems such as wheel washes; and
  - Use of a rainwater harvesting system for use in equipment and vehicle washing.

- 5.68** The energy and water consumption of the project will be monitored, either through sub-metering or utility bills, to allow comparison against best practice benchmarks.
- 5.69** There is a possibility that vermin and other wildlife may visit the site in search of food. To minimise this problem, workers will avoid consuming food outside of designated areas, which will be kept clean and free of food waste.

## **Cumulative Impact Assessment**

- 5.70** There are a number of proposed developments within the nearby area, some of which have received planning permission or are already under construction and some of which are likely to be granted planning permission subject to Section 106 agreements, in addition to areas which have site allocations from the CDC.
- 5.71** It is considered that the construction phase of the Proposed Development will have the greatest potential to contribute to impact interactions. It is not unusual for construction to take place on more than one site in close proximity to each other and the contractor will undertake regular liaison meetings and reviews with neighbouring sites to plan works so that they do not cause unnecessary disruption.
- 5.72** During construction phase, potential impacts exist for the sensitive receptors, as detailed in Chapter 2 EIA Methodology. The receptors considered to be most sensitive to cumulative impacts during construction phase are pedestrians on the surrounding rights of way, users of the A41 Oxford Road and Kings End road and visitors to the neighbouring Bicester Village. The criteria for identifying those receptors that are considered to be potentially sensitive include the nature of the receptor, proximity to the works, and extent of exposure to impacts and impact interactions.
- 5.73** Potential impact interactions are largely related to noise, dust and traffic. Interactions will take place during the construction phase, and noise and traffic impacts will predominantly occur during piling. The introduction of site hoardings and compliance with the mitigation measures detailed above will reduce as far as possible these impact interactions.
- 5.74** Should the construction programme of any of the cumulative schemes identified in Chapter 2: EIA Methodology, Table 2.1 overlap, a detailed strategy will be developed to mitigate against any particular issues which may arise.

# Construction

# 5

## ***Demolition of the Proposed Development***

- 5.75** The main structure of the Proposed Development has been designed with a minimum design life of 50 years, with shorter design life periods for minor elements.
- 5.76** At the end of its life it is anticipated that the demolition of the Bicester Office Park will use similar methods to those used during construction. Safe working practice's will be devised and implemented during the demolition period. The stages of demolition of the development are:
- Erect hoardings and tower cranes;
  - Soft strip of internal finishes;
  - Remove plant including major service risers;
  - Dismantle the facade glazing. This will be undertaken from either within the building or from external 'mast' climbers/cranes; and
  - Dismantling of the superstructure.

## Introduction

- 6.1** This chapter of the ES assesses the anticipated significant socio-economic effects resulting from the construction and operation of the Proposed Development. An assessment of the permanent socio-economic effects of two different potential schemes has been undertaken (Option A and Option B), the details of which are outlined in the Assessment of Likely Significant Effects.
- 6.2** This chapter sets out the relevant socio-economic planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on the defined impact areas as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 6.3** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in *Chapter 13: Effect Interactions of this ES (Volume I)*.
- 6.4** This chapter is supported by **Appendix 6** which is provided in ES Volume II and broken down into two parts: **Appendix 6A** (policy review) and **Appendix 6B** (full list of references).

## EIA Scoping

- 6.5** An EIA Scoping Report was submitted to Cherwell District Council (CDC) in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in **Technical Appendix 2.2, ES Volume 2**. The Scoping Opinion stated that the socio-economic assessment should include all the main elements included in the outline scope, as follows:
- Temporary employment created during the construction phase of the redevelopment;
  - Gross value added to the local economy by the temporary construction employment;
  - Construction training opportunities;
  - 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;
  - The provision of amenity space for office users;
  - The legislative and planning policy context; and
  - Assessment of apprenticeship opportunities for both the temporary and permanent socio-economic effects.

## Legislative and Planning Policy Context

- 6.6** A review of planning policy has been undertaken, which considers the relevant local, sub-regional and national planning policies, helping to form a clear understanding of the strategic regeneration aspiration for Cherwell and the wider sub-regional area.

- 6.7** The full policy review is included in the supporting **Appendix 6A** and includes:

- **Planning Policy** - National Planning Policy Framework (NPPF), paragraphs 14 and 17;
- **Planning Policy** - Local Planning Policy: Cherwell Local Plan Part 1 (2015), Strategic Objective 1 and 3, Policy SLE1-5;
- **Planning Policy** - Local Plan Saved Policies (2007); and
- **Planning Policy** - South East Midlands Local Enterprise Partnership Strategic Economic Plan (2014).

## Assessment Methodology

- 6.8** This section of the chapter sets out the methodologies used in the assessment of the baseline socio-economic conditions and the socio-economic effects of the Proposed Development.

### Methodology for Determining Construction Effects

- 6.9** The temporary construction employment benefits have been assessed based on the anticipated build cost for the Proposed Development.
- 6.10** Data from the Annual Business Survey published in November 2016<sup>1</sup> reveals that total turnover in the construction sector during 2015 was £242,148 million. The average number of people employed in the construction sector during 2015 was 1.361 million, suggesting that average turnover per full time equivalent construction job in 2014 was £177,919.
- 6.11** Using the build cost estimate and the average turnover per full time equivalent construction job in 2015 of £177,919, the number of person years of temporary construction employment has been estimated.
- 6.12** The widely accepted convention in economic impact assessment is that ten person years of construction employment equate to one full-time equivalent, permanent job in the construction sector. This means that the estimated number of person years of temporary construction employment must be divided by 10 to estimate the number of permanent construction jobs generated.

### Methodology for Determining Completed Development Effects

#### Gross, On Site Employment

- 6.13** The direct employment generated by the completed (and operational) Development at full occupancy is calculated by applying standard employment density ratios to the commercial floor space figures provided for the Proposed Development, using the methodology set out within the Homes and Communities Agency's (HCA)'s Employment Density Guide, 3rd Edition, 2015<sup>2</sup>.
- 6.14** It is assumed that employees would be drawn from a catchment area beyond the Local Area and that while many of the benefits of the Proposed Development would remain in Cherwell, some indirect and induced benefits would accrue across the wider surrounding region.

#### Net Additional Permanent Employment

- 6.15** To calculate the net additional employment of the Proposed Development once operational, adjustments have been made for several factors which, when considered together, allow an assessment of the net additional jobs that will be generated on the site.

<sup>1</sup> Office for National Statistics (2015) Annual Business Survey

<sup>2</sup> Homes and Communities Agency (2015) Employment Density Guide (Third Edition)

# SOCIO-ECONOMICS



6.16 The following adjustment factors have been allowed for:

- **Displacement effects** – will occur if some firms simply switch jobs from one location to another for example by moving staff from an existing operation in Bicester to the Proposed Development;
- **Leakage effects** – will occur if some of the jobs created by the Proposed Development are taken up by people living outside the regional impact area;
- **Substitution effects** – occur when firms substitute one activity or input for a similar one to take advantage of public funding. In this case there will be no substitution effects;
- **An indirect multiplier effect** – is likely to create supply chain effects which will benefit local firms such as cleaning and maintenance contractors, training agencies and other suppliers of goods and services to the occupiers of the Proposed Development. This effect is also known as a **supply linkage multiplier**; and
- **An induced multiplier effect** – is associated with increased expenditure in the local area by people deriving incomes from the direct and indirect effects of the Proposed Development. The induced effects of the Proposed Development will bring benefits to local shops and other service providers. This effect is also known as a **consumption multiplier**.

6.17 In estimating the size of these effects advice provided by the Additionality Guide (Fourth Edition 2014)<sup>3</sup> has been drawn on in this assessment. This guidance provides ready reckoner values which can be used to model the scale of these adjustment factors in the absence of empirical evidence on their value. Table 6.1 below shows the ready reckoner values used.

**Table 6.1 – Adjustment Factors used in Estimating Net Additional Employment**

Adjustment factor	Scale of adjustment	Adjustment value
Displacement effects	Low	25%
Leakage effects	Low	10%
Substitution effects	None	0%
Combined multiplier effects	Medium supply linkages	1.3

## Gross Value Added to the Local Economy

6.18 To estimate the annual GVA created by the completed Development information from the ONS (2017) Sub-regional Productivity tables has been used.

### Understanding gross value added

6.19 The Office for National Statistics defines Gross Value Added (GVA) as “the contribution of each individual producer, industry or sector to the economy.” GVA can be estimated at either an aggregate (or macro) level or at an individual producer (or micro) level, as follows:

- **At macro level** – GVA measures the value of output (goods and services) produced in the economy minus the cost of raw materials and other inputs used to produce them; and
- **At micro level** – GVA measures the value of output generated by a producer minus the costs associated

with the production of the output.

### Assessing Baseline Socio-economic Conditions

6.20 In assessing the socio-economic effects of the Proposed Development, baseline information on a variety of socio-economic indicators has been identified and interpreted. The indicators have been grouped into several thematic areas. Taken together, these thematic areas provide a picture of the socio-economic strengths and weaknesses of a local area.

6.21 Data on baseline socio-economic conditions from a variety of sources has been obtained. The sources include: the 2011 Census, the Office for National Statistics (ONS), the National Online Manpower Information Service (NOMIS), Public Health England and the English Indices of Deprivation 2015 which allow consideration of socio-economic conditions at very small local areas known as lower layer super output areas (SOAs).

6.22 The GeoInsight service provided by Pitney Bowes has also been used. GeoInsight is a GIS-based mapping tool which enables socio-economic data to be collated and analysed at a range of different geographies.

### Assessing the Significance of Socio-economic effects

6.23 The socio-economic effects identified in this assessment have been categorised as **adverse** or **beneficial** depending on their expected effect. The identified effects have then been evaluated against four main criteria, drawing on the evaluation criteria typically used in environmental impact assessment which.

are as follows:

- **Scale of the effect** – this includes the magnitude and likely severity of the impact;
  - **Duration of the effect** – this distinguishes between temporary impacts (those effects associated with the demolition, refurbishment and construction period) and those that will continue to have an effect in the long-term (those effects associated with the completed and operational Development);
  - **Importance of the effect** – to the affected communities in the impact area; and
  - **Compatibility of the effect** – with the outcomes sought by relevant regeneration and economic development policies.
- 6.24 The significance of the identified socio-economic effects has been assessed by considering both the magnitude of the effect and the sensitivity of the receptor. Table 6.2 below shows the range of potential assessments for the significance of socio-economic effects.

**Table 6.2 – Assessing the Significance of Socio-Economic Effects**

Magnitude	Sensitivity			
	Very High	High	Moderate	Low
Major/Substantial	Major – Adverse or Beneficial	Major – Adverse or Beneficial	Major to Moderate – Adverse or Beneficial	Moderate to Minor – Adverse or Beneficial
Moderate	Major to Moderate – Adverse or Beneficial	Major to Moderate – Adverse or Beneficial	Moderate to Minor – Adverse or Beneficial	Minor – Adverse or Beneficial
Minor/Slight	Moderate – Adverse or Beneficial	Moderate to Minor – Adverse or Beneficial	Minor – Adverse or Beneficial	Minor to Negligible – Adverse or Beneficial
Negligible	Minor – Adverse or Beneficial	Negligible	Negligible	Negligible

<sup>3</sup> Homes and Communities Agency (2014) Additionality Guide



# SOCIO-ECONOMICS

# 6

6.25 The assessment of significance reflects the following definitions:

- **Adverse Effect of Major/substantial Significance** – A detrimental or negative effect resulting in a geographically extensive, or substantial change to a socio-economic resource or receptor. The change would be an important factor in the decision-making process.
- **Adverse Effect of Moderate Significance** – A detrimental or negative effect resulting in a moderate demonstrable change to a socio-economic resource or receptor. The change would typically be experienced beyond the local scale, and could be considered a factor in the decision-making process.
- **Adverse Effect of Minor/slight Significance** – A detrimental or negative effect resulting in a short, small or highly localised change to a socio-economic resource or receptor.
- **Beneficial Effect of Minor/slight Significance** – An advantageous or positive effect resulting in a short term, small or highly localised change to a socio-economic resource or receptor.
- **Beneficial Effect of Moderate Significance** – An advantageous or positive effect resulting in a moderate demonstrable change to a socio-economic resource or receptor. The change would typically be experienced beyond the local scale, and could be considered a factor in the decision-making process.
- **Beneficial Effect of Major/substantial Significance** – An advantageous or positive effect resulting in a geographically extensive, or substantial change to a socio-economic resource or receptor. The change would be an important factor in the decision-making process; and
- **Negligible effect** – An adverse or beneficial effect which is too small to be assessed or measured.

6.26 There is no formalised technical guidance or criteria available to assess the significance of socio-economic effects. Potential effects are assessed by applying the criteria outlined in Table 6.2 using professional judgement. Where possible, the likely socio-economic effects are quantified. However, some impacts by their nature can only be evaluated on a qualitative basis.

6.27 The duration of the activity that affects a given resource or receptor is considered either as short term (typically those effects associated with the demolition, refurbishment and construction period) or long-term (typically those associated with the Proposed Development during operation).

6.28 The geographical extent considers the appropriate administrative boundary or geographical area of influence within which an effect occurs and is assessed at the following spatial scales:

- **Local** – the five Bicester electoral wards as of 2015 in and around which the Proposed Development is located. The wards are: Bicester Town, Bicester South, Bicester North, Bicester East and Bicester West;
- **District** – the Cherwell District Council local authority area; and
- **Regional** – the South East Midlands Local Enterprise Partnership (SEMLEP) area, comprising the following 11 local authorities: Aylesbury Vale District, Bedford Borough, Central Bedfordshire, Cherwell District, Corby Borough, Daventry District, Kettering Borough, Luton Borough, Milton Keynes, Northampton Borough and South Northants.

## Baseline Conditions

6.29 The baseline assessment has been prepared through a desktop analysis of economic and social conditions, using a wide range of socio-economic indicators. The main thematic areas considered within the baseline assessment are as follows:

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

## Key Messages

6.30 The key messages from the assessment of baseline conditions are as follows:

- **Population** – There is a higher proportion of working age people and a lower proportion of people of retirement age within the local impact area compared to the national average. However, the same figures for Cherwell are more comparable to the national average;
- **Housing** – Average house prices are significantly higher within Cherwell compared to the national average, yet more people still own their own home either outright or with a mortgage than the national average;
- **Employment** – A high proportion of the working age population in Cherwell are economically active, with good levels of job density and lower levels of unemployment and benefit claimants compared to the national average;
- **Health conditions** – Although health indicators for Cherwell are generally better than the national averages, there is a large gap between the life expectancy of people living in the most deprived and the least deprived parts of the local authority; and
- **Deprivation** – The local impact area is mixed regarding deprivation, with a predominately better than average picture for employment and income deprivation but worse than average representation for education and skills deprivation.

6.31 A full review of baseline conditions is included in **Appendix 6B**.

## Assessment of Likely Significant Effects

6.32 This section identifies and assesses the significance of the socio-economic effects associated with the Proposed Development.

### Construction Phase

6.33 This section considers the following **temporary socio-economic effects** arising during the construction phase of the Proposed Development:

- Construction employment;
- Gross valued added by the construction employment; and
- Construction training opportunities.

### Construction Employment

6.34 The Proposed Development will include a significant construction phase which will generate turnover and

temporary employment for construction firms and related trades.

- 6.35** The UK construction sector is characterised by an extensive network of supply chains and contracting relationships covering a very wide range of trades and skills. As a result, the spin off benefits from new construction projects are greater than for many other economic sectors in the UK.
- 6.36** The temporary construction employment benefits have been assessed based on the anticipated build cost for the Proposed Development. The total construction cost for the Proposed Development is estimated to be £111 million.
- 6.37** Using the build cost estimate of £111 million and the average turnover per full time equivalent construction job in 2015 of £177,919 (as noted in the Methodology for Determining Construction Effects), the development proposals will generate 624 person years of temporary construction employment. This is equivalent to 624 construction workers being employed on a full-time basis for twelve months.
- 6.38** The standard convention in economic impact assessment is that ten person years of construction employment equate to one full-time equivalent, permanent job in the construction sector. This means that the construction of the scheme will support the equivalent of around 62.4 permanent construction jobs.
- 6.39** The significance of the temporary employment generated by the construction phase of the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.
- 6.40** The construction employment has been assessed as a **short-term, beneficial impact of moderate significance** at the **district** level.

### *Gross Value Added by Temporary Construction Employment*

- 6.41** Gross value added (GVA) is a conventional measure of economic well-being. GVA measures the value of output generated by a producer minus the costs associated with the production of the output. The commentary on operational effects later in this chapter provides further details on the definition and measurement of GVA.
- 6.42** The Annual Business Survey 2015 also provides estimates of the approximate gross value added by different sectors of the UK economy. During 2015 the approximate gross value added by the construction sector was £92.122 billion.
- 6.43** With an average number of people employed in the construction sector during 2015 of 1.361 million, this suggests that the gross value added per full time equivalent construction job in 2014 was £67,687.
- 6.44** It is estimated that 624 person years of temporary construction employment generated by the Proposed Development will create gross value added to the economy of around £42.2 million.
- 6.45** The significance of the gross value added by the employment generated by the construction phase of the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.
- 6.46** The GVA from construction employment been assessed as a **short-term, beneficial impact of moderate significance** at the **district** level.

### *Construction Training Opportunities*

- 6.47** The Proposed Development will involve a phased construction programme. Given the scale of building activity,

there is considerable scope to provide training, apprenticeships and work experience in a range of construction trades. These opportunities will be available during the construction phases for the commercial space at the Proposed Development.

- 6.48** For example, there will be opportunities for local young people to gain NVQ Level 2 and Level 3 training and practical experience in a range of different construction and engineering trades. Initiatives of this sort are typically run by a training provider in partnership with the main contractor for the construction programme.
- 6.49** The Applicant is committed to working with its suppliers and contractors to maximise the opportunities for Bicester residents to take advantage of the construction training opportunities created by the Proposed Development.
- 6.50** The significance of the training opportunities that will be created by the construction phase of the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.
- 6.51** The construction training opportunities have been assessed as a **short-term beneficial impact of minor to moderate significance** at the **district** level.
- 6.52** The precise significance of this effect will depend on the quality and effectiveness of the training programmes established and the mechanisms put in place for their delivery.

### **Completed Development**

- 6.53** This section considers the following **permanent socio-economic effects** arising once the Proposed Development becomes operational:
- **Employment effects** – the permanent employment that will be generated by the Proposed Development;
  - **Economic effects** – the gross valued added to the local economy by the Proposed Development and additional spending by officer workers at the Proposed Development;
  - **Training and skills development opportunities** – once the commercial space at the Proposed Development becomes operational; and
  - **Amenity space** – the amount of amenity space provided for future occupiers of the Proposed Development.

### ***Permanent Employment – Gross, On Site Employment***

- 6.54** The Proposed Development will create a major new employment hub, providing permanent jobs in a range of sectors. An assessment of the permanent socio-economic effects of two different potential schemes has been undertaken (Option A and Option B), as follows:
- 6.55 Option A:** The Proposed Development provides a total of 49,000m<sup>2</sup> (NIA) of B1a Use floorspace.
- 6.56 Option B:** The Proposed Development provides a total of 36,750m<sup>2</sup> (NIA) of B1a Use floorspace and 12,250m<sup>2</sup> of B1b Use floorspace.
- 6.57** Table 6.3 below outlines the assumptions used when estimating the gross, on site employment that will be created by Option A and Option B.

# SOCIO-ECONOMICS

# 6

**Table 6.3 – Gross, On Site Permanent Employment (Option A and Option B)**

Use class	Use	Floor space (m <sup>2</sup> )	FTE jobs	Comments and assumptions
<b>Option A</b>				
<b>B1a</b>	Office	49,000 NIA	3,769 to 4,900	Employment density of 10 to 13 based on net internal area (NIA)
<b>Option A Total</b>		<b>49,000 NIA</b>	<b>3,769 to 4,900</b>	
<b>Option B</b>				
<b>B1a</b>	Office	36,750 NIA	2,826 to 3,675	Employment density of 10 to 13 based on net internal area (NIA)
<b>B1b</b>	R&D* Space	12,250 NIA	204 to 306	Employment density of 40 to 60 based on net internal area (NIA)
<b>Option B Total</b>		<b>49,000 NIA</b>	<b>3,030 to 3,981</b>	

\* Research and Development

6.58 Table 6.3 assumes the following:

- **Employment density** – evidence provided by the *Employment Density Guide* (Third Edition 2015) has been used. Employment density refers to the average floor space in sqm per full-time equivalent (FTE). Employment density describes the intensity of use within a building and is an indicator of the amount of space typically occupied by one person in a commercial building; and
- **B1a office** – the employment density range of 10 to 13 provided by the Employment Density Guide under the B1a general office category has been adopted. This employment density would accommodate a range of potential office users, including corporate, professional services, public sector and finance occupiers. The employment density range has been applied to the net internal area of the B1a office space in the Proposed Development.
- **B1b research and development space** – the employment density range of 40 to 60 provided by the Employment Density Guide under the B1b Use Class has been adopted. The employment density range has been applied to the net internal area of the B1b office space in the Proposed Development.

6.59 Based on the above assumptions, it is estimated that **Option A** will create gross, on site employment of **3,769 to 4,900 full-time equivalent (FTE) permanent jobs**.

6.60 Based on the above assumptions, it is estimated that **Option B** will create gross, on site employment of **3,030 to 3,981 full-time equivalent (FTE) permanent jobs**.

### **Gross, On Site Employment – Contribution to the District Impact Area Employment Base**

6.61 The Proposed Development (Option A and Option B) will create an employment hub which will make a significant contribution to the employment base of the district impact area.

6.62 Data from the National Online Manpower Information Service (NOMIS) reveals that there were 50,000 full-time and 22,000 part-time employee jobs in Cherwell during 2015. This means that the gross, on site employment created by **Option A** represents an increase of between 7.5% and 9.8%, and **Option B** represents an increase of between 6% and 8%, in the number of full-time jobs throughout Cherwell.

6.63 The significance of the gross on site employment that will be generated by the Proposed Development has been assessed based on the criteria outlined earlier in this chapter.

6.64 The gross, on site permanent employment created by **Option A** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

6.65 The gross, on site permanent employment created by **Option B** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

### **Net Additional Permanent Employment**

6.66 The 3,769 to 4,900 FTE jobs that will be created by Option A and the 3,030 to 3,981 FTE jobs that will be created by Option B represent a gross employment figure. In order to understand the real employment effects of the Proposed Development, adjustments have been made for several factors which, when considered together, allow an assessment of the net additional jobs that will be generated on this site.

6.67 Based on the assumptions outlined in the Methodology for Determining completed Development Effects, the net additional jobs that will be created by the Proposed Development has been calculated using the following formula:

Gross on site jobs x (1 – displacement) x (1 – leakage) x combined multiplier effects = net additional jobs

**Option A:** 3,769 to 4,900 x (1 – 0.25) x (1 – 0.10) x 1.3 = **3,307 to 4,300 net additional jobs**

**Option B:** 3,030 to 3,981 x (1 – 0.25) x (1 – 0.10) x 1.3 = **2,658 to 3,493 net additional jobs**

6.68 After allowing for displacement, leakage and multiplier effects, it is estimated that **Option A** will create **3,307 to 4,300 net additional jobs**.

6.69 After allowing for displacement, leakage and multiplier effects, it is estimated that **Option B** will create **2,658 to 3,493 net additional jobs**.

6.70 The net additional permanent employment created by **Option A** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

6.71 The net additional permanent employment created by **Option B** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

### **Gross Value Added (GVA) to the Local Economy**

6.72 The net additional employment created by the Proposed Development will have wider economic effects by generating gross value added to the local economy.

6.73 In estimating the GVA that would be generated by the Proposed Development, data provided by the Office for National Statistics has been used. Detailed information on GVA per filled job is provided by the Regional

# SOCIO-ECONOMICS

# 6

Economic Analysis Sub Regional Productivity Tables published in January 2017<sup>4</sup>. Table B3 reveals that GVA per filled job for Oxfordshire was £53,879 in 2015, the most recent year for which data is currently available.

- 6.74** Based on the above evidence, it is estimated that the 3,307 to 4,300 net additional jobs created by **Option A** would create a gross value added to the local economy of **£178.2 million to £231.7 million** annually in perpetuity.
- 6.75** Based on the above evidence, it is estimated that the 2,658 to 3,493 net additional jobs created by **Option B** would create a gross value added to the local economy of **£143.2 million to £188.2 million** annually in perpetuity.
- 6.76** This analysis does not provide GVA per filled job by industry sector. The GVA per filled job for Oxfordshire of £53,879 in 2015 covers all sectors. This means that it will slightly overstate the GVA for office uses which will typically be lower than the values for manufacturing industries. Nevertheless, the Proposed Development (Option A and Option B) will still make a very significant contribution to the gross value added in the local, district and regional impact areas defined for the assessment.
- 6.77** The significance of the gross value added that will be created by Option A and Option B has been assessed based on the criteria outlined earlier in this chapter.
- 6.78** The gross value added by **Option A** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.
- 6.79** The gross value added by **Option B** has been assessed as a **long-term, beneficial impact of major significance** at the **regional** level.

## ***Training and Skills Opportunities***

- 6.80** On completion of the Proposed Development (Option A and Option B) there will be a range of job brokerage and other Cherwell District Council supported recruitment initiatives that could be tailored to meet the needs of local people and prospective employers. Typically these initiatives provide help for local people with confidence-building, interview skills and skills for life development, as well as support for employers in identifying dedicated staff with real potential.
- 6.81** The training and skills development opportunities for **Option A** and **Option B** have been assessed as a **long-term, beneficial impact of moderate significance** at the **district** level.

## ***Additional local spending by office workers at the Proposed Development***

- 6.82** In the absence of empirical evidence on the scale of spending by future employees at the site, a modest local spend assumption of £5 per working day per directly employed FTE member of staff has been used.
- 6.83** Assuming £5 daily spending for 222 working days per year, the 3,307 to 4,300 net additional jobs created by **Option A** would generate an estimated spend of **£3.7 million to £4.8 million per annum**.
- 6.84** Assuming £5 daily spending for 222 working days per year, the 2,658 to 3,493 net additional jobs created by **Option B** would generate an estimated spend of **£3 million to £3.9 million per annum**.

- 6.85** The additional local spending by office workers at the Proposed Development (**Option A**) has been assessed as a **long term, beneficial impact of moderate significance** at the **district** level.

- 6.86** The additional local spending by office workers at the Proposed Development (**Option B**) has been assessed as a **long term, beneficial impact of moderate significance** at the **district** level.

## ***Amenity Space Provision***

- 6.87** The Proposed Development (Option A and Option B) includes 9,800m<sup>2</sup> of amenity space which will include the provision of hard and soft landscaping such as benches and planting for the benefit of future occupiers. Furthermore, the lake to the north of the site as well as the land to the east of the site within the Applicant's ownership boundary is publicly accessible and provides further amenity area.
- 6.88** The provided amenity space and the existing nearby open space will together provide a high quality setting for the new office park.

## **Mitigation and Monitoring**

### ***Construction***

- 6.89** No adverse socio-economic effects that require mitigation are predicted during the construction phase of the Proposed Development (Option A and Option B).
- 6.90** The delivery of training opportunities will be monitored during the construction phase. This monitoring could take the form of an Employment and Skills Plan agreed between Cherwell District Council and the main contractor for the building project.

### ***Operation***

- 6.91** All of the permanent socio-economic effects identified in this chapter for Option A and Option B will be beneficial and so no mitigation measures are proposed.
- 6.92** The delivery of training opportunities will be monitored during the operational phase. This monitoring could take the form of an Employment and Skills Plan agreed between Cherwell District Council and key employers at the office park.

## **Residual Effects**

### ***Construction***

- 6.93** There will be no adverse effects during the construction phase of the Proposed Development (Option A and Option B).
- 6.94** There will be no residual effects arising from the temporary construction employment, gross value added and training opportunities provided by the Proposed Development. However, there will be some long-term benefits for those people who have gained employment experience and skills whilst working during the construction phase of the Proposed Development.

<sup>4</sup> Office for National Statistics (2017) Regional Economic Analysis sub-regional productivity tables

# SOCIO-ECONOMICS

## Operation

- 6.95 There will be no adverse effects during the operation of the Proposed Development (Option A and Option B).
- 6.96 The employment and economic effects of the Proposed Development (**Option A** and **Option B**) are considered to be a **beneficial effect of major significance**.

Table 6.5: Summary of Residual Effects (Option A and Option B)

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre-Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
<b>Option A</b>			
<b>Construction</b>			
Construction employment	Short-term, beneficial impact of moderate significance at the district level	None	<b>N/a</b>
Gross value added	Short-term, beneficial impact of moderate significance at the district level	None	<b>N/a</b>
Construction training	Short-term, beneficial impact of minor to moderate significance at the district level	None	<b>N/a</b>
<b>Completed Development</b>			
<b>Employment effects</b>			
Gross on site permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	<b>Major</b>
Net additional permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	<b>Major</b>
<b>Economic effects</b>			
Gross value added	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	<b>Major</b>
Additional local spending	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	<b>Moderate</b>
<b>Training opportunities</b>			
Training and skills development opportunities	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	<b>Moderate</b>
<b>Option B</b>			

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre-Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
<b>Construction</b>			
Construction employment	Short-term, beneficial impact of moderate significance at the district level	None	<b>N/a</b>
Gross value added	Short-term, beneficial impact of moderate significance at the district level	None	<b>N/a</b>
Construction training	Short-term, beneficial impact of minor to moderate significance at the district level	None	<b>N/a</b>
<b>Completed Development</b>			
<b>Employment effects</b>			
Gross on site permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	<b>Major</b>
Net additional permanent jobs	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	<b>Major</b>
<b>Economic effects</b>			
Gross value added	Long-term, beneficial impact of major significance at the regional level	Long-term, beneficial impact of major significance at the regional level	<b>Major</b>
Additional local spending	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	<b>Moderate</b>
<b>Training opportunities</b>			
Training and skills development opportunities	Long-term, beneficial impact of moderate significance at the district level	Long-term, beneficial impact of moderate significance at the district level	<b>Moderate</b>

## Cumulative Effects Assessment

6.97 The following cumulative effects of the Proposed Development have been considered:

- **Intra Cumulative Effects** – the combined effect of individual impacts arising from the Proposed Development (see Chapter 14: Effect Interactions); and
- **Inter Cumulative Effects** – the combined effect of impacts arising from the Proposed Development in conjunction with other relevant developments.

# SOCIO-ECONOMICS

# 6

## Intra Cumulative Effects

- 6.98** Intra cumulative effects will arise during the construction period of the Proposed Development (Option and Option B) through the combination of additional construction jobs created by, and the construction training opportunities arising from, the Proposed Development. The result of these combined effects would be a better skilled construction workforce within the local area. The scale of these intra cumulative effects will depend on the extent to which the construction training opportunities are delivered in practice.
- 6.99** Intra cumulative effects would arise once the Proposed Development (Option A and Option B) is occupied, through the interaction between the permanent jobs created and the skills and training opportunities generated by the completed Development. The combination of these effects will result in a better skilled workforce in the local area. The scale of these intra cumulative effects will depend on the extent to which training opportunities are delivered in practice during the operational phase.
- 6.100** In addition to the intra cumulative effects described above, there is a direct relationship between the estimated employment generation (of both the construction period and completed development) and GVA. As indicated in the Methodology, the GVA for both the construction and operational periods is calculated using the estimated employment generation figure and, as such, the two effects are interrelated.

## Inter Cumulative Effects

- 6.101** Table 6.6 below outlines the schemes which have been included in the cumulative effects assessment, as agreed with Cherwell District Council, comprising both site allocations and recent planning permissions.

**Table 6.6 Schemes Included in Cumulative Effects Assessment**

Site	Proposal/Description	Status	Approximate distance from site	Estimated number of jobs generated by completed development
<b>SE Bicester Extension</b>	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	3,000
<b>NW Bicester Extension</b>	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	3,000
<b>Kingsmere Residential Estate</b>	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	N/a
<b>Bicester Village Phase 4</b>	5,181m <sup>2</sup> GIA of retail floorspace and 147 car parking spaces	Permission granted November 2016	200m	200*

Site	Proposal/Description	Status	Approximate distance from site	Estimated number of jobs generated by completed development
<b>Bicester Gateway Retail</b>	Outline application for 4 no. Class A1 units (7,840m <sup>2</sup> GIA); 1 Class A3 unit (435m <sup>2</sup> GIA); and 1 Class D2 unit (967m <sup>2</sup> GIA) with car parking area (345 spaces)	Resolution to grant at 13 April 2017 Planning Committee (LPA Ref. 16/02505/OUT)	0.8km	300*
<b>Graven Hill</b>	Future phases in relation to approval of reserved matters in relation to LPA Ref. 15/02159/OUT (2,100 homes)	RMA approved, NMA to increase GIA (LPA Ref. 17/00022/NMA) was approved on 8 March 2017	3.7km	N/a
<b>Bicester Gateway</b>	Site Allocation – Bicester 10: Knowledge economy employment development to the south of the existing retail area (Wyvale Garden Centre), adjacent to the A41. Approximately 3,500 jobs in B1 uses (high tech knowledge industries)	Site allocation	0.8km	3,500
<b>Bicester Business Park (Proposed Development)</b>	Full planning application for the construction of a business park comprising between 55,000 and 60,000 sqm office use (B1), parking for approximately 2,000 cars, associated highway, infrastructure and earthworks.	Proposed Development	N/a	Option A: 3,769 to 4,900 Option B: 2,658 to 3,493
<b>TOTAL</b>				<b>Option A: 13,769 to 14,900</b> <b>Option B: 12,658 to 13,493</b>

\*A high-level estimate of the number of jobs these proposals would generate has been undertaken.

- 6.102** Table 6.6 identifies that cumulatively the site allocations, planning permissions and **Option A** of the Proposed Development would generate an estimated 13,769 to 14,900 jobs. Table 6.6 also identifies that cumulatively the site allocations, planning permission and **Option B** of the Proposed Development would generate an estimated 12,658 to 13,493 jobs.
- 6.103** The time period over which these jobs would come forward cannot accurately be predicted, due to the inclusion of site allocations in the assessment for which there is not a current planning application. However, the inclusion of the site allocations within the local plan suggests that the Council consider them deliverable within the plan period (2011 to 2031).
- 6.104** As identified earlier in the chapter, in 2015 there were 50,000 full-time employees in Cherwell. As such, the cumulative employment generated by the schemes included in the assessment would increase the 2015 Cherwell full-time employment base by 26% to 30% (**Option A**) and 25% to 27% (**Option B**).

# SOCIO-ECONOMICS

# 6

## Conclusions

### Construction phase

**6.105** The construction phase will generate three different temporary socio-economic effects. All three of these temporary socio-economic effects will be beneficial for Option A and Option B.

**Table 6.7 – Construction Phase – Temporary Socio-Economic Effects for the Proposed Development (Option A and Option B)**

Temporary effect	Scale of the effect	Significance	Mitigation measures	Residual effects
Construction employment	624 person years	Moderate – beneficial	Not required	None
Gross value added	£42.2 million	Moderate - beneficial	Not required	None
Construction training	Not quantified	Minor to moderate - beneficial	Not required	None

### Completed Development

**6.106** Once it is operational and fully occupied, the Proposed Development (Option A and Option B) will generate five different permanent socio-economic effects. All five will be beneficial effects which will be enjoyed in perpetuity.

**6.107** The Proposed Development (Option A and Option B) will create a major new employment hub which will make a very significant contribution to the delivery of jobs and economic growth for the local, district and regional impact areas for the assessment.

**6.108** The gross, on site employment of 3,769 to 4,900 full-time equivalent permanent jobs created by **Option A** represents an increase of between 7.5% and 9.8% in the number of full-time jobs throughout Cherwell District Council.

**6.109** The gross, on site employment of 3,030 to 3,981 full-time equivalent permanent jobs created by **Option B** represents an increase of between 6% and 8% in the number of full-time jobs throughout Cherwell District Council.

**Table 6.8 – Operational Phase – Permanent Socio-Economic Effects for the Proposed Development (Option A and Option B)**

Temporary effect	Scale of the effect	Significance	Mitigation measures	Residual effects
<b>Option A</b>				
<b>Employment effects</b>				
Permanent jobs	3,769 to 4,900 full-time equivalent permanent jobs	Major – beneficial	Not required	Major – beneficial
Net additional permanent jobs	3,307 to 4,300 full-time equivalent net additional jobs	Major - beneficial	Not required	Major – beneficial
<b>Economic effects</b>				

Temporary effect	Scale of the effect	Significance	Mitigation measures	Residual effects
Gross value added	£178.2 million to £231.7 million	Major – beneficial	Not required	Major – beneficial
Additional local spending	£3.67 million to £4.77 million	Moderate – beneficial	Not required	Moderate – beneficial
<b>Training opportunities</b>				
Training and skills development opportunities	Not quantified	Moderate – beneficial	Not required	Moderate – beneficial
<b>Option B</b>				
<b>Employment effects</b>				
Permanent jobs	3,030 to 3,981 full-time equivalent permanent jobs	Major – beneficial	Not required	Major – beneficial
Net additional permanent jobs	2,658 to 3,493 full-time equivalent net additional jobs	Major - beneficial	Not required	Major – beneficial
<b>Economic effects</b>				
Gross value added	£143.2 million to £188.2 million	Major – beneficial	Not required	Major – beneficial
Additional local spending	£3 million to £3.9 million	Moderate – beneficial	Not required	Moderate – beneficial
<b>Training opportunities</b>				
Training and skills development opportunities	Not quantified	Moderate – beneficial	Not required	Moderate – beneficial

# TRAFFIC AND TRANSPORT

# 7

## Introduction

- 7.1 This chapter of the ES reports the findings of an assessment of the likely significant environmental effects of the Proposed Development with respect to traffic and transport.
- 7.2 This chapter sets out the relevant planning policy framework upon which the Application will be determined, the methods used to assess potential effects of the Proposed Development, the baseline conditions and potential effects on the local highway network as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 7.3 The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 14: Effect Interactions of this ES (Volume 1).
- 7.4 This chapter is supported by a Transport Assessment (TA) prepared by Motion, provided as ES Volume 2: Appendix 7.1.

## Legislative and Planning Policy Context

- 7.5 A summary of the relevant planning policies is found below while full details are provided in the Transport Assessment attached at Appendix 7.1:
  - National Planning Policy Framework (March 2012)<sup>1</sup>; and
  - Cherwell Local Plan 2011-2031 (July 2015)<sup>2</sup>.

## Assessment Methodology

- 7.6 This section of the chapter sets out the assessment methodology used to determine the effects of the Proposed Development, both during the construction phase and during the operation of the Proposed Development.
- 7.7 The scope of assessment and the significance criteria identified have been developed based on guidance set out in the following documents:
  - 'Guidelines for Environmental Impact Assessment, IEMA, 2004'<sup>3</sup>; and
  - 'Guidelines for the Environmental Assessment of Road Traffic, IEMA, 1993'<sup>4</sup>.
- 7.8 A separate TA has been prepared in relation to the Proposed Development. This ES chapter has been prepared based on the findings of the TA and summarises the likely significant effects of the Proposed Development in relation to traffic and transport.
- 7.9 The completion year of 2026 forms the future baseline scenario as agreed with Oxfordshire County Council (OCC), with a current baseline year of 2017. Potential effects were considered for the morning (0800 - 0900) and evening (1700 – 1800) peak hours and throughout the day.
- 7.10 An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2. This chapter has been prepared with consideration of the Scoping Opinion provided by CDC and addresses the matters raised within the Scoping Opinion including effect of the vehicle trips associated with the development on junctions in the vicinity of the site including consideration of allocated and committed developments in the vicinity of the site. In addition, the

effect of the development proposals on walkers, cyclists, equestrians and those with disabilities has been assessed.

- 7.11 Operational effects of committed developments, as detailed during EIA scoping, have been accounted for as part of the future baseline scenario. In this way, cumulative effects associated with traffic and transport have been considered in this chapter of the ES within the assessment of the Proposed Development, which is consistent with the advice set out in section 10.3 of IEMA (2004) Guidelines for Environmental Impact Assessment.
- 7.12 The 'Guidelines for the Environmental Assessment of Road Traffic, IEMA, 1993' set out a number of potential environmental effects which may require assessment. Those of which are relevant to the Proposed Development and are therefore covered in this assessment include:
  - Severance;
  - Delay;
  - Amenity;
  - Fear and intimidation; and
  - Accidents and safety.
- 7.13 With this chapter the effect of the Proposed Development on amenity, fear and intimidation can be considered together as they are considered to be strongly interrelated.

## Methodology for Determining Construction Effects

- 7.14 The expected number of construction staff on site and construction vehicle movements to the site are detailed at Chapter 5: Construction of this Volume of this ES. Construction vehicle movements to the site have been distributed on the local road network utilising the most direct routes to the strategic and trunk road networks.
- 7.15 The effect of construction vehicle movements on the local highway network have been assessed with reference to the environmental effects identified above and the significant criteria set out below.

## Methodology for Determining Completed Development Effects

- 7.16 In order to determine the likely effects of the Proposed Development once completed, vehicle trip rates have been extracted from the TRICS database and agreed with OCC. These have been applied to the proposed 60,000m<sup>2</sup> GEA office floorspace (comprising the maximum possible floorspace within the outline parameters) to determine the likely vehicle trips associated with the Proposed Development during the morning and evening peak hours and throughout the day.
- 7.17 The resulting vehicle trips have been distributed on the local highway network with reference to journey to work data from the 2011 Census data. The effect of the Proposed Development on the highway network local to the site has been assessed based on the following study area, as agreed with OCC:
  - Oxford Road / Middleton Stoney / King's End roundabout;
  - Oxford Road / Pingle Drive roundabout;
  - Oxford Road / A41 / Esso signalised roundabout;
  - Rodney House roundabout;
  - A41 / Lakeview Drive signalised junction;

<sup>1</sup> Department for Communities and Local Government. 2012. The National Planning Policy Framework. HMSO.

<sup>2</sup> Cherwell District Council, 2016. Cherwell Local Plan, 2016. Adopted Cherwell Local Plan 2011-2031 Part 1 (incorporating Policy Bicester 13 re-adopted on 19 December 2016).

<sup>3</sup> IEMA. 2004. Guidelines for Environmental Impact Assessment,

<sup>4</sup> IEMA. 1993. Guidelines for the Environmental Assessment of Road Traffic



# TRAFFIC AND TRANSPORT

# 7

- A41 / Kingsmere signalised junction; and
- A41 / Bicester Park & Ride / Vendee Drive Roundabout.

7.18 Junction capacity modelling has been undertaken at the agreed scope of junctions using the industry standard junction modelling package for each junction type, namely ARCADY for roundabout junctions and LinSig for signal controlled junctions. Where relevant, consideration has been given to committed and ongoing junction improvement works at the junctions listed above.

7.19 The effect of vehicle movements associated with the operation of the Proposed Development have been assessed with reference to the likely effects identified above and the significance criteria set out below.

## Significance Criteria

7.20 The following criteria have used to assess how far a potential impact deviates from the baseline condition, i.e. the magnitude of change, which results in the likely effect, and these are set out in Table 7.1 below.

**Table 7.1 Magnitude of Impact**

Magnitude	Criteria
Large	Changes which are likely to be perceptible and which would significantly change conditions which would otherwise prevail to the extent that it would significantly affect travel behaviour
Medium	Changes which are likely to be perceptible and which would materially change conditions which would otherwise prevail to the extent that it may affect travel behaviour to a measurable degree
Small	Changes which are likely to be perceptible but not the extent that it would materially change conditions which would otherwise prevail
Negligible	Changes which are unlikely to be perceptible

7.21 The significance of a likely effect is derived by considering both the sensitivity of the feature and the magnitude of change, as demonstrated in Table 7.2 below which considers the magnitude of an effect against the sensitivity of the receptor in order to identified the overall significance of the effect.

**Table 7.2 - Effect of Significance**

		Magnitude of change / impact			
		Large	Medium	Small	Negligible
Receptor sensitivity	High	Major	Major	Moderate/Minor	Negligible
	Moderate	Major	Moderate	Minor	Negligible
	Low	Moderate/Minor	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

7.22 It is noted that moderate and major effects are considered to be 'significant'. Where an effect is assessed as being within the "moderate-minor" category professional judgment has been used to determine if it is considered a significant effect or not.

## Baseline Conditions

### 2017 Baseline – Existing Situation

7.23 The following provides an overview of the current baseline transport and accessibility conditions within the study area, having regard to pedestrian and cycle facilities, public transport and the operation of the existing

local highway network. This analysis provides the baseline context against which the Proposed Development is assessed.

### Existing Highway Network

- 7.24 Lakeview Drive forms the northern boundary of the site and the site would be accessed from Lakeview Drive via two existing roundabout junctions. The two existing roundabouts on Lakeview Drive, at the eastern end of Lakeview Drive and centrally on Lakeview Drive, currently include a southern arm on each roundabout which would form the vehicle access to the site,
- 7.25 The roundabout at the eastern end of Lakeview Drive also provides access to the existing Tesco service yard while the central roundabout on Lakeview Drive also provides customer access to the existing Tesco store. At its western end, Lakeview Drive connects with the A41 Oxford Road via a signal controlled junction. The A41 Oxford Road runs on a broadly north-south alignment and connects north to Bicester town and south to the M40.
- 7.26 North of the application site, the A41 Oxford Road connects with the A41 at a junction known as the Esso roundabout. The A41 connects east from The Esso roundabout towards Aylesbury. North of the A41 junction, Oxford Road forms a junction with Pingle Drive which provides access to Bicester Village.
- 7.27 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, Lakeview Drive and Kingsmere junctions.
- 7.28 Furthermore, recently consented development proposals at Bicester Gateway Retail Park include further improvements to the A41 junctions with Lakeview Drive, the Esso Roundabout and Kingsmere signal controlled junctions.
- 7.29 East of the site, the A41 forms a conventional roundabout with the A4421 and London Road, known as the Rodney House roundabout. As part of consented development proposals at Graven Hill, improvement works are proposed to the Rodney House roundabout including signalisation of the roundabout and it is understood that these works are expected to commence in late 2017.
- 7.30 More detail on the existing traffic conditions and consented highway works are set out within the Transport Assessment provided at Appendix 7.1.
- 7.31 Baseline traffic data for 2017 has been gathered through traffic surveys undertaken on 11 May 2017. Table 7.3 provides a summary of the two-way peak hour traffic flows on roads in the immediate vicinity of the site and the location of the links and data points are indicated on Figure 7.1.

**Table 7.3 Peak Hour Traffic Flows**

Ref	Location	AM Peak Hour Flows	PM Peak Hour Flows
1	King's End	1,652	1,830
2	Pingle Drive	412	763
3	A41 (e)	1,604	1,935
4	Oxford Road (A41)	1,705	2,568
5	Lakeview Drive	530	1,053
6	Saxon Fields	157	194

# TRAFFIC AND TRANSPORT

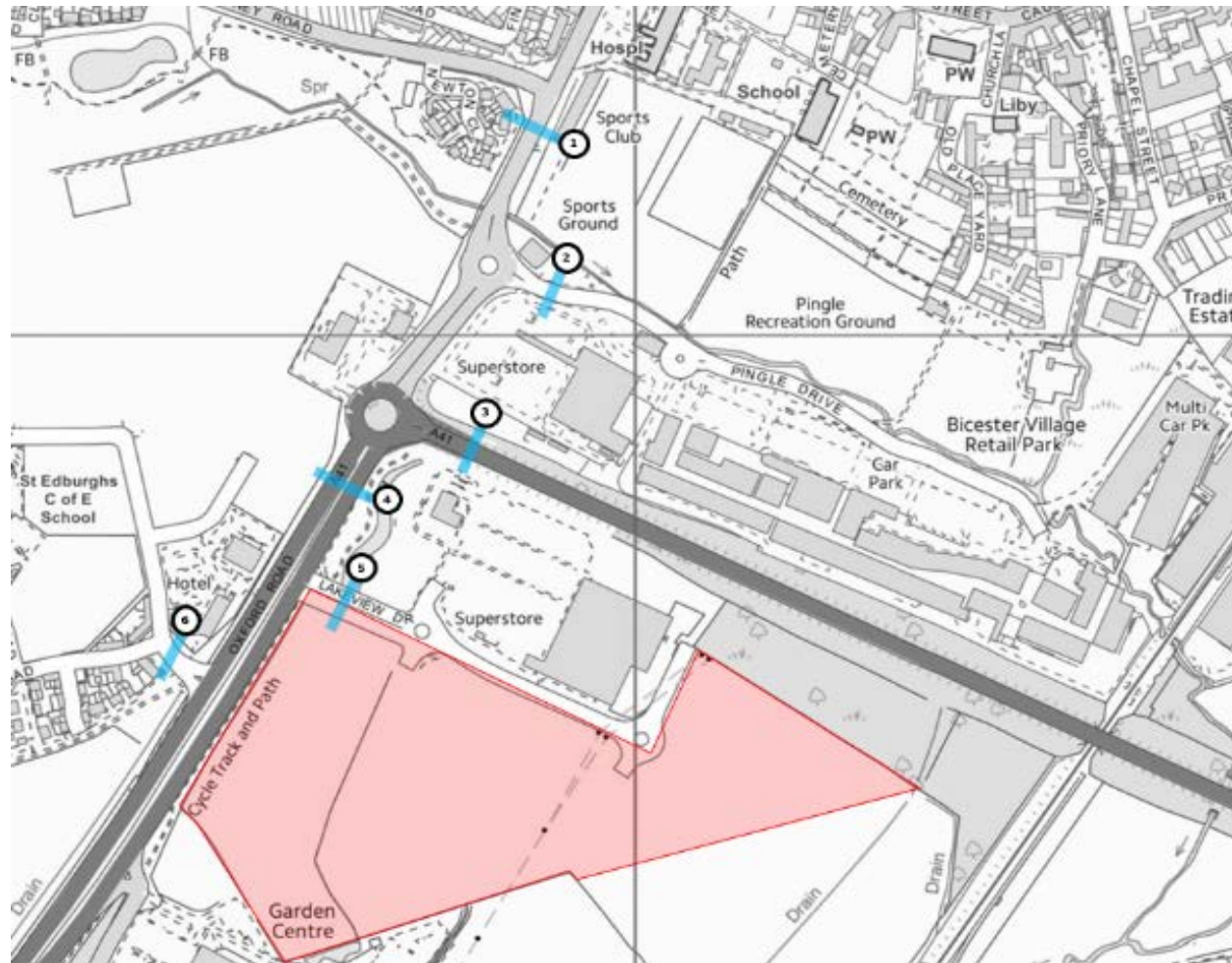


Figure 7.1 Link/ Data Point Locations

### Existing Pedestrian and Cycle Transport Network

- 7.32 Footways are provided along both sides of Lakeview Drive adjacent to the site and these connect with further footways on both sides of the A41 Oxford Road. These connect with the wider existing pedestrian network on Oxford Road and Pingle Drive offering access to the residential developments to the north as well as Bicester Village to the north east.
- 7.33 Signal controlled pedestrian crossing facilities are provided at the junction between Lakeview Drive and the A41 Oxford Road. Further signal controlled pedestrian crossing facilities are provided at the junction between the A41 Oxford Road and Kingsmere, a short distance south of the site.
- 7.34 Further signal controlled pedestrian crossing facilities are provided at the A41 Esso roundabout junction and the Oxford Road junction with Pingle Drive.
- 7.35 The pedestrian footway network and pedestrian crossing facilities in the vicinity of the site provide convenient connections towards local services and facilities as well as local retail opportunities and residential areas. The pedestrian facilities also provide walking routes towards local public transport infrastructure, in particular both northbound and southbound bus stops on the A41.

- 7.36 National Cycle Network Route 51 (NCN 51) runs directly past the site and this section of the route offers a traffic-free cycle path running along the side of the A41. NCN 51 links south from the site and connects to on-road traffic cycle routes on Wendlebury Road which continue south towards Wendlebury, Kidlington and Oxford. From the site, NCN 51 connects north on traffic-free cycle routes towards Bicester Village and then links with on-road signed cycle routes which continue towards Bicester town centre.
- 7.37 It is evident that the cycle facilities in the vicinity of the site provide the opportunity for future users of the Proposed Development to undertake journeys by cycle and provide connections to local services and facilities as well as local retail opportunities and residential areas.

### Existing Public Transport Network

- 7.38 The nearest bus stop to the site is situated on the A41 Oxford Road northbound, just north of the junction between Lakeview Drive and the A41 Oxford Road. The northbound bus stop is an approximate 120m walk from the north-western corner of the site and is accessible via the existing signal controlled pedestrian crossing facilities at the junction between A41 Oxford Road and Lakeview Drive, The bus stop is 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 weekend between Cambridge Parkside bus station and Oxford City Centre via Milton Keynes Railway Station.
- 7.39 There is not currently a southbound bus stop directly adjacent to the site on the A41 Oxford Road, however, as part of highways works associated with the consented development proposals at Bicester Gateway Retail Park, a new southbound bus stop and lay-by on A41 Oxford Road would be provided. The new bus stop would be directly adjacent to the application site on the eastern side of the A41 Oxford Road and it is envisaged that the additional southbound bus stop would also be served by the S5 and X5 services.
- 7.40 Additional bus stops are located on Oxford Road, north of the Pingle Drive roundabout, an approximate 500m walk from the north-west corner of the site. The stops are served by the S5 and X5 services, as well as the No. 26 bus service which operates a circular route between Bicester Town Centre, Kingsmere and Oxford Road. A further bus stop is located on Pingle Drive approximately 800m to the north east and is served by the Bicester Village Shuttle operating towards Bicester North Railway Station.
- 7.41 The nearest railway station is Bicester Village Railway Station located approximately 1.4km 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.
- 7.42 Bicester North Railway Station is located approximately 1.8km 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.
- 7.43 Public transport facilities in the vicinity of the site provide the opportunity for future users of the Proposed Development to undertake journeys by public transport and provide connections to local services and facilities as well as local retail opportunities and residential areas.

### 2026 Baseline – Future Year without Development

- 7.44 Future baseline conditions have been established within inclusion of traffic associated with expected committed developments, as agreed with CDC, consented highway works and background growth extracted from TEMPRO.
- 7.45 The following committed developments have been included in the 2026 baseline scenario:
  - Bicester Gateway;
  - Bicester Gateway Office Park;

# TRAFFIC AND TRANSPORT

# 7

- Bicester Village Phase 4;
- Land north east of Skimmingdish Lane;
- North West Bicester Extension;
- Rentwick Green; and
- Graven Hill.

7.46 Further information regarding the detail and location of the schemes can be found in Chapter 2 EIA Methodology.

## Assessment of Effects

### Construction

7.47 Construction works would be undertaken within the curtilage of the site with vehicle access taken from Lakeview Drive which is accessed from the A41 Oxford Road. The construction programme detailed in Chapter 5 and is based on a construction period of between 8 to 9 years. The programme sets out expected daily construction HGV movements and site staff and visitors during the first 18 months of construction which is considered to be the peak period of construction. Table 7.4 summarises the expected construction vehicles and staff associated with the site during that period.

**7.4 Changes in traffic flows during the construction period**

Receptor	Site Staff	Subcontractors	Total	Daily Visitors	Daily Deliveries	Total
Month 1	8	15	23	8	8	16
Month 2	9	23	32	8	15	23
Month 3	11	30	41	8	23	31
Month 4	12	60	72	15	30	45
Month 5	15	90	105	15	45	60
Month 6	15	120	135	15	45	60
Month 7	15	120	135	15	45	60
Month 8	15	120	135	23	45	68
Month 9	15	120	135	23	45	68
Month 10	15	120	135	23	45	68
Month 11	15	120	135	23	45	68
Month 12	15	135	150	30	60	90
Month 13	15	135	150	30	60	90
Month 14	15	150	165	30	60	90
Month 15	15	150	165	30	45	75
Month 16	15	105	120	23	30	53
Month 17	15	75	90	15	23	38
Month 18	12	75	87	15	15	30

7.48 Construction sets out that during the peak of construction activity up to 165 staff and subcontractors would be expected on site with a further 30 additional visitors per day. In addition, up to 60 daily HGV deliveries per day associated with the construction works are expected during the peak in construction activity.

7.49 It is envisaged that the majority of construction traffic associated with the site would route between the site and the strategic highway network of the M40, south of the site. As such it is envisaged that the majority of

construction traffic associated with the site would route south to/from the site to connect to the M40. In order to provide a robust assessment, it has been assumed that each of the staff and visitors drives to the site separately. Table 7.5 below summarises the change in vehicle trips on the A41 during the construction phase.

**Table 7.5 Changes in traffic flows during the construction period**

Receptor	2017 Base Year Flows	Change in Flow	% Change in Flow	2017 Baseline HGV	Increase in HGV movements	% Change in HGV
A41 South of site	36,804	390	1.1%	1,849	120	6.5%

7.50 It is highlighted that traffic flows generated during the construction phase of the Proposed Development are likely to be significantly lower than those generated during the operation of the Proposed Development. As such any anticipated traffic-related environmental impacts will be significantly lower during the construction phase.

7.51 In order to mitigate any effects during the construction phase a Construction Environmental Management Plan (CEMP) will be prepared and agreed with CDC prior to commencement of the construction phase. The CEMP will include measures to minimise the effect of construction activity and seek to ensure that any nuisance and disruption is minimised throughout the construction phase. Further detail of the CEMP is provided at Chapter 5: Construction. The CEMP is likely to include measures such as:

- Restrictions on Construction Delivery Hours;
- Restrictions on Daily Construction Vehicle Movements;
- Restriction on Construction Delivery Routes; and
- Construction Vehicle Wheel Washing

### Severance

7.52 Table 7.5 demonstrates that the construction vehicle movements associated with the Proposed Development are not considered to be significant relative to existing traffic movements on the A41. Table 7.6 below considers the significance of the effect of construction vehicle movements (both total vehicle movements and HGV movements) in relation to severance on the A41. As set out above it is considered that the vast majority of construction movements associated with the site would route between the site and the M40 via the A41 only.

7.53 There is footway provided on both sides of Lakeview Drive and the A41 Oxford Road in the vicinity of the site and there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road. In addition, there are further signal controlled pedestrian crossing facilities at the junction of the A41 and Oxford Road, north of the site, and at the junction of the A41/ Kingsmere junction south of the site. All the signal controlled pedestrian crossing facilities in the vicinity of the site include dropped kerbs with tactile paving to assist crossing for people with disabilities. The footway provision and signal controlled crossing facilities in the vicinity of the site provide convenient and safe connection from the site to the wider network,

7.54 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Construction traffic associated with the site would not route in the vicinity of the bridleway and, as such, equestrians using the bridleway would not be affected by construction traffic.

**Table 7.6 Significance of Effect on Severance**

Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
A41 (Traffic Flow)	Low	Proposed Development Construction Traffic	Negligible	Negligible

# TRAFFIC AND TRANSPORT



Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
A41 (HGV Movements)	Low	Proposed Development Construction Traffic	Small	Minor Adverse

7.55 Table 7.6 demonstrates that construction vehicle movements associated with the Proposed Development would result in a negligible effect on severance in the study area during the construction phase.

### Delay

7.56 During construction, the Proposed Development is not expected to result in material changes to traffic movements on the local highway network which would affect perceptions of driver delay. The change in traffic flow on the A41 during the construction phase would be negligible relative to existing flows. To this extent, the overall effect of construction traffic flows on the operation of local junctions, and therefore vehicle delay, would be negligible.

7.57 All construction works are to be undertaken within the curtilage of the site where currently there is minimal access for pedestrians, cyclists and buses and therefore it is anticipated that the delay to buses, pedestrians and cyclists will be negligible. As set out above there are signal controlled pedestrian crossing facilities at junctions in the vicinity of the site and no changes are proposed to the operation of the crossings facilities that would result in changes to delay for crossing users.

7.58 As previously highlighted the nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Construction traffic associated with the site would not route in the vicinity of the bridleway and, as such, equestrians using the bridleway would not be affected by construction traffic.

7.59 As set out above, construction traffic associated with the site will be managed through a CEMP. The CEMP will include measures to minimise any disruption on the local highway network associated with construction vehicles and this would include limiting construction vehicle movements associated with the site during peak periods on the local highway network.

### Amenity, Fear and Intimidation

7.60 Table 7.6 demonstrates that the construction vehicle movements associated with the Proposed Development are not considered to be significant relative to existing traffic movements on the A41.

7.61 With reference to guidance provided by the IEMA, the expected change in HGV movements on Oxford Road relative to the baseline is not considered to be significant. As such, it is expected that the construction phase associated with the Proposed Development will result in a negligible change in the perception of amenity, fear and intimidation in the vicinity of the site.

7.62 It is highlighted that there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road. For cyclists, there is a traffic free cycle route along the eastern side of Oxford Road which provides a north-south cycle connection, segregated from vehicular traffic on the A41 Oxford Road.

7.63 It is evident that pedestrian and cyclists in the vicinity of the site benefit from footway and cycle route facilities along with signal controlled pedestrian crossings. This provides users with segregated facilities from vehicular traffic such that the change in traffic flow during the operational phase would have a negligible effect on the safety of pedestrians, cyclists and other users. The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Construction traffic associated with the site would not route in the vicinity of the bridleway and, as such, equestrians using the bridleway would not be affected by construction traffic.

7.64 On that basis it is concluded that, during the construction phase, the Proposed Development would have a negligible effect on amenity, fear and intimidation in the vicinity of the site.

### Accidents and Safety

7.65 Table 7.6 demonstrates that the construction vehicle movements associated with the Proposed Development are not considered to be significant relative to existing traffic movements on the A41. With reference to guidance provided by the IEMA, given that the expected change in both traffic and HGV movements on Oxford Road relative to the baseline is not considered to be significant, it is evident that there will be a negligible effect on accident risk and highway safety, in the vicinity of the site.

7.66 The safety of highway users will also be managed through the CEMP which will include measures to ensure that construction activity associated and vehicle movements associated with the site are undertaken in a safe and sustainable manner. It is envisaged that the CEMP will identify appropriate routes for construction traffic and measures requiring that construction HGV drivers associated with the site will hold appropriate driver training.

7.67 On that basis it is concluded that, during the construction phase, the Proposed Development would have a negligible effect on accident risk and highway safety, in the vicinity of the site.

### Completed Development

7.68 The effects of the Proposed Development once it is operational have been assessed against the operation of the future baseline network.

7.69 In order to determine the anticipated effects of the Proposed Development once completed, vehicle trip rates have been extracted from the TRICS database and agreed with OCC. These have been applied to the proposed 60,000m<sup>2</sup> GEA B1(a)/B1(b) floorspace to determine the likely vehicle trips associated with the Proposed Development during the morning and evening peak hours. Table 7.6 below summarises the change in traffic flow as a result of the Proposed Development.

**Table 7.7 Summary of Impact of Operational Development Traffic**

	Receptor	2026 Baseline Flow	Absolute Change in Flow	2026 Baseline Flow + Development	% Change in Flow
AM	King's End	1,900	352	2252	19%
	Pingle Drive	501	0	501	0%
	A41 (e)	2,402	231	2633	10%
	Oxford Road (n)	3,381	583	3964	17%
	Lakeview Drive	730	1,005	1735	138%
	Oxford Road (s)	3,175	422	3597	13%
	Saxon Fields	175	31	206	18%
PM	King's End	2,485	360	2845	14%
	Pingle Drive	1,831	0	1831	0%
	A41 (e)	3,927	236	4163	6%
	Oxford Road (n)	5,329	596	5925	11%
	Lakeview Drive	1,328	1,028	2356	77%
	Oxford Road (s)	4,715	432	5147	9%
	Saxon Fields	538	31	569	6%

# TRAFFIC AND TRANSPORT

# 7

7.70 As outlined above the effect of traffic associated with the operation of the Proposed Development has been considered with reference to the following impacts:

- Severance;
- Delay;
- Amenity, fear and intimidation; and
- Accidents and safety.

## Severance

7.71 Guidance provided by IEMA state that changes in traffic flow of 30%, 60% and 90% can be considered to have a slight, moderate adverse and substantial effect on severance respectively. It is evident from Table 7.6 that all links on the network, with the expectation of Lakeview Drive will experience less than a 30% change in traffic flows as a result of the Proposed Development, with the majority of links experiencing changes in traffic flow substantially less than 30%.

7.72 It is highlighted that Lakeview Drive, was designed to accommodate traffic associated with both the existing Tesco foodstore and the Consented Business Park Scheme. This was assessed and approved as part of a previous planning application on the site. Chapter 1: Introduction provides for further information of the planning history.

7.73 As Lakeview Drive currently serves only the existing Tesco foodstore, the existing baseline traffic flows on Lakeview Drive are significantly below the level of traffic it has been designed, and previously assessed, to accommodate the Consented Business Park Scheme and hence why the proportional increase in traffic on Lakeview Drive presented in this assessment is moderate adverse.

7.74 IEMA guidance states that consideration of severance should consider specific local conditions including pedestrian facilities and the provision of pedestrian crossings. To this extent it is highlighted that a pedestrian footway is provided along both sides of Lakeview Drive and there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road. In addition, there are further signal controlled pedestrian crossing facilities at the junction of the A41 and Oxford Road, north of the site, and at the junction of the A41/ Kingsmere junction south of the site. All the signal controlled pedestrian crossing facilities in the vicinity of the site include dropped kerbs with tactile paving to assist crossing for people with disabilities. The footway provision and signal controlled crossing facilities in the vicinity of the site provide convenient and safe connection from the site to the wider network,

7.75 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Given the distance between the site the bridleway it is evident, that the development proposals would have negligible effect on severance of equestrians using the bridleway.

7.76 On that basis, whilst the magnitude of change in traffic movements on Lakeview Drive is considered moderate adverse, relative to existing baseline traffic flow, the overall significance of the effect in this location is considered negligible given the pedestrian infrastructure available in this location.

**Table 7.8 Significance of Effect on Severance**

Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Lakeview Drive	Low	Proposed Development Operational Traffic	Negligible	Negligible
Wider Highway Network	Low	Proposed Development Operational Traffic	Negligible	Negligible

7.77 Table 7.8 demonstrates that operational traffic associated with the Proposed Development is expected to result in a negligible effect on severance in the vicinity of the site during the operation of the Proposed Development.

## Delay

7.78 The effect of traffic associated with the Proposed Development on the highway network adjacent to the site has been assessed through junction capacity modelling utilising the industry standard software package for each junction type.

7.79 The Proposed Development will be accessed from Lakeview Drive, which connects with the A41 Oxford Road via a signal controlled junction. Whilst this junction currently serves the existing Tesco foodstore only, Lakeview Drive was designed to accommodate the Tesco foodstore and Consented Business Park Scheme.

7.80 The Transport Assessment submitted alongside the planning application includes full details of the effect of the Proposed Development on the highway network local to the site and results of junction capacity modelling. The scope of junctions considered as part of the Transport Assessment has been agreed with Officers at OCC.

7.81 Table 7.9 summarises the result of the highway capacity on the highway network local to the site and effect of the Proposed Development on the scope of junctions assessed. Full details of the junction capacity assessments included within the Transport Assessment and this details of the overall expected operation of the local highway network including anticipated delay.

**Table 7.9 Summary of Development Traffic Impact on Delay**

Junction/ Receptor	Sensitivity	Description of Effect	Magnitude of Effect	Effect Significance
A41/ Lakeview Drive	Moderate	Increase in traffic	Medium	Moderate Adverse
A41/ Saxon Fields	Moderate	Increase in traffic	Negligible	Negligible
A41/ Vendee Drive	Moderate	Increase in traffic	Negligible	Negligible
A41/ Oxford Road	Moderate	Increase in traffic	Negligible	Negligible
Oxford Road/ Pingle Drive	Moderate	Increase in traffic	Negligible	Negligible
Oxford Road/ Middleton Stoney Road	Moderate	Increase in traffic	Small	Minor Adverse
A41 / A4421	Moderate	Increase in traffic	Negligible	Negligible

7.82 The results of the analysis demonstrate that the Proposed Development will result in an increase in traffic on the local road network, in particular at the junction between Lakeview Drive and A41 Oxford Road.

7.83 At the majority of junctions on the local road network the change in traffic flow as a result of the Proposed Development will result in a negligible effect on the operation of the junction and on driver delay at the junctions.

7.84 At the junction between the A41/ Lakeview Drive and at the junction between Oxford Road, Middleton Stoney Road and Kings Road it is considered that the effect of the change in traffic movements as a result of the Proposed Development will be moderate adverse. The Transport Assessment details mitigation measures that would be implemented at each of these junctions to mitigate the effect of the Proposed Development proposals. Table 7.10 below summarises the mitigation measures at the identified junctions and the residual effect following mitigation.

# TRAFFIC AND TRANSPORT

**Table 7.10 Mitigation and Residual Effect**

Location	Effect Significance	Mitigation	Residual Effect
A41/ Lakeview Drive	Moderate Adverse	Capacity Improvement Works	Negligible
Oxford Road/ Middleton Stoney Road	Minor Adverse	Capacity Improvement Works	Negligible

- 7.85 Table 7.10 demonstrates that with the implementation of the proposed mitigation works the residual effect of the development will be negligible.
- 7.86 As set out above there are signal controlled pedestrian crossing facilities at junctions in the vicinity of the site and no changes are proposed to the operation of the crossings facilities that would result in changes to delay for crossing users including pedestrians, cyclists and users with disabilities.
- 7.87 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Given the distance between the site the bridleway it is evident, that the development proposals would have negligible effect on delay of equestrians using the bridleway.
- 7.88 In addition to the mitigation identified, a Framework Workplace Travel Plan has been prepared and submitted alongside the planning application and it is envisaged that a final Workplace Travel Plan would be secured by Condition. The Travel Plan would seek to encourage travel to the site by sustainable mode of travel and reduce reliance on the private car. To this extent the Travel Plan would seek to reduce the overall vehicle trip attraction of the site.

### **Amenity, Fear and Intimidation**

- 7.89 Guidance provided by IEMA advises a threshold of a doubling of traffic movements, or its HGV component, can be considered to have a significant effect on pedestrian amenity. The IEMA guidance advises that there are no commonly agreed thresholds for assessment of the impact of traffic flows on fear and intimidation. Given that fear and intimidation can be closely linked to overall pedestrian amenity it is considered that a comparable threshold of a doubling of traffic movements, or its HGV component, can be considered to have a significant effect on fear and intimidation.
- 7.90 It is evident from Table 7.7 that all links on the network, with the expectation of Lakeview Drive, will experience less than a 50% change in traffic flows as a result of the operation of the Proposed Development, with the majority of links experiencing changes in traffic flow substantially less than 50%.
- 7.91 As previously highlighted, Lakeview Drive was designed to accommodate traffic associated with both the existing Tesco foodstore and the Consented Business Park Scheme. This was assessed and approved as part of a previous planning application on the site. As Lakeview Drive currently serves only the existing Tesco foodstore, the existing baseline traffic flows on Lakeview Drive are significantly below the level of traffic it has been designed, and previously assessed, to accommodate and hence why the proportional increase in traffic on Lakeview Drive is moderate adverse.
- 7.92 IEMA guidance highlights that, in addition to traffic flow, perceived amenity, fear and intimidation will be dependent on features such as pedestrian facilities including pavement width and protection and segregation from traffic. A pedestrian footway is provided along both sides of Lakeview Drive and there are signal controlled pedestrian crossing facilities at the junction between Lakeview Drive and the A41 Oxford Road which provide segregated crossing facilities for pedestrians to cross both Lakeview Drive and Oxford Road.
- 7.93 Therefore, whilst the magnitude of change in traffic movements on Lakeview Drive is considered moderate adverse, relative to existing baseline traffic flow, the overall significance of the effect in this location is considered negligible given the pedestrian infrastructure available in this location.

- 7.94 The nearest bridleway to the site, usable by equestrians, is approximately 2 kilometres south-east of the site. Given the distance between the site the bridleway it is evident, that the development proposals would have negligible effect on amenity, fear or intimidation of equestrians using the bridleway.

**Table 7.9 Significance of Effect on Amenity, Fear and Intimidation**

Location	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Lakeview Drive	Low	Proposed Development Operational Traffic	Moderate adverse	Negligible
Wider Highway Network	Low	Proposed Development Operational Traffic	Negligible	Negligible

- 7.95 Table 7.7 demonstrates that operational traffic associated with the Proposed Development is expected to result in a negligible effect on severance in the vicinity of the site during the operational phase.

### **Accidents and Safety**

- 7.96 A full analysis of existing traffic incident records on the highway network local to the site is included within the Transport Assessment. The analysis reviewed traffic incident records, obtained from OCC, for the most recent 5-year period available.
- 7.97 The analysis indicated that the most predominant causation factors for incidents were driver error and poor driver behaviour, unrelated to the design and operation of the existing highway network and infrastructure. As such it is considered that there are no inherent safety issues associated with the highway layout which result in a higher than expected number of incidents or any concerns with regard road safety.
- 7.98 On the basis that no inherent safety issues have been identified on the highway network local to the site, it is concluded that the change in traffic movements as a result of the operation of the Proposed Development would have a negligible effect on accident patterns and highway safety in the vicinity of the site.
- 7.99 It is evident that pedestrian and cyclists in the vicinity of the site benefit from footway and cycle route facilities along with signal controlled pedestrian crossings. This provides user with segregated facilities from vehicular traffic such that the change in traffic flow during the operational phase would have a negligible effect on the safety of pedestrians, cyclists and other users.

### **Mitigation and Monitoring**

#### **Construction**

- 7.100 No material adverse effects have been identified in the assessment of the construction stage and therefore no further mitigation is identified or considered necessary.
- 7.101 However, a CEMP will be prepared and agreed with CDC in advance of commencement of the Proposed Development. This will include measures to monitor and management of any potential effects of construction traffic associated with the Proposed Development and seek to ensure that construction activity can occur in an efficient and sustainable manner.

#### **Completed Development**

- 7.102 No material adverse effects have been identified in the assessment of the operational stage, following the mitigation identified, and therefore no further mitigation is identified or considered necessary.
- 7.103 A Framework Workplace Travel Plan has been prepared and submitted alongside the planning application and it is envisaged that a final Workplace Travel Plan would be secured by Condition.

# TRAFFIC AND TRANSPORT

# 7

7.104 The Travel Plan would seek to encourage travel to the site by sustainable mode of travel and reduce reliance on the private car. To this extent the Travel Plan would seek to reduce the overall vehicle trip attraction of the site.

## Residual Effects

7.105 Table 7.10 below provides a summary of the residual effects of the Proposed Development on the highway network local to the site and mitigation measures to be implemented to address the likely effects.

**Table 7.10 Summary of Residual Effects**

Potential Effect	Magnitude of Impact (Pre-Mitigation)	Mitigation	Residual Effect Significance
<b>Construction</b>			
Severance (Lakeview Drive)	Minor Adverse	Construction Environmental Management Plan	<b>Negligible</b>
Delay	Negligible	Construction Environmental Management Plan	<b>Negligible</b>
Amenity	Negligible	Construction Environmental Management Plan	<b>Negligible</b>
Fear and Intimidation	Negligible	Construction Environmental Management Plan	<b>Negligible</b>
Accidents and Safety	Negligible	Construction Environmental Management Plan	<b>Negligible</b>
<b>Completed Development</b>			
Severance (Lakeview Drive)	Negligible	Travel Plan	<b>Negligible</b>
Delay	Moderate Adverse	Proposed Highway Works Travel Plan	<b>Negligible</b>
Amenity	Negligible	Not Required	<b>Negligible</b>
Fear and Intimidation	Negligible	Not Required	<b>Negligible</b>
Accidents and Safety	Negligible	Not Required	<b>Negligible</b>

7.106 The analysis confirms that the development proposals would result in a negligible residual effect on the highway network local to the site.

## Cumulative Effects Assessment

7.107 The cumulative effects of the Proposed Development have been fully considered during its operation.

7.108 As this included the effect of the Proposed Development in conjunction with other developments in the area and also allowed for background traffic growth by applying TEMPRO growth rates to surveyed traffic, no further consideration of traffic and transport cumulative effects is considered appropriate.

## Conclusions

7.109 This chapter has considered the potential environmental effects of the Proposed Development in relation to traffic and transportation.

7.110 Methodologies were determined for determining both the construction and operational traffic effects of the Proposed Development on highway network local to the site and significance factors were determined with regard to delay, severance, intimidation and safety.

7.111 It has been demonstrated that during the construction phase the Proposed Development would result in a negligible residual effect on the highway network local to the site. The construction works would be managed through a CEMP which would encourage construction activity to be undertaken in an efficient and sustainable manner and minimise any effect on the highway network local to the site.

7.112 With regard to the operation of the Proposed Development, it has been demonstrated that the Proposed Development is likely to result in a negligible residual effect on the highway network local to the site. Furthermore, the Proposed Development of a Travel Plan will promote sustainable travel choices at the site and reduce reliance on the private car, reducing the effect of the Proposed Development on the local highway network.

## Introduction

- 8.1** This chapter of the ES reports the findings of an assessment of the likely significant effects on the noise environment as a result of the Proposed Development.
- 8.2** 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 or structural implications. The operational phase of the Proposed Development is unlikely to give rise to any vibration that would be measurable beyond the site boundary. Vibration, therefore, has not been assessed further.
- 8.3** This chapter sets out the relevant planning policy context in relation to noise; the methods used to assess potential effects; the baseline conditions and potential effects on the noise environment as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 8.4** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 14: Effect Interactions of this ES (Volume I).

## Legislative and Planning Policy Context

- 8.5** Legislative and policy context are set out in the following documents. Full details are provided in Appendix 8.1.
- Environmental Protection Act 1990, Part III;
  - Cherwell Local Plan 2011-2031;
  - Noise Policy Statement for England (NPSE), May 2010;
  - National Planning Policy Framework (NPPF), March 2012; and
  - Planning Practice Guidance – Noise (PPG-N), December 2014.

## Assessment Methodology

- 8.6** An EIA must be undertaken in a prescriptive way that is set out in various EIA guidance documents. This assessment approach requires that one clearly and succinctly displays the environmental effects in terms of their magnitude, duration, extent and significance.
- 8.7** It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source on existing receptors. These may be determined by several methods, listed below and described above and below:
- The effect may be determined by reference to guideline noise values, principally those contained in the WHO 'Guidelines for Community Noise' for operational noise; or BS5228:2009 for construction noise.
  - Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect; and
  - Another method is to compare the resultant noise level against the background noise level (LA90) of the area. This is the method employed by BS 4142:2014 to determine the significance of impacts from industrial and commercial sound.

- 8.8** An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2 which confirmed acceptability of the scope and method proposed for the noise assessment.

## Methodology for Determining Construction Effects

### Construction Site Activity – Fixed Thresholds

- 8.9** BS 5228 provides a method for predicting noise from construction activity or equipment. It is the accepted Standard employed for the assessment of construction noise and vibration. The Standard also provides a framework for good working practice and guidance on the mitigation of noise by, for example, the selection of plant or use of screens and enclosures.
- 8.10** Annex E of BS 5228 provides guidance on criteria for the assessment of significance of noise effects and outlines three approaches:
- That noise levels should not exceed 70 – 75 dB LAeq;
  - That noise levels should not exceed thresholds determined from existing ambient noise levels:
    - A – 65 dB LAeq (daytime) – where ambient noise levels (rounded to the nearest 5 dB) are less than this value;
    - B – 70 dB LAeq (daytime) if ambient noise levels (rounded to the nearest 5 dB) are the same as the threshold A value;
    - C – 75 dB LAeq (daytime) where ambient noise levels (rounded to the nearest 5 dB) are above the threshold A value; and
  - That noise levels are deemed to be significant if the total noise (ambient + construction noise) exceeds the pre-construction ambient noise level by 5 dB or more, subject to lower cut-off values of 65 dB (LAeq, Period).
- 8.11** The standard suggests evening limits 5 dB lower than daytime limits and a further reduction of 5 dB for night-time activity and that noise levels may need to be as low as LAeq1hr = 40 dB at night to avoid sleep disturbance and that noise limits during the evening may have to be as much as 10 dBA below the daytime limit.
- 8.12** BS 5228 explains the statutory control available to citizens and local authorities. In particular the BS 5228 notes that "Section 60 and 61 of the Control of Pollution Act 1974 gives local authorities powers for controlling noise and vibration arising from construction and demolition works on any building or engineering sites."
- 8.13** Using the above guidance, a reasonable Lowest Observed Adverse Effect Level (LOAEL) for construction noise is LAeq,day = 65 dB (this is the lower cut-off value in BS5228). A reasonable SOAEL for construction noise is LAeq,day = 75 dB (this is the level that, if exceeded for "significant" periods of time (either continuous or sporadic), could result in "widespread community disturbance, or interference with activities or sleep is likely to occur").

### Construction Traffic – Change in Noise Levels

- 8.14** Design Manual for Roads and Bridges (DMRB) describes the assessment process for potential noise impacts arising out of road projects (or alterations). The assessment approach is based on risk of impacts, judged according to change in noise level. This assessment is appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of the Proposed Development.
- 8.15** This assessment is broadly appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of the Proposed Development. The noise changes during the construction phase have been calculated based on the effect of the change in overall traffic



# NOISE & VIBRATION



flow, and in the proportional HGV content, according to the following formulae, derived from “Calculation of Road Traffic Noise” (CRTN):

Overall traffic -  $Change\ in\ noise\ level = 10\text{Log} \left( \frac{Predicted\ flow}{Existing\ flow} \right)$

HGV - the difference between the result of the formula for the future scenario against the existing situation (based on a speed of 50km/h):

$$10\text{Log} (1+(5 \times p/50)) - 68.8 \text{ (where } p = \%HGV)$$

8.16 The traffic flows are presented in Annual Average Daily Traffic (AADT), two-way flows. The road segments analysed are, from the Transport Assessment. These are road segments of existing roads.

8.17 Table 8.1 below shows the response to changes in noise, as set out in DMRB, for short-term impacts (i.e. Construction Phase).

**Table 8.1 – Response to Change in Road Traffic Noise – Short-Term (Construction Phase)**

Change in noise level (LA10, 18h dB)	Magnitude of Impact (Long Term)
0	No Change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

## Methodology for Determining Completed Development Effects

### Car Parking and Development Operational Noise Emissions – Fixed Thresholds

8.18 The World Health Organisation document “Guidelines for Community Noise” (1999) contains a matrix of guideline values for effects from noise within different environments. These guideline values are set at the lowest level that produces an adverse effect, that is, the “critical health effect”. As such the guideline values suggested in the Guidelines are thresholds below which effects such as annoyance during the day can be assumed to be negligible. Therefore, they are aligned to the Government policy LOAEL values.

8.19 The guideline values are set out in a table in the Executive Summary of the document. The WHO guideline values for moderate and serious annoyance during the daytime and evening are LAeq16hrs = 50 and 55 dB, respectively.

8.20 The WHO daytime guideline values are all external levels and can be considered to be freefield or façade levels.

8.21 The National Physical Laboratory (NPL) report of 1998 which was commissioned by the Department of the Environment, Transport and the Regions, contains a section entitled: Guide to the Interpretation of the WHO Guidelines (the 1995 draft WHO Guidelines which were not materially different from the final 1999 Guidelines).

8.22 The summary of this section of the NPL report states:

*“In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.”*

8.23 It can be seen that the WHO guideline values are aligned to the Government policy LOAEL values. Significant effects, i.e. SOAEL values would not be expected until much higher levels than LOAEL values.

8.24 “Higher degrees of exposure” is not defined by NPL. However, in accordance with professional opinion, this would equate to 10 dB – around a doubling of the loudness. This relationship should apply to the setting of SOAEL values, i.e. they should be 10 dB higher than the LOAEL values or WHO guideline values.

### Operational Road Traffic - Changes in Noise Levels

8.25 Design Manual for Roads and Bridges (DMRB) describes the assessment process for potential noise impacts arising out of road projects (or alterations). The assessment approach is based on risk of impacts, judged according to change in noise level. This assessment is appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of a proposal.

8.26 This assessment is broadly appropriate for assessing the impact of noise increase resulting from the contribution of additional traffic to the existing network as a result of the proposal. The noise changes have been calculated again based on the effect of the change in overall traffic flow, and in the proportional HGV content, according to the following formulae, derived from “Calculation of Road Traffic Noise” (CRTN):

Overall traffic -  $Change\ in\ noise\ level = 10\text{Log} \left( \frac{Predicted\ flow}{Existing\ flow} \right)$

HGV - the difference between the result of the formula for the future scenario against the existing situation (based on a speed of 50km/h):

$$10\text{Log} (1+(5 \times p/50)) - 68.8 \text{ (where } p = \%HGV)$$

8.27 The traffic flows are presented in Annual Average Daily Traffic (AADT), two-way flows. The road segments analysed are from the Chapter 7: Traffic and Transport of the Volume of the ES. These are road segments of existing roads.

8.28 Table 8.2 below shows the response to changes in noise, as set out in DMRB, for long-term impacts (i.e. Completed Development).

**Table 8.2 – Response to Change in Road Traffic Noise – Long-Term**

Change in noise level (LA10, 18h dB)	Magnitude of Impact (Long Term)
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

## **Mechanical Plant and Machinery - Comparison with Background Sound Levels**

- 8.29** The relevant standard for this type of assessment – the fourth edition of BS 4142:2014 was published in October 2014. It is entitled “Methods for rating and assessing industrial and commercial sound”.
- 8.30** The Scope of the standard includes:
- “1.1 This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes: a) sound from industrial and manufacturing processes; b) sound from fixed installations which comprise mechanical and electrical plant and equipment; c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.”*
- 8.31** It can be seen that this standard is appropriate in this case for the assessment of noise from the fixed mechanical services plant, being the potential plant and machinery associated with air conditioning and heating of buildings, for example.
- 8.32** The standard assesses the likely impact from a proposed scheme by considering the difference between the “rating level” of the sound being assessed with the “background sound level” of the area.
- 8.33** The noise source is assessed in terms of the LAeqT statistical index – in effect the average sound energy level. During the day (defined as 0700 to 2300 hours), the LAeqT level must be normalised to 1 hour (i.e. LAeq1hr) and at night (2300 to 0700 hours) the LAeq,T level must be normalised to 15 minutes. BS 4142 terms this level the “specific sound level”.
- 8.34** The specific sound level is then corrected by given decibel factors for any impulsiveness, tonality, intermittency or other character that may attract attention. These different character corrections are additive. BS 4142 calls the resultant, corrected level the “rating level.”
- 8.35** The background sound level is described by the LA90 statistical index – the level exceeded for 90% (i.e. almost all of) the time.
- 8.36** Section 11 of BS 4142 is important and warrants careful consideration and analysis. The following extracts are of note:
- “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs;
  - An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context;
  - Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following:
    - a) Typically, the greater this difference, the greater the magnitude of the impact;
    - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
    - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
    - d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level

does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

- 8.37** BS 4142 employs assessment criteria in terms that are the same as those used within the NPPF and NPSE i.e. the degree of adverse impact (None, Low (LOAEL) and Significant (SOAEL)).
- 8.38** It is clear from the guidance set out above that a series of assessment methods exist which allow a thorough assessment of noise impacts based on both objective (quantitative) and subjective (qualitative) standards. These can be set into a matrix of significance of effects for the purposes of the Environmental Statement.
- 8.39** The approach taken is consistent with current Government Policy and Practice, which is applicable to all noise sources.

## **Significance Criteria**

- 8.40** The assessment of overall, LAeqT, levels during the day has been undertaken on the basis that: noise impact in terms of serious annoyance can be assumed to be negligible at a level (LAeqT) below 55 dB (this is the LOAEL based on the WHO guideline value) and that “significant” impacts may not occur until a level (LAeqT) above 65 dB (this is the SOAEL based on the WHO guideline value +10dB).
- 8.41** For operational plant, a rating level of 0dB in relation to the background sound level represents a low impact levels (the LOAEL) and a rating level of 10 dB above the background sound level represents a significant impact (the SOAEL).
- 8.42** Whilst not strictly able to be defined as LOAEL and SOAEL because they are not absolute thresholds, for the purposes of this assessment, changes in traffic noise have been allocated a LOAEL and SOAEL according to the DMRB impact definitions. Long term changes of less than 3 dB equate to the LOAEL and (this is the negligible magnitude in DMRB), and changes of greater than 10 dB would equate to the SOAEL (this is the “major” magnitude in DMRB). For short term changes in traffic noise (i.e. during construction), those impact definition would apply at a change of 1 dB (LOAEL), and 5dB (SOAEL).
- 8.43** In determining whether an effect on a receptor is significant, reference is also made to the nature of the receptors, expected duration of exposure and the predicted noise level in relation to recommended noise values.

## **Sensitivity of Receiving Environment**

- 8.44** The sensitivity of the receiving environment is classified as follows:
- High - receptors of greatest sensitivity to noise such as world heritage sites and tranquil areas;
  - Medium - noise sensitive receptors such as dwellings, hospitals, schools, places of quiet recreation;
  - Low - receptors with some sensitivity to noise such as offices, other workplaces and play areas; and
  - Very Low - receptors of very low sensitivity to noise or marginal to the zone of influence of the proposals.
- 8.45** In this case, all receptors are residential properties and are therefore of medium sensitivity.

## **Magnitude**

- 8.46** The magnitude of noise effects can be classified as follows:
- High – change in sound sound produced in excess of 10 dBA above the recommended noise guideline values (this is the SOAEL);
  - Medium - sound produced between 5 and 10 dBA above the recommended noise guideline values;
  - Low - sound produced between 1 and 5 dBA above the recommended noise guideline values; and

# NOISE & VIBRATION



- Very Low – sound produced less than 1 dBA above the recommended noise guideline values (this is the LOAEL).

## Duration

8.47 Noise effects can vary in duration and are classified as follows:

- Short term - the period over which the effect is experienced is temporary and lasts for the period of construction (if less than 5 years) or less;
- Medium term - the effect occurs for longer than the full period of construction, or if the construction period is over 5 years; and
- Long term - the effect remains for a substantial time, perhaps permanently, after construction.

8.48 In this case, effects during construction are short term and effects from operational noise are long-term.

## Extent

8.49 Effects can also be classified according to the extent of the effect as follows:

- Local - the site and its immediate surroundings;
- District - the wider area of the borough;
- Regional -the region (i.e. the south east); and
- National - namely England and Wales.

8.50 In respect of noise impacts, they are confined to a local extent in this case.

## Significance Matrix

8.51 The LOAEL and SOAEL levels are identified in Table 8.3 below for each activity and the significance matrix used in the assessment for medium sensitivity receptors (residential dwellings) is set out in Table 8.4.

**Table 8.3 Lowest Observed Adverse Effect Levels (LOAEL) and Significant Observed Adverse Effect Levels (SOAEL) applied to assessment.**

Activity	LOAEL	SOAEL
Construction Activity	65 dB LAeq,day	75 dB LAeq,day
Construction Traffic	Change of <3dB LA10,18Hr	Change of >5 dB LA10,18Hr
Operational Activity	55 dB LAeq,day	65 dB LAeq,day
Operational Traffic	Change of <5 dB LA10,18Hr	Change of >10dB LA10,18Hr
Operational Plant/Machinery	Rating level of 0dB above background sound	Rating level of 10 dB above background sound

**Table 8.4 Significance matrix for Medium Sensitivity Receptors**

Magnitude	Effect Significance
Very Low (the "LOAEL")	Negligible
Low	Minor
Medium	Moderate
High (the "SOAEL")	Major

## Quantifying Baseline Conditions

8.52 The noise environment across the site, and in the vicinity, is dominated by road traffic noise from the A41. The nearest receptors are located some 65 metres to the west, fronting on to the A41, and some 20 metres from the carriageway. Noise surveys were undertaken, therefore, at a location on site to represent the noise environment at those properties (at a similar distance from the A41).

8.53 Noise survey measurements have been undertaken in accordance with BS 7455 'Description and measurement of environmental noise - Part 1: Guide to quantities and procedures', and the equipment used conformed to the requirements of BS EN 61672 'Electroacoustics – Sound level meters – Part 1: Specifications'.

8.54 Baseline conditions in respect of traffic noise have been informed by data contained in the Chapter 7: Traffic and Transport for the Proposed Development.

## Establishing Operational Noise Levels

8.55 Modelling of noise emissions from the site has been undertaken using SoundPLAN computer software. This software takes account of source noise levels, local topography, screening attenuation uses the ISO 9613 algorithm to predict noise propagation over distance. The models are displayed as LAeq,1Hr. These assume a peak hour of activity in the Proposed Development, including car parking and access road traffic movements. They represent, therefore, a worst-case peak hour noise level.

## Identification of Receptors

8.56 The receptors identified as the nearest and potentially most sensitive to noise from the Proposed Development are set out in table 8.5 and shown on the plan in Appendix 8.2

**Table 8.5 – Receptor Locations**

Receptor Name	Direction	Distance
New housing west of A41 ("Kingsmere Residential Estate")	NW	65 Metres
Isolated Farm Properties	E	450 Metres
Acorn PH/Middleton Stoney Road	N	365 Metres

## Limitations and Assumptions

8.57 All noise predictions are, necessarily, limited by the extent of knowledge at any particular point in time. Computer modelling is based on a series of assumptions, albeit these are derived from expert knowledge and calibrated software, along with actual measurements on a wide variety of sites which are included in the SoundPLAN software database. A worst-case peak hour assumption has been made, so as to reflect a robust assessment position ensuring that the likely significant effects are assessed.

## Baseline Conditions

8.58 A noise survey was undertaken over a 24-hour period from Monday 12<sup>th</sup> to Tuesday 13<sup>th</sup> June 2017. The measurements were undertaken at a location close to the west of the site, at a similar distance from the A41 to be representative of the nearest sensitive receptors to the west.

8.59 Noise measurements were taken in 15-minute samples using Norsonics sound level meter Type 140, which was calibrated at the start and at the end of the survey.

8.60 Weather conditions were warm and dry and within acceptable parameters for surveying. The following parameters were measured directly from the sound level meter:

- LAeqT: The A-weighted equivalent continuous sound level over a period of time, T. This is the average sound energy level and is used to describe the ambient sound level in the area.
- LAMAX: The A-weighted maximum level of noise during the measurement period.
- LA90: The A-weighted sound level exceeded for 90% of the time. This is usually referred to as the background sound level.

8.61 The noise levels were dominated by road traffic on the A41 Oxford Road.

8.62 The noise survey results are displayed in Appendix 8.2 and are summarised in Table 8.6.

**Table 8.6– Existing Noise Climate Survey Results Summary**

Period	LAeq,T, dB	LAMAX, dB	LA90, dB
Day (0700-1900)	62	85	50
Evening (1900-2300)	59	85	48
Night (2300-0700)	58	80	41
Peak Hour (0800-0900)	63	86	50

8.63 LAeq,T results are for the period given. LAMAX results are the levels exceeded in 10% of the samples in that period and LA90 results are the typical (median) values in the time period.

## Assessment of Effects

### Construction

#### Construction Site Activity

8.64 The construction of the Proposed Development is anticipated to be phased over a 8 to 9-year period. Details of the methods and plant likely to be used during the construction phase are necessarily indicative at this stage and would be likely to change during the site redevelopment. This makes it difficult to accurately predict the

noise levels for direct comparison with the noise criteria described previously. Therefore, a maximum reasonable worst case noise scenario has been estimated, assuming that construction plant would be operating at the closest point to the nearest noise sensitive receptor (Kingsmere Residential Estate) and in the absence of mitigation, representative of the phase of the Proposed Development involving construction activities in the western part of the site.

8.65 In practice, noise levels would tend to be lower particularly in later phases, owing to greater separation distances and screening effects, and a second scenario, which allows for greater separation distances and localised screening, has also been calculated.

8.66 Calculations were undertaken using the data and procedures set out in BS 5228-1:2009 for the noisiest construction phases, to derive indicative noise levels at the closest receptor. The highest noise levels tend to be associated with plant used during earthmoving, concreting and road pavement construction. During the fit-out of buildings etc., construction noise would be significantly lower. The calculated worst case noise levels for the daytime periods are presented in Appendix 8.3, summarised in Table 8.7.

**Table 8.7 – Indicative Calculated Construction Noise Levels at Kingsmere Residential Estate**

Activity Type	Closest Phase	Further Phases
	LAeq,Day,	LAeq,Day
Earthworks & enabling	66 dB	57 dB
Main construction	68 dB	58 dB
Internal road construction	68 dB	57 dB

8.67 The worst case predicted noise levels (without mitigation) suggest that the LOAEL threshold levels would marginally be exceeded at the nearest receptor during the daytime period as a result of all typical construction activities, but the SOAEL would not be exceeded. This is as would be expected with construction occurring in close proximity to residential properties. The exceedance is of low magnitude, indicative of a minor, medium-term, adverse effect.

### Construction Traffic

8.68 The calculation for increases in noise from increased traffic flows during the construction phase is included in the calculation tables at Appendix 8.4. These include the peak construction phase construction traffic flows and these are added to the 2017 baseline traffic flows to assess a change in traffic flows (and HGV content) on the A41 and Oxford Road – the routes into and out of the site, on the worst-case assumption in each case that all construction traffic will either head south on Oxford Road, or north on Oxford Road, then east on the A41. Traffic flows are presented in 18-hour (i.e. daytime).

8.69 In relation to existing noise sensitive receptors adjacent to the road network, the calculated increases in road traffic noise during the construction phase have been calculated to be 0.1 dB. Such changes would be below the LOAEL, be less than a very low magnitude and, therefore, represent a negligible effect.

### Completed Development

#### Site Activity (Car Parking and Access Road)

8.70 Modelling of noise emissions from the site has been undertaken using SoundPLAN computer software. This software takes account of source noise levels, local topography, screening attenuation uses the ISO 9613 algorithm to predict noise propagation over distance.

# NOISE & VIBRATION



- 8.71 The models include the effect of localised screening by the buildings themselves as appropriate (i.e. the models are 3-dimensional and take account of the presence of solid buildings and other structures).
- 8.72 Noise from the car park and access road has been modelled assuming the peak day activity outlined in Chapter 7: Traffic and Transport for the peak level of activity. The models, therefore, are displayed as LAeq,1 Hr (for a peak hour of activity at the business park). These assume the full completed Proposed Development.
- 8.73 The car parking areas are treated by the model as area sources, and activity has been allocated to each car parking area as a proportion of the total vehicle flows. A reasonable worst-case layout including parking areas around the perimeter of the site has been modelled. The internal roads are modelled as a line source dictated by passby noise levels of vehicles at slow speed (30 km/h) on the internal roads.
- 8.74 These models represent a very worst (and therefore robust) case. They assume the peak activity in the car parks and access road.
- 8.75 The model results for this worst-case are displayed in Appendix 8.5. The result at the receptor locations are shown in Table 8.8.

**Table 8.8 – Predicted sound levels from site activity**

Receptor Location	Predicted sound level, LAeq,1Hr
New housing west of A41 (“Kingsmere Residential Estate”) - W	54 dB
Isolated Farm Properties - E	<40 dB
Acorn PH/Middleton Stoney Road - N	<40 dB

- 8.76 These levels would be below the LOAEL, be less than a very low magnitude and, therefore, represent a **negligible effect**. This is especially the case in the context of the existing road-traffic dominated noise environment already being almost 10 dB above the predicted sound emission levels from the Proposed Development.

### **Mechanical Services Plant and Machinery**

- 8.77 Full detail of other plant and machinery is not yet available. However, it is likely to consist of comfort cooling, heating and extraction equipment for the business park buildings.
- 8.78 The exact nature and location of each plant item, and the noise output from the equipment is unknown at this stage. However, experience at other large office park sites indicates that such plant has the potential to produce noise levels which may exceed the background sound levels by a medium magnitude, potentially leading to a moderate adverse effect if mitigation measures and plant noise limits are not inherent in the design of the installations.
- 8.79 The design target (for a low impact) should be that cumulative noise from such plant does not exceed the background noise level at the nearby receptors. General mitigation measures are discussed further in the mitigation section below.

### **Road Traffic**

- 8.80 The calculation for increases in noise from increased traffic flows during the full operation of the Proposed Development operation is included in the calculation tables at Appendix 8.4.

- 8.81 Table 8.9 below shows the predicted change in noise level on the principal roads dictating the noise climate in the area, as a result of traffic generated by the Proposed Development, using the same calculation methodology as for construction traffic.
- 8.82 The traffic flows are presented in AADT, 18, hour, two-way flows. The road segments analysed are, from the Transport Assessment. The Proposed Development impacts are assessed using the future (2026) baseline and comparing with the 2026 “with development” traffic flows.

**Table 8.9 – Changes in Road Traffic Noise – Operational Phase**

Road Segment	Change in traffic noise Level, LA10,18Hr, dB
Kings End	+0.8
Pingle Drive	+0.4
A41 (e)	+0.8
Oxford Road (north of Lakeview Drive	+0.9
Lakeview Drive	+1.5
Oxford Road (south of Lakeview Drive	+0.7
Saxon Fields	0

- 8.83 Such changes would be below the LOAEL, be of very low magnitude and, therefore, represent a negligible effect.

## **Mitigation and Monitoring**

### **Construction**

- 8.84 In general, noise from construction activity would be best controlled by the following process:
  - Determine the likely extent of construction works (where, when, duration);
  - Determine noise emission levels by reference to BS 5228;
  - Agree noise amelioration measures with the local authority (amelioration and management control) and/or noise limits;
  - Prepare a construction works method study and environmental management plan in agreement with the local authority, to include hours of working and agreed traffic routes; and
  - Obtain prior consent under the Control of Pollution Act 1974 where necessary and/or appropriate.
- 8.85 The contractors will take note of, and act on, the advice in BS 5228. Equipment such as breakers and compressors and mobile plant such as excavators and road works equipment, will be expected to conform with the appropriate EC directive noise limit. Best practice techniques and machinery will be employed at all times. Construction phase mitigation measures would be implemented through a Construction Environmental Management Plan (CEMP) to be secured through a planning condition.

# NOISE & VIBRATION



**8.86** In day-to-day operations, it is assumed that no activity will be undertaken outside of daytime hours which could be expected to give rise to noise noticeably above current prevailing background noise levels at nearby properties. To allow for short term noisy operations, any one -hour period during the working day should not exceed 75dB LAeq,1hr on the site boundary.

**8.87** Given the expected minor, medium-term effects only during the phases closes to the receptors in a 8 to 9 construction programme, it is not considered that mitigation measures beyond the general measures set out would be necessary.

### Construction Traffic

**8.88** Effects are assessed as negligible, so no mitigation is proposed.

### Completed Development

#### Site Activity

**8.89** Effects are assessed as negligible, so no mitigation is proposed.

#### Mechanical Services Plant and Machinery

**8.90** It is a typical requirement that the noise level from commercial plant should not exceed the existing background sound level. This would represent a low impact, and therefore, a negligible effect. This will be imposed by way of a planning condition if necessary to limit the plant noise emissions from the Proposed Development as a whole.

**8.91** Measures such as selection of intrinsically quiet plant, engineering noise control (attenuators to ventilation plant and louvred screening, for example) can easily be introduced as part of the design and roof top plant rooms can be screened as an integral part of the architectural approach during submission of any reserved matters application.

### Road Traffic

**8.92** Effects are assessed as negligible, so no mitigation is proposed.

### Residual Effects

**8.93** Table 8.10 shows the assessed residual effects.

**Table 8.10 Summary of Residual Effects**

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
<b>Construction</b>			
Construction Activity	Negligible – Minor	Negligible	<b>Negligible</b>
Construction Traffic	Negligible	Negligible	<b>Negligible</b>
<b>Completed Development</b>			
Site Activity	Negligible	Negligible	<b>Negligible</b>
Mechanical Services Plant	Moderate*	Negligible	<b>Negligible</b>
Road Traffic	Negligible	Negligible	<b>Negligible</b>

\*This is an assumed risk, were all plant to be installed with no inherent mitigation of any kind.

## Cumulative Effects Assessment

**8.94** Cumulative effects in relation to the Proposed Development apply to traffic noise impacts, when the Proposed Development traffic interacts with other traffic from committed developments in the area. Chapter 7: Traffic and Transport has included the committed development traffic within the 2026 future flows, and for a robust assessment, these have been compared to the 2017 baseline flows (i.e. assessing impacts from all committed development, the Proposed Development itself and any assumed growth in traffic generally).

**8.95** The calculation for increases in noise from increased traffic flows during the full Proposed Development operation (with committed development), compared to a 2017 baseline is included in the calculation tables at **Appendix 8.4**.

**8.96** Table 8.11 below shows the predicted change in noise level on the principal roads dictating the noise climate in the area, as a result of traffic generated by the Proposed Development, and cumulative developments, using the same calculation methodology as previously.

**Table 8.11 – Changes in Road Traffic Noise – Cumulative Effects**

Road Segment	Change in traffic noise Level, LA10,18Hr, dB
Kings End	+1.5
Pingle Drive	+1.1
A41 (e)	+1.5
Oxford Road (north of Lakeview Drive)	+1.6
Lakeview Drive	+2.2
Oxford Road (south of Lakeview Drive)	+1.4
Saxon Fields	+0.7

**8.97** Such changes would be below the LOAEL, be less than a very low magnitude and, therefore, represent a **negligible effect**.

## Conclusions

**8.98** With the exception of a minor short-term effect from early construction phases and an assumed worst-case risk of a moderate effect (pre-mitigation) from mechanical services noise the Proposed Development is predicted to have a generally **negligible** noise effect before mitigation.

**8.99** Mitigation measures will reduce all effects to **negligible**.

**8.100** Cumulative effects are assessed to be **negligible**.

**8.101** The Proposed Development, therefore, will have a **negligible** residual and cumulative effect on the surrounding noise environment.

## Introduction

- 9.1** This chapter of the ES reports the findings of an assessment of the likely significant effects on air quality as a result of the Proposed Development.
- 9.2** The Proposed Development will lead to an increase in traffic on the local roads, which may impact on air quality at existing residential properties. The main air pollutants of concern related to traffic emissions are nitrogen dioxide (NO<sub>2</sub>) and fine particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). There is also the potential for the construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and PM<sub>10</sub>.
- 9.3** This chapter sets out the relevant national, regional and local planning policy context; the methods used to assess potential effects; the baseline conditions; and potential effects on air quality as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 9.4** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes is discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 13: Effect Interactions of this ES (Volume I).
- 9.5** This chapter is supported by Technical Appendices provided as ES Volume 2:
- Appendix 9.1: Glossary;
  - Appendix 9.2: Legislative and Planning Policy Context;
  - Appendix 9.3: Construction Dust Assessment Procedure;
  - Appendix 9.4: EPUK & IAQM Planning for Air Quality Guidance;
  - Appendix 9.5: Professional Experience;
  - Appendix 9.6: Modelling Methodology; and
  - Appendix 9.7: Construction Mitigation.

## Legislative and Planning Policy Context

- 9.6** Legislation, guidance documents and planning policies which are of relevance to this assessment are listed below. Where relevant, further details are provided in Appendix 9.2.
- The Air Quality Strategy<sup>1</sup>;
  - The National Planning Policy Framework (NPPF)<sup>2</sup> (Chapter 11: Conserving and Enhancing the Natural Environment);
  - Connecting Oxfordshire: Local transport plan 2015-2031<sup>3</sup>;

- The Cherwell Local Plan 2011-2031<sup>4</sup> : The Local Plan includes Policy 'Bicester 4' which specifically considers the Bicester Business Park development. However, air quality is not specifically mentioned in this policy;
- National Air Quality Plans<sup>5, 6</sup>; and
- Cherwell District Council Air Quality Action Plan<sup>7</sup>.

## Assessment Methodology

- 9.7** This section of the chapter sets out the assessment criteria used, the methodology followed to predict the impacts, and the approach taken to determine the significance of the effects.

## Consultation

- 9.8** An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2 which confirmed acceptability of the scope and method proposed for the air quality assessment.

## Assessment Criteria

- 9.9** The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations 2000<sup>8</sup> and the Air Quality (England) (Amendment) Regulations 2002<sup>9</sup>.
- 9.10** The objectives for nitrogen dioxide and PM<sub>10</sub> were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM<sub>2.5</sub> objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m<sup>3</sup><sup>10</sup>. Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour PM<sub>10</sub> objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m<sup>3</sup><sup>10</sup>. The predicted annual mean PM<sub>10</sub> concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM<sub>10</sub> objective. Where predicted annual mean concentrations are below 32 µg/m<sup>3</sup> it is unlikely that the 24-hour mean objective will be exceeded.
- 9.11** The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance<sup>10</sup>. The annual mean objectives for nitrogen dioxide and PM<sub>10</sub> are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM<sub>10</sub> is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for

<sup>1</sup> Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra.

<sup>2</sup> National Planning Policy Framework (2012), DCLG.

<sup>3</sup> Oxfordshire County Council (2015) Connecting Oxfordshire: Local Transport Plan 2015-2031

<sup>4</sup> Cherwell District Council (2015) The Cherwell Local Plan 2011-2031

<sup>5</sup> Defra (2015) Air quality in the UK: plan to reduce nitrogen dioxide emissions, [Online], Available:

<https://www.gov.uk/government/publications/air-quality-in-the-uk-plan-to-reduce-nitrogen-dioxide-emissions>.

<sup>6</sup> Defra (2017) Improving air quality in the UK: tackling nitrogen dioxide in our towns and cities. Draft UK Air Quality Plan for tackling nitrogen dioxide.

<sup>7</sup> Cherwell District Council (2017) Air Quality Action Plan

<sup>8</sup> The Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000), HMSO.

<sup>9</sup> The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043 (2002), HMSO.

<sup>10</sup> Defra (2016) Review & Assessment: Technical Guidance LAQM.TG16, Defra.

nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

**9.12** The European Union has also set limit values for nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub>. The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one<sup>11</sup>. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.

**9.13** The relevant air quality criteria for this assessment are provided in Table 9.1.

**Table 9.1 Air Quality Criteria for Nitrogen Dioxide, PM<sub>10</sub> and PM<sub>2.5</sub>**

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m <sup>3</sup>
Fine Particles (PM <sub>10</sub> )	24-hour Mean	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m <sup>3</sup> <sup>a</sup>
Fine Particles (PM <sub>2.5</sub> ) <sup>b</sup>	Annual Mean	25 µg/m <sup>3</sup>

<sup>a</sup> A proxy value of 32 µg/m<sup>3</sup> as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM<sub>10</sub> objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM<sub>10</sub> objective are possible<sup>10</sup>

<sup>b</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

## Descriptors for Air Quality Impacts and Assessment of Significance

### Construction Phase

**9.14** There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)<sup>12</sup> has been used. Full details of this approach are provided in Appendix 9.3.

**9.15** Guidance from IAQM<sup>12</sup> is that, with appropriate mitigation in place, the effects of construction dust will be ‘not significant’. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be ‘not significant’.

### Operational Phase

**9.16** There is no official guidance in the UK in relation to development control on how to describe air quality impacts, or how to assess their significance. The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)<sup>13</sup> has therefore been used. This includes defining descriptors of the impacts at individual receptors, which take account of the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective, as described in Table 9.2 below. The overall significance of

the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix 9.4. The approach includes elements of professional judgement, and the experience of the consultants preparing the chapter is set out in Appendix 9.5.

**9.17** It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this chapter, the air quality assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

**9.18** Judgement on the overall significance of the effect of the Proposed Development has taken into account factors such as:

- the existing and future air quality conditions without the Proposed Development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted in undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as minor individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a moderate or major impact may not have a significant effect if it is confined to a very small area and where it is obviously not the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

<sup>11</sup> Directive 2008/50/EC of the European Parliament and of the Council (2008).

<sup>12</sup> IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.

<sup>13</sup> Moorcroft and Barrowcliffe et al (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2, IAQM, London.



# AIR QUALITY



**Table 9.2 Air Quality Impact Descriptors for Individual Receptors for All Pollutants<sup>a,d</sup>**

Long-term average concentration at receptor in assessment year <sup>b</sup>	Change in concentration relative to AQAL <sup>c</sup>				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Negligible	Minor	Moderate	Moderate	Major
103-109% of AQAL	Negligible	Moderate	Moderate	Major	Major
110% or more of AQAL	Negligible	Moderate	Major	Major	Major

<sup>a</sup> Values are rounded to the nearest whole number.

<sup>b</sup> This is the 'without Proposed Development' concentration where there is a decrease in pollutant concentration and the 'with Proposed Development' concentration where there is an increase.

<sup>c</sup> AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.  
<sup>d</sup> The terminology from the IAQM has been adapted for the purposes of this EIA, so that 'Slight' corresponds to 'Minor', and 'Substantial' to 'Major'.

## Methodology for Determining Construction Effects

- 9.19** The transport consultant has indicated that during the construction of Phase 1 of the Proposed Development, there will be a maximum of 60 deliveries to the site per day over three months of the construction period, with lower numbers over the rest of Phase 1. On average, over the 18 months of Phase 1, there will be 38 deliveries to site per day. It has been assumed that the number of deliveries to the site will be within similar ranges for the other construction phases. The Design Manual for Roads and Bridges (DMRB)<sup>14</sup> indicates that there are likely to be significant air quality impacts where "Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more". More recent guidance from IAQM and EPUK<sup>13</sup> considers that significant air quality impacts could arise where "a development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere". Delivery vehicles will access the site from the A41 Oxford Road, and are not anticipated to cross Bicester town centre and pass through the Bicester AQMA. The increase in HDV movements during construction is therefore not considered to be capable of leading to significant air quality impacts, and construction traffic has not been considered further in this assessment.
- 9.20** The construction dust assessment considers the potential for impacts within 350m of the site boundary; or within 50m of roads used by construction vehicles. The assessment methodology is that provided by IAQM<sup>12</sup>. This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix 9.3 explains the approach in more detail.

## Methodology for Determining Completed Development Effects

**9.21** Once operational, the Proposed Development will lead to an increase in traffic on the local roads, which may impact on air quality at existing residential properties. The main air pollutants of concern related to traffic emissions are nitrogen dioxide (NO<sub>2</sub>) and fine particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). An assessment of the operational impacts that the Proposed Development will have on concentrations of these pollutants has been carried-out following the methodology presented below.

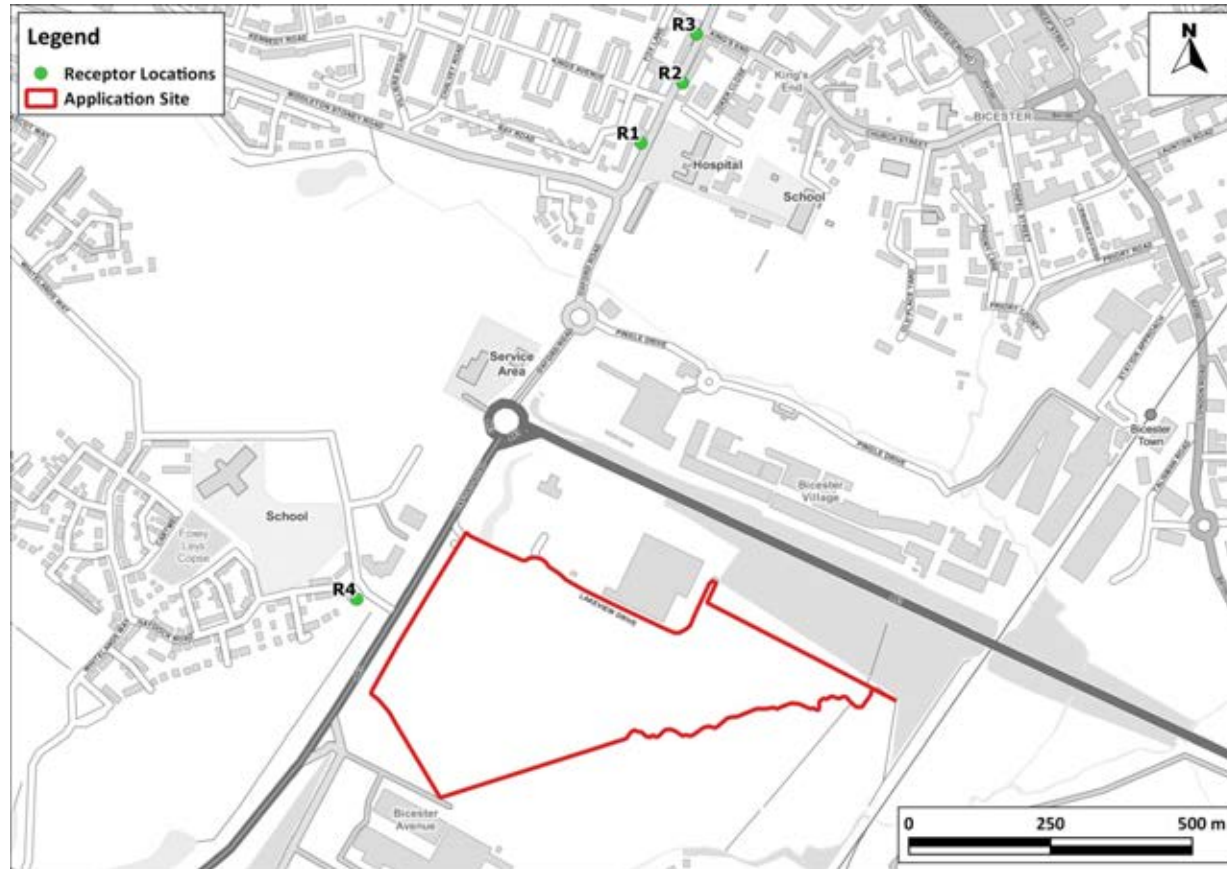
### Sensitive Receptor Locations

- 9.22** Concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> have been predicted at a number of locations close to the Proposed Development. Receptors have been identified to represent worst-case exposure within these locations, being located on the façades of the residential properties closest to the sources. When selecting these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.
- 9.23** Four existing residential properties have been identified as receptors for the assessment. These locations are described in Table 9.3 and shown in Figure 9.1. In addition, concentrations have been modelled at two diffusion tube monitoring sites located along Kings End in order to verify the model outputs (see Appendix 9.6 for verification method).

**Table 9.3 Description of Receptor Locations**

Receptor	Description
R1	Residential Property at 48 Kings End
R2	Residential Property at 43 Kings End
R3	Residential Property 'Fox Cottage'
R4	Residential Property 'Saxon fields'

<sup>14</sup> Highways Agency (2007), Design Manual for Roads and Bridges



**Figure 9.1 Receptor Locations**

Contains Ordnance Survey data © Crown copyright and database right 2017. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

## Assessment Scenarios

- 9.24** Nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been predicted for a base year (2015) and the proposed year of opening (2026). For 2026, predictions have been made assuming both that the Proposed Development does proceed (With Proposed Development), and does not proceed (Without Proposed Development). In addition to the set of 'official' predictions, a sensitivity test has been carried out for nitrogen dioxide that involves assuming much higher nitrogen oxides emissions from certain vehicles than have been predicted by Defra, using AQC's Calculator Using Realistic Emissions for Diesels (CURED V2A) tool<sup>15</sup>. This is to address the potential under-performance of emissions control technology on modern diesel vehicles<sup>16</sup>.

## Modelling Methodology

- 9.25** Concentrations have been predicted using the ADMS-Roads dispersion model. Details of the model inputs, assumptions and the verification are provided in Appendix A6, together with the method used to derive base and future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.

## Traffic Data

- 9.26** Traffic data for the assessment have been provided by Motion, who have undertaken the Traffic and Transport Chapter (Chapter 7) and the Transport Assessment for the Proposed Development. Further details of the traffic data used in this assessment are provided in Appendix 9.6.

## Uncertainty in Road Traffic Modelling Predictions

- 9.27** There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 9.28** An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix 9.6). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2015) concentrations.
- 9.29** Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.
- 9.30** Historically, large reductions in nitrogen oxides emissions have been projected, which has led to significant reductions in nitrogen dioxide concentrations from one year to the next being predicted. Over time, it was found that trends in measured concentrations did not reflect the rapid reductions that Defra and DfT had predicted<sup>17</sup>. This was evident across the UK, although the effect appeared to be greatest in inner London; there was also considerable inter-site variation. Emission projections over the 6 to 8 years prior to 2009 suggested that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25%, whereas monitoring data showed that concentrations remained relatively stable, or even showed a slight increase. Analysis of more recent data for 23 roadside sites in London covering the period 2003 to 2012 showed a weak downward trend of around 5% over the ten years<sup>18</sup>, but this still falls short of the improvements that had been predicted at the start of this period. This pattern of no clear, or limited, downward trend is mirrored in the monitoring data assembled for this study, as set out later in Paragraph 9.39.
- 9.31** The reason for the disparity between the expected concentrations and those measured relates to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have had to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the nitrogen oxides emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles has often been no better than that of earlier models. This has

<sup>15</sup> AQC (2016) CURED V2A, [Online], Available: <http://www.aqconsultants.co.uk/getattachment/Resources/Download-Reports/CURED-V2A.zip.aspx>.

<sup>16</sup> AQC (2016) Emissions of Nitrogen Oxides from Modern Diesel Vehicles, [Online], Available: <http://www.aqconsultants.co.uk/getattachment/Resources/Download-Reports/Emissions-of-Nitrogen-Oxides-from-Modern-Diesel-Vehicles-210116.pdf.aspx>.

<sup>17</sup> Carslaw, D., Beevers, S., Westmoreland, E. and Williams, M. (2011) Trends in NO<sub>x</sub> and NO<sub>2</sub> emissions and ambient measurements in the UK, [Online], Available: [uk-air.defra.gov.uk/reports/cat05/1108251149\\_110718\\_AQ0724\\_Final\\_report.pdf](http://uk-air.defra.gov.uk/reports/cat05/1108251149_110718_AQ0724_Final_report.pdf).

<sup>18</sup> Carslaw, D. and Rhys-Tyler, G. (2013) Remote sensing of NO<sub>2</sub> exhaust emissions from road vehicles, July, [Online], Available: [http://uk-air.defra.gov.uk/assets/documents/reports/cat05/1307161149\\_130715\\_DefraRemoteSensingReport\\_Final.pdf](http://uk-air.defra.gov.uk/assets/documents/reports/cat05/1307161149_130715_DefraRemoteSensingReport_Final.pdf).

# AIR QUALITY

# 9

been compounded by an increasing proportion of nitrogen dioxide in the nitrogen oxides emissions, i.e. primary nitrogen dioxide, which has a significant effect on roadside concentrations<sup>17, 18</sup>.

**9.32** A detailed analysis of emissions from modern diesel vehicles has been carried out<sup>16</sup>. This shows that, where previous standards had limited on-road success, the 'Euro VI' and 'Euro 6' standards that new vehicles have had to comply with from 2013/16 are delivering real on-road improvements. A detailed comparison of the predictions in Defra's latest Emission Factor Toolkit (EFT) v7.0 against the results from on-road emissions tests has shown that Defra's latest predictions still have the potential to under-predict emissions from some vehicles, albeit by less than has historically been the case<sup>16</sup>. In order to account for this potential under-prediction, a sensitivity test has been carried out in which the emissions from Euro IV, Euro V, Euro VI, and Euro 6 vehicles have been uplifted as described in in Appendix 9.6, using AQC's CURED (V2A) tool<sup>15</sup>. The results from this sensitivity test are likely to over-predict emissions from vehicles in the future<sup>16</sup> and thus provide a reasonable worst-case upper-bound to the assessment.

## Assumptions and Limitations

**9.33** Where specific information was not available, assumptions have been made based on professional judgment:

- It has been assumed that most of the site will be subject to earthworks, which has led to the dust emissions magnitude associated with earthworks being considered as large; and
- At the time of assessment, there was no indication that a centralised energy plant or other plant would form part of the proposals. If a centralised energy plant was proposed, then further assessment would be required to determine the potential impacts and likely effects on air quality. This could be secured through planning condition.

## Baseline Conditions

### Industrial Sources

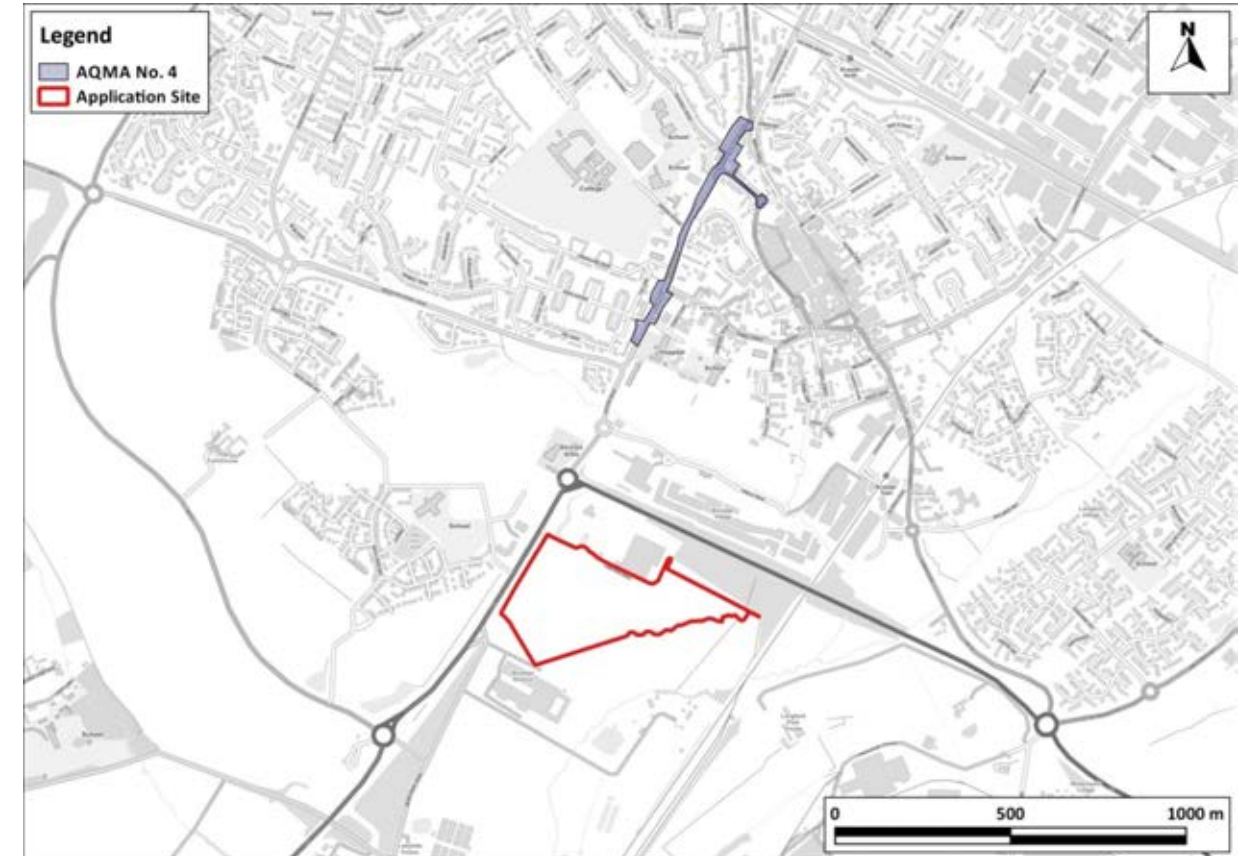
**9.34** Bicester Sewage Treatment Works is located immediately to the south of the site. Such a facility is not anticipated to affect concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at the site. Odours could however be emitted by such a facility, and impact amenity at the site. Meteorological data from Benson meteorological station indicate that wind predominantly blows from the southwest. Under such conditions, the site is not located downwind from the plant. The Sewage Treatment Works are therefore unlikely to significantly impact the Proposed Development in terms of odour. A search of the UK Pollutant Release and Transfer Register<sup>19</sup> and Environment Agency's 'what's in your backyard'<sup>20</sup> websites has also been undertaken, and has not identified any other significant industrial or waste management sources that are likely to affect the Proposed Development, in terms of air quality.

### Air Quality Management Areas

**9.35** CDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. In January 2011 an AQMA was declared at three residential properties backing onto Hennef Way in Banbury, for exceedances of the annual mean and hourly mean nitrogen dioxide objectives. Two further AQMAs were declared in 2014 in Banbury town centre, and along a section of Bicester Road in Kidlington for exceedances of the annual mean nitrogen dioxide objective. In 2015, a fourth AQMA was declared in Bicester town centre

along Queens Avenue, also for exceedances of the annual mean nitrogen dioxide objective<sup>21</sup>. The closest AQMA is located 600m north of the site. This AQMA is shown in Figure 9.2.

**9.36** In terms of PM<sub>10</sub>, Cherwell District Council concluded that there are no exceedances of the objectives. It is, therefore, reasonable to assume that existing PM<sub>10</sub> levels will not exceed the objectives within the study area<sup>22</sup>.



**Figure 9.2 Declared AQMA**

Contains Ordnance Survey data © Crown copyright and database right 2017. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

### Local Air Quality Monitoring

**9.37** CDC does not operate any automatic monitoring station within its area. The Council, however, operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Environmental Scientifics Group (using the 50% TEA in acetone method). These include eleven deployed in the Bicester area. Results for the years 2011 to 2015 are summarised in 4 and the monitoring locations are shown in Figure 9.3 and Figure 9.4.

<sup>19</sup> Defra (2017) UK Pollutant Release and Transfer Register, [Online], Available: [prtr.defra.gov.uk](http://prtr.defra.gov.uk).

<sup>20</sup> Environment Agency (2017) 'what's in your backyard', [Online], Available: <http://www.environment-agency.gov.uk/homeandleisure/37793.aspx>.

<sup>21</sup> Cherwell District Council (2017) 2016 Air Quality Annual Status Report

<sup>22</sup> Cherwell District Council (2015) 2015 Updating and Screening Assessment

# AIR QUALITY

**Table 9.4 Summary of Nitrogen Dioxide (NO<sub>2</sub>) Diffusion Tube Monitoring (2011-2015)<sup>a</sup>**

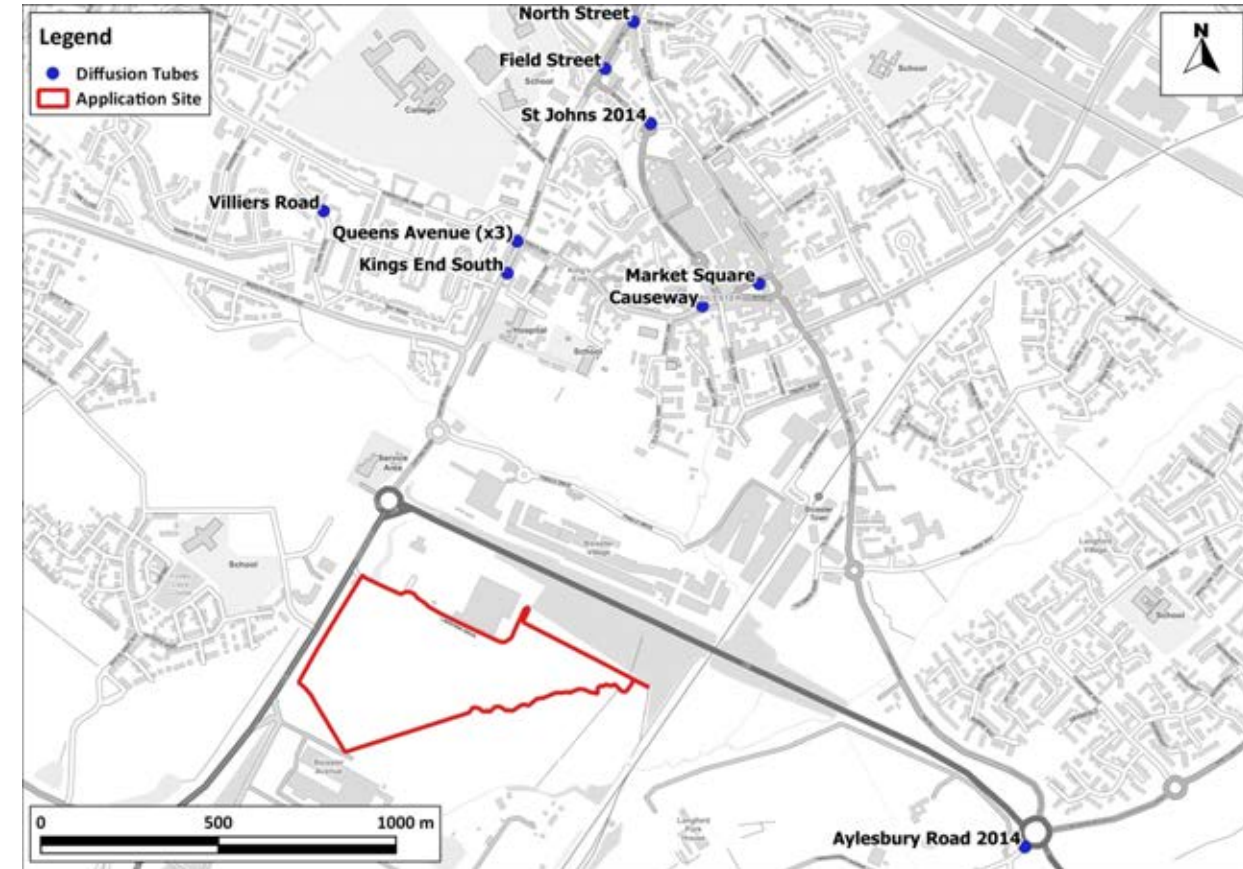
Site No.	Site Type	2011	2012	2013	2014	2015
Villiers Road	Urban Background	19.0	20.5	19.8	18.3	16.9
Causeway	Roadside	No data	No data	23.2	20.2	20.0
Kings End South	Roadside	<b>49.5</b>	<b>49.0</b>	<b>48.5</b>	<b>46.9</b>	<b>46.0</b>
St John 2014	Roadside	No data	No data	No data	36.3	38.3
Field Street	Kerbside	<b>42.9</b>	<b>41.6</b>	<b>40.3</b>	36.2	36.5
North Street	Kerbside	<b>46.1</b>	<b>45.6</b>	<b>44.7</b>	<b>41.9</b>	39.8
Queens Avenue (x3)	Kerbside	<b>42.9<sup>b</sup></b>	<b>45.0<sup>b</sup></b>	<b>41.0<sup>b</sup></b>	<b>40.3<sup>b</sup></b>	38.7 <sup>b</sup>
Market square 2014	Roadside	No data	No data	No data	23.5	23.7
Tamarisk Gardens	Urban Background	18.5	17.6	17.4	15.9	15.7
Howes lane 2014	Roadside	No data	No data	No data	23.4	23.9
Aylesbury Road 2014	Roadside	No data	No data	No data	32.7	30.5
<b>Objective</b>		<b>40</b>				

<sup>a</sup> Exceedances of the objectives are shown in bold.

<sup>b</sup> Average of triplicates diffusion tubes

**9.38** Data presented above indicates that annual mean concentrations of nitrogen dioxide are above or close to the objective along Kings End (within the declared AQMA), and below the objective along the A41 to the west of the Proposed Development site. This is consistent with conclusions made by CDC in their latest Annual Status report<sup>21</sup>. It appears that concentrations have been slightly decreasing over the past five years, indicating a limited downwards trend with regards to annual mean concentrations of nitrogen dioxide.

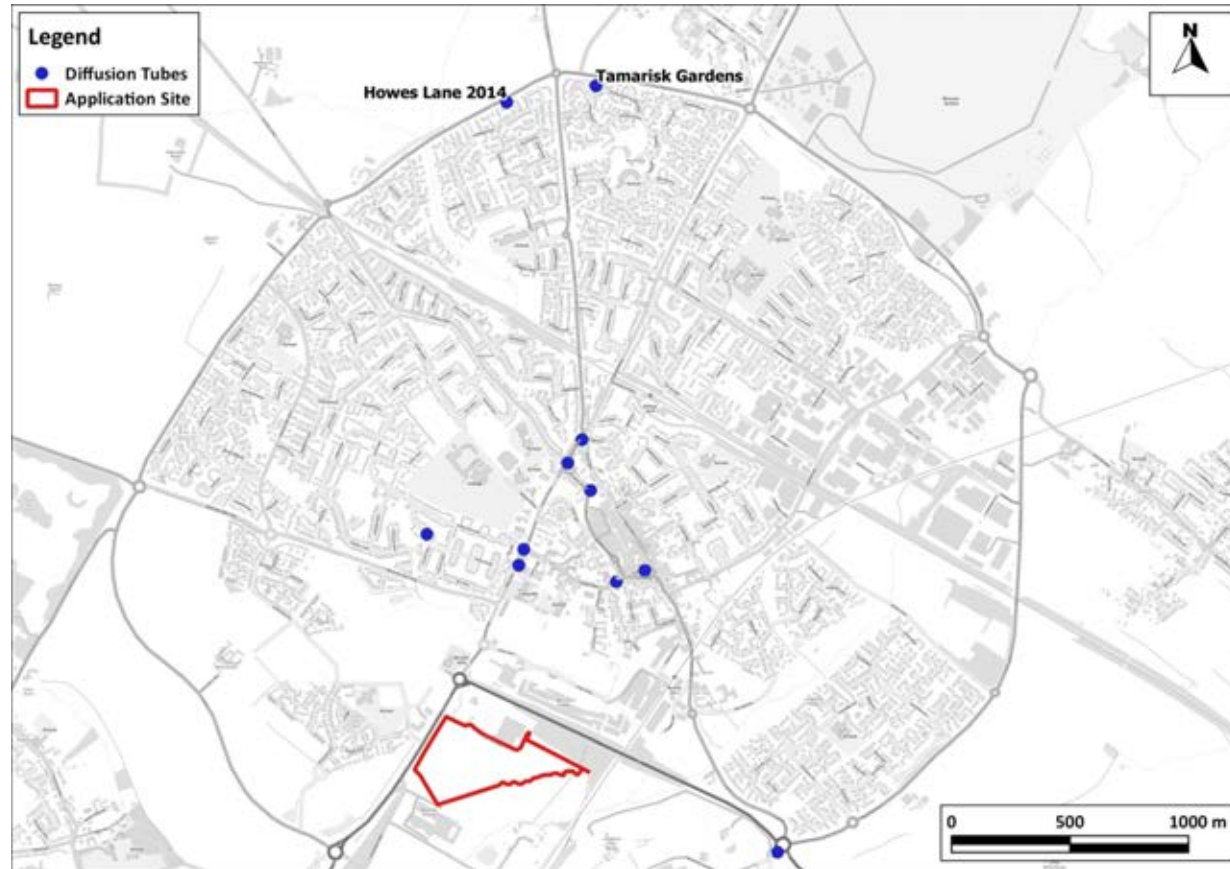
**9.39** No monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> concentrations is undertaken in Cherwell District.



**Figure 9.3 Monitoring Locations – Near Site of Proposed Development**

Contains Ordnance Survey data © Crown copyright and database right 2017. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

# AIR QUALITY



**Figure 9.4 Monitoring Locations – North Bicester**

Contains Ordnance Survey data © Crown copyright and database right 2017. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

## Exceedances of EU Limit values

**9.40** There are no AURN monitoring sites within the study area with which to identify exceedances of the annual mean nitrogen dioxide limit value. The national maps of roadside annual mean nitrogen dioxide concentrations<sup>23</sup>, used to report exceedances of the limit value to the EU, do not identify any exceedances within the study area. Defra's mapping for 2025 which takes account of the measures contained in its 2015 Air Quality Plan<sup>24</sup>, also does not identify any exceedances within the study area. Defra is in the process of updating its air quality plan and associated modelling, but it has not yet published its revised maps.

## Background Concentrations

**9.41** In addition to these locally measured concentrations, estimated background concentrations in the study area have been determined for 2015 and the opening year 2026 using Defra's background maps<sup>25</sup>. The background

concentrations are set out in 5 and have been derived as described in Appendix 9.6. The background concentrations are all well below the objectives.

**Table 9.5 Estimated Annual Mean Background Pollutant Concentrations in 2015 and 2026 ( $\mu\text{g}/\text{m}^3$ )**

Year	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2015	13.2 – 14.5	15.1 – 16.6	10.7 – 11.4
2026 <sup>a</sup>	8.8 – 9.9	14.1 – 15.6	9.9 – 10.6
2026 Worst-case Sensitivity Test <sup>b</sup>	9.8 – 11.1	N/A	N/A
Objectives	40	40	25 <sup>c</sup>

N/A = not applicable. The range of values is for the different 1x1 km grid squares covering the study area.

<sup>a</sup> In line with Defra's forecasts.

<sup>b</sup> Assuming higher emissions from modern diesel vehicles as described in Appendix A6.

<sup>c</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

## Baseline Dispersion Model Results

**9.42** Baseline concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> have been modelled at each of the existing receptor locations (see Figure 9.1 and Table 9.6 for receptor locations). The results, which cover both the existing (2015) and future year (2026) baseline (Without Proposed Development), are set out in Table 9.6 and Table 9.7. The predictions for nitrogen dioxide include a sensitivity test which accounts for the potential under-performance of emissions control technology on modern diesel vehicles. In addition, the modelled road components of nitrogen oxides, PM<sub>10</sub> and PM<sub>2.5</sub> have been increased from those predicted by the model based on a comparison with local measurements (see Appendix 9.6 for the verification methodology).

<sup>23</sup> Defra (2017) UK Ambient Air Quality Interactive Map, [Online], Available: <http://uk-air.defra.gov.uk/data/gis-mapping>.

<sup>24</sup> Defra (2015) Air quality in the UK: plan to reduce nitrogen dioxide emissions, [Online], Available: <https://www.gov.uk/government/publications/air-quality-in-the-uk-plan-to-reduce-nitrogen-dioxide-emissions>.

<sup>25</sup> Defra (2017) Defra Air Quality Website, [Online], Available: <http://laqm.defra.gov.uk/>.

**Table 9.6 Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ( $\mu\text{g}/\text{m}^3$ ) at Existing Receptors <sup>a</sup>**

Receptor	2015 <sup>b</sup>	2026 Without Proposed Development <sup>b</sup>	Worst-case Sensitivity Test <sup>c,d</sup>	
			2015	2026 Without Proposed Development
R1	36.2	21.9	36.3	30.6
R2	<b>41.7</b>	25.4	<b>41.7</b>	35.3
R3	<b>41.1</b>	25.1	<b>41.1</b>	34.9
R4	19.6	11.8	20.2	15.0
<b>Objective</b>	<b>40</b>			

<sup>a</sup> Exceedances of the objective are shown in bold.

<sup>b</sup> In line with Defra's forecasts.

<sup>c</sup> Assuming higher emissions from modern diesel vehicles as described in Appendix 9.6.

<sup>d</sup> The methodology for the sensitivity test uses different traffic emissions and required a separate verification (see Appendix 9.6), which leads to slightly different values.

**Table 9.7 Modelled Annual Mean Baseline Concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ ) at Existing Receptors**

Receptor	PM <sub>10</sub> <sup>a</sup>		PM <sub>2.5</sub>	
	2015	2026 Without Proposed Development	2015	2026 Without Proposed Development
R1	20.2	19.8	13.9	13.1
R2	20.7	20.2	14.3	13.4
R3	20.7	20.2	14.3	13.4
R4	17.7	16.9	12.1	11.3
<b>Objective/Criterion</b>	<b>32 <sup>a</sup></b>		<b>25 <sup>b</sup></b>	

<sup>a</sup> While the annual mean PM<sub>10</sub> objective is 40  $\mu\text{g}/\text{m}^3$ , 32  $\mu\text{g}/\text{m}^3$  is the annual mean concentration above which an exceedance of the 24-hour mean PM<sub>10</sub> objective is possible, as outlined in LAQM.TG16<sup>10</sup>. A value of 32  $\mu\text{g}/\text{m}^3$  is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM<sub>10</sub> objective, as recommended in EPUK & IAQM guidance<sup>13</sup>

<sup>b</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### 2015 Baseline

- 9.43** Predicted annual mean concentrations of nitrogen dioxide are below the objective at receptors R1 and R4 in 2015; at receptors R2 and R3, located on Kings End, exceedances of the objective are predicted.

- 9.44** Annual mean concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are well below the objectives in 2015 at all receptors. The annual mean PM<sub>10</sub> concentrations are below 32  $\mu\text{g}/\text{m}^3$  and it is, therefore, unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded.

- 9.45** These results are consistent with the conclusions of CDC in the outcome of its air quality review and assessment work.

### 2026 Baseline

- 9.46** The predicted annual mean concentrations of nitrogen dioxide are well below the objective at all receptor locations. All of the predictions for PM<sub>10</sub> and PM<sub>2.5</sub> are also well below the objectives. The annual mean PM<sub>10</sub> concentrations are below 32  $\mu\text{g}/\text{m}^3$  and it is, therefore, unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded.

### Worst-case Sensitivity Test for Nitrogen Dioxide

- 9.47** The results from the sensitivity test show that for the 2015 scenario, annual mean concentrations of nitrogen dioxide are not materially different from those derived using the 'official' predictions.

- 9.48** The worst-case sensitivity test shows that in 2026, annual mean nitrogen dioxide concentrations are predicted to be below the objective at all selected receptor locations, but are higher than shown for the "official reduction" in emissions.

## Assessment of Effects

### Construction

- 9.49** The construction works will last between 8 and 9 years and give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix 9.3), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

### Potential Dust Emission Magnitude

#### Demolition

- 9.50** There is no requirement for demolition on site, as it currently consists in greenfield land.

#### Earthworks

- 9.51** The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website<sup>26</sup>, as set out in Table 9.8. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

<sup>26</sup> British Geological Survey (2017) UK Soil Observatory Map Viewer, [Online], Available: <http://mapapps2.bgs.ac.uk/ukso/home.html>.

**Table 9.8 Summary of Soil Characteristics**

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Argillic <sup>a</sup> – Arenaceous <sup>b</sup>
European Soil Bureau Description	Claystone / Mudstone
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Clayey Loam to Silty Loam <sup>c</sup> / Clay to sandy loam

<sup>a</sup> grain size < 0.06 mm.

<sup>b</sup> grain size 0.06 – 2.0 mm.

<sup>c</sup> a loam is composed mostly of sand and silt

**9.52** The site covers approximately some 100,000m<sup>2</sup> and most of this will be subject to earthworks, involving digging of the basement levels, landscaping, and levelling the ground (where required). As the construction will be phased, it is anticipated that earthworks will be required throughout the construction period, hence over 8 to 9 years. Dust will arise mainly from vehicles travelling over unpaved ground in the first phases of the works, as it is likely roads will have not yet been tarmacked, and from the handling of dusty materials (such as dry soil) throughout the construction period. Based on the example definitions set out in Table 9.3.1 in Appendix 9.3, the dust emission class for earthworks is considered to be large.

### Construction

**9.53** A total of 11 buildings will be constructed at the site, over six zones referred to as Zones A to F. All buildings will be three to four storeys high. Construction will start with Zones B and C, which will be completed in approximately 2 years. Zones A, D, E and F will follow alphabetically, with works lasting 12 to 18 months for each phase. A conservative worst-case approach has been adopted, which considers that construction works could occur simultaneously over several Zones. Zone A has a total building volume of 109,200m<sup>3</sup>, while it amounts to 123,840m<sup>3</sup> for each of Zones B and C, 248,624 m<sup>3</sup> for Zone D, 185,760 m<sup>3</sup> for Zone E and 261,200 m<sup>3</sup> for Zone F. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. Based on the example definitions set out in Table 9.3.1 in Appendix 9.3, the dust emission class for each phase of the construction works is considered to be large. May works overlap, the dust emission class would remain large (as this represents the highest dust emission class).

### Trackout

**9.54** There will be a maximum of 60 deliveries to the site per day over Phase 1 of the construction works. Vehicles accessing the site may track out dust and dirt onto the local road network. All vehicles will access the site via Lakeview Drive and then through two roundabouts providing access to the different zones of Proposed Development. Based on the example definitions set out in Table 9.3.1 in Appendix 9.3 the dust emission class for trackout is considered to be large.

**9.55** Table 9.9 summarises the dust emission magnitude for the proposed development.

**Table 9.9 Summary of Dust Emission Magnitude**

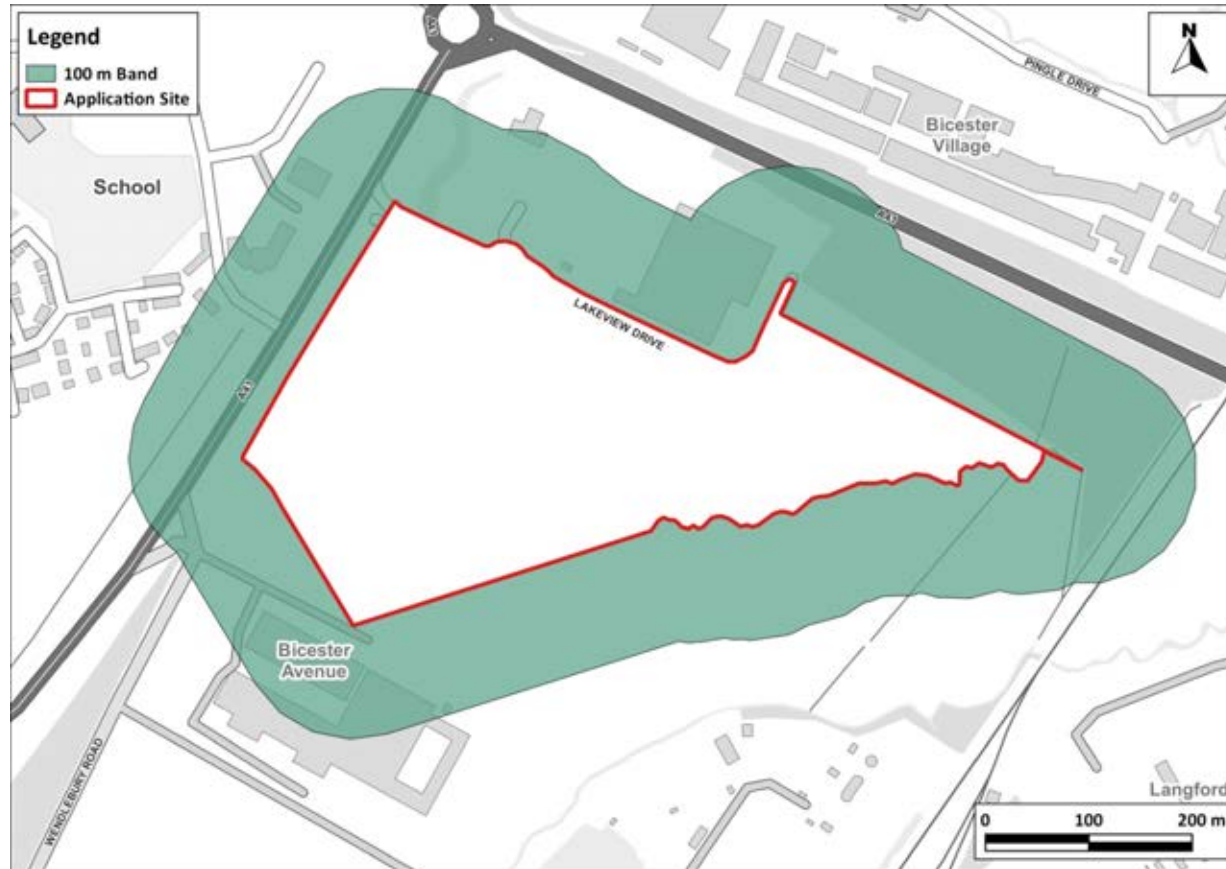
Source	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	Large
Trackout	Large

### Sensitivity of the Area

**9.56** This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM<sub>10</sub> concentrations.

### Sensitivity of the Area to Effects from Dust Soiling

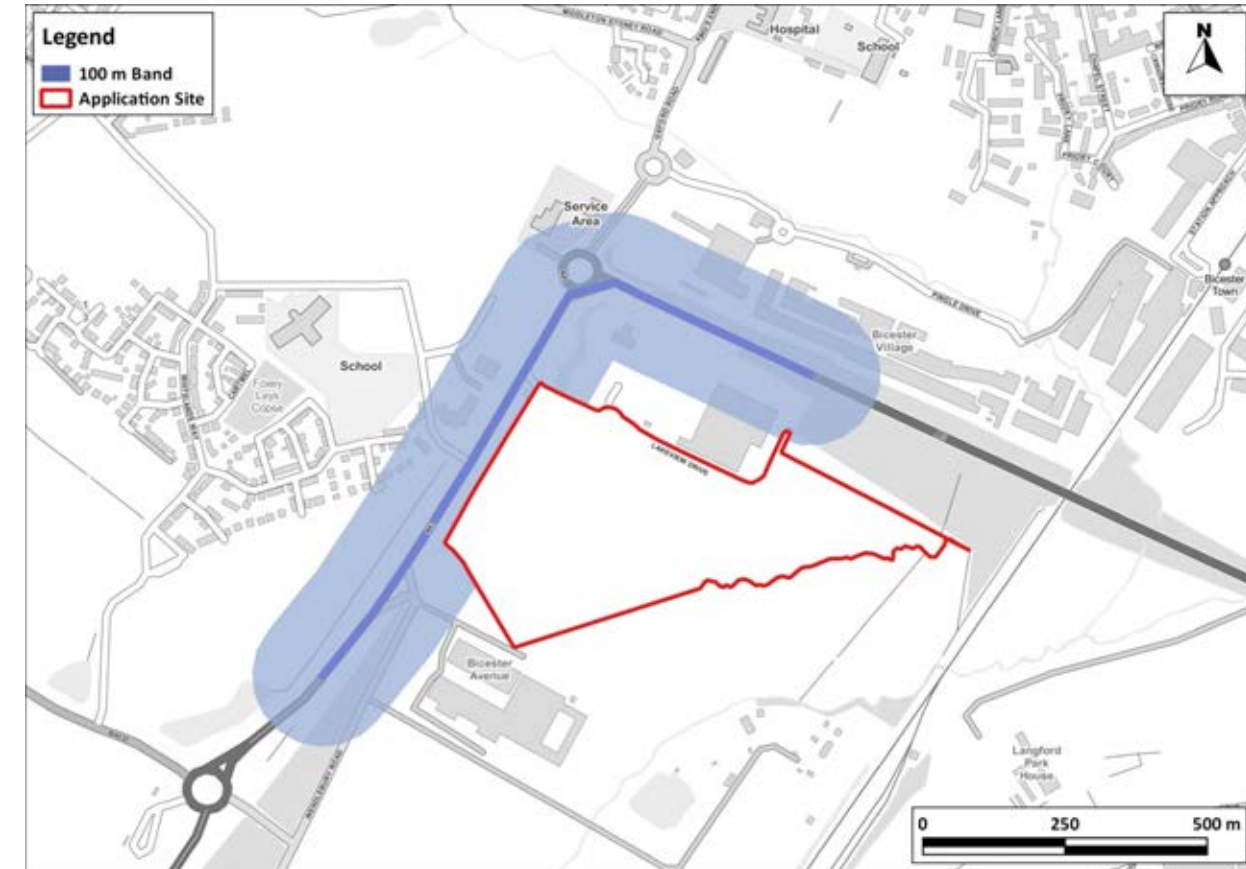
**9.57** The IAQM guidance explains that residential properties and garden centres are 'high' sensitivity receptors to dust soiling, while the Hotel (Premier Inn) located opposite the A41 is a 'medium' sensitivity receptor (Table 9.3.2 in Appendix 9.3). There are approximately five residential properties within 100m of the site, while the Hotel and Bicester Avenue Garden Centre are also within 100m from the site (see Figure 9.5). Using the matrix set out in Table 9.3.3 in Appendix 9.3, the area surrounding the onsite works is of 'low' sensitivity to dust soiling.



**Figure 9.5 100 m Distance Band around Site Boundary**

Contains Ordnance Survey data © Crown copyright and database right 2017. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

- 9.58** Table 9.9 shows that the dust emission magnitude for trackout is large and Table 9.3.3 in Appendix 9.3 thus explains that there is a risk of material being tracked 500 m from the site exit. Construction vehicles will access the site from the A41, either from the south or west of the site. There are approximately ten residential properties within 100m of the roads along which material could be tracked (see Figure 9.6), and Table 9.3.3 in Appendix 9.3 thus indicates that the area is of 'low' sensitivity to dust soiling due to trackout.



**Figure 9.6 50 m Distance Bands around Roads Used by Construction Traffic Within 500 m of the Site Exit**

Contains Ordnance Survey data © Crown copyright and database right 2017. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

### *Sensitivity of the Area to any Human Health Effects*

- 9.59** Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. The matrix in Table 9.3.4 in Appendix 9.3 requires information on the baseline annual mean PM<sub>10</sub> concentration in the area. It is considered that the modelled baseline PM<sub>10</sub> concentration at Receptor R4 in Table 9.7 (17.7 µg/m<sup>3</sup>) will best represent conditions near to the site. Using the matrix in Table 9.3.4 in Appendix 9.3, the area surrounding the onsite works and the area surrounding roads along which material may be tracked from the site are of 'low' sensitivity to human health effects.

### *Summary of Area Sensitivity*

- 9.60** Table 9.10 summarises the sensitivity of the area around the proposed construction works.



# AIR QUALITY



**Table 9.10 Summary of the Area Sensitivity**

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	Low	Low
Human Health	Low	Low

### Risk and Significance

**9.61** The dust emission magnitudes in Table 9.9 have been combined with the sensitivities of the area in Table 9.10 using the matrix in Table 9.3.7 in Appendix 9.3, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 9.11. These risk categories have been used to determine the appropriate level of mitigation as set out in Paragraphs 9.74 to 9.76 (step 3 of the assessment procedure).

**Table 9.11 Summary of Risk of Impacts Without Mitigation**

Source	Dust Soiling	Human health
Demolition	N/A	N/A
Earthworks	Low Risk	Low Risk
Construction	Low Risk	Low Risk
Trackout	Low Risk	Low Risk

**9.62** The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'<sup>12</sup>.

### Completed Development

#### Impacts of Development-Generated Road Traffic Emissions

**9.63** Predicted annual mean concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> in 2026 for existing receptors are set out in Table 9.12, Table 9.13 and Table 9.14 for both the "Without Proposed Development" and "With Proposed Development" scenarios. These tables also describe the impacts at each receptor using the impact descriptors given in Appendix 9.4. For nitrogen dioxide, results are presented for two scenarios so as to include a worst-case sensitivity test.

**Table 9.12 Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2026 (µg/m<sup>3</sup>)**

Receptor	Without Proposed Development	With Proposed Development	% Change <sup>a,b</sup>	Impact Descriptor	Worst-case Sensitivity Test <sup>d</sup>			
					Without Proposed Development	With Proposed Development	% Change <sup>b</sup>	Impact Descriptor
R1	21.9	23.4	4	Negligible	30.6	32.8	6	Moderate Adverse
R2	25.4	27.2	4	Negligible	35.3	37.9	6	Moderate Adverse
R3	25.1	26.9	4	Negligible	34.9	37.4	6	Moderate Adverse
R4	11.8	12.0	1	Negligible	15.0	15.4	1	Negligible
<b>Objective</b>	<b>40</b>	-	-	-	<b>40</b>	-	-	-

<sup>a</sup> In line with Defra's forecasts.

<sup>b</sup> % changes are relative to the objective and have been rounded to the nearest whole number.

<sup>c</sup> Assuming higher emissions from modern diesel vehicles as described in Appendix 9.6.

**Table 9.13 Predicted Impacts on Annual Mean PM<sub>10</sub> Concentrations in 2026 (µg/m<sup>3</sup>)**

Receptor	Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> )			Impact Descriptor
	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	
R1	19.8	20.5	2	Negligible
R2	20.2	21.0	2	Negligible
R3	20.2	20.9	2	Negligible
R4	16.9	17.0	0	Negligible
<b>Criterion</b>	<b>32<sup>b</sup></b>	-	-	-

<sup>a</sup> % changes are relative to the criterion and have been rounded to the nearest whole number.

<sup>b</sup> While the annual mean PM<sub>10</sub> objective is 40 µg/m<sup>3</sup>, 32 µg/m<sup>3</sup> is the annual mean concentration above which an exceedance of the 24-hour mean PM<sub>10</sub> objective is possible, as outlined in LAQM.TG16<sup>10</sup>. A value of 32 µg/m<sup>3</sup> is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM<sub>10</sub> objective, as recommended in EPUK & IAQM guidance<sup>13</sup>.

**Table 9.14 Predicted Impacts on Annual Mean PM<sub>2.5</sub> Concentrations in 2026 (µg/m<sup>3</sup>)**

Receptor	Annual Mean PM <sub>2.5</sub> (µg/m <sup>3</sup> )			
	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	Impact Descriptor
R1	13.1	13.5	1	Negligible
R2	13.4	13.8	2	Negligible
R3	13.4	13.8	2	Negligible
R4	11.3	11.4	0	Negligible
<b>Criterion</b>	<b>25 <sup>b</sup></b>		-	-

<sup>a</sup> % changes are relative to the criterion and have been rounded to the nearest whole number.

<sup>b</sup> The PM<sub>2.5</sub> objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### Nitrogen Dioxide

- 9.64 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors.
- 9.65 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to be 4% at receptors R1 to R3, and 1% at receptor R4. Using the matrix in Table 9.4.1 (Appendix 9.4), these impacts are described as negligible.
- 9.66 The annual mean nitrogen dioxide concentrations are below 60 µg/m<sup>3</sup> at all of the receptor locations. It is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.
- 9.67 The results from the worst-case sensitivity test show that annual mean concentrations of nitrogen dioxide are predicted to be below the objective at all receptors. The percentage changes in concentrations are higher than for the official predictions, with values ranging between 1 and 6 % of the objective. The impacts of such changes are described as negligible to moderate adverse.

### PM<sub>10</sub> and PM<sub>2.5</sub>

- 9.68 The annual mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are well below the annual mean objectives at all receptors, with or without the Proposed Development. Furthermore, as the annual mean PM<sub>10</sub> concentrations are below 32 µg/m<sup>3</sup>, it is unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded at any of the receptors.
- 9.69 The percentage changes in both PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, relative to the air quality objective (when rounded), are predicted to range between zero and 2%. Using the matrix in Table 9.4.1 (Appendix 9.4), these impacts are described as negligible.

### Significance of Operational Air Quality Effects

- 9.70 Professional judgment applied to determine the significance of operational air quality effects has been made in accordance with the methodology set out in Appendix 9.4, and also takes into account the results of the worst-case sensitivity test for nitrogen dioxide (undertaken using AQC's CURED tool<sup>15</sup>). This sensitivity test considers the potential under-performance of emissions control technology on modern diesel vehicles, and provides an upper-bound estimate for the assessment. Defra is currently updating its own national modelling using the COPERT 5.0 emissions model. Current evidence<sup>27</sup> shows that, for an assessment year of 2026, concentrations

predicted using CURED will be much higher than those that would be predicted using COPERT 5.0. In this instance, future year concentrations are therefore expected to lie between the two sets of results presented in this chapter, as are the predicted impacts at selected receptor locations.

- 9.71 Concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> are predicted to be below the objectives at all selected receptors. Impacts attributable to the increase in traffic associated with the operation of the Proposed Development are anticipated to be moderate adverse, but only based on the worst-case sensitivity test, which, as explained above, is likely to be overly conservative for the assessment year 2026. Taking this into account, as well as the criteria defined in Paragraph 9.18, operational air quality effects without mitigation are judged to be 'not significant'.

## Mitigation and Monitoring

### Mitigation Included by Design

- 9.72 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The Proposed Development incorporates the following good design and best practice measures:

- adoption of a Dust Management Plan (DMP) or Construction Environmental Management Plan (CEMP) to minimise the environmental impacts of the construction works; and
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public, cycling and walking).

### Recommended Mitigation

#### Construction

- 9.73 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.
- 9.74 The site has been identified as Low Risk during earthworks, construction and for trackout, as set out in Table 9.11. Comprehensive guidance has been published by IAQM<sup>12</sup> that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction<sup>28</sup>. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix 9.7.
- 9.75 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

#### Completed Development

- 9.76 The assessment has demonstrated that the Proposed Development will not cause any exceedances of the air quality objectives and that the overall effect of the Proposed Development will be 'not significant'. It is, therefore, not considered appropriate to propose further mitigation measures for this Proposed Development.

<sup>27</sup> [http://www.aqconsultants.co.uk/AQC/media/Reports/Relationship-between-CURED-V2A-and-COPERT-V5\\_0-July-2017.pdf](http://www.aqconsultants.co.uk/AQC/media/Reports/Relationship-between-CURED-V2A-and-COPERT-V5_0-July-2017.pdf)

<sup>28</sup> IAQM (2012) Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites, [Online], Available: [www.iaqm.co.uk/guidance.html](http://www.iaqm.co.uk/guidance.html).

# AIR QUALITY



9.77 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

## Residual Effects

Table 9.15 Summary of Residual Effects

Intended End Use	Likely Effect, Geographic Scale and Duration (Pre Mitigation))	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
<b>Construction</b>			
Dust Soiling	Low risk of impacts Local Impacts Medium term (8 years)	Negligible Local Impacts Medium term (8 years)	<b>Not significant</b>
Dust Impacts on Human Health	Low risk of impacts Local Impacts Medium term (8 to 9 years)	Negligible Local Impacts Medium term (8 to 9 years)	<b>Not significant</b>
<b>Completed Development</b>			
Road traffic impacts on air quality at existing receptors	Negligible to Minor Adverse Local Impacts Permanent	Negligible to Minor Adverse Local Impacts Permanent	<b>Not significant</b>

## Cumulative Effects Assessment

### Construction Phase

- 9.78 A total of nine developments have been identified as cumulative schemes. Relevant guidance considers that dust impacts from a construction site can arise up to 350m from the site boundary or construction area. Over that distance, a construction site is not considered capable of significantly affecting sensitive receptors in terms of dust deposition or concentrations of PM<sub>10</sub>. As such, only a scheme located within 700m of the site would be capable of impacting receptors affected by works carried out at the Proposed Development site.
- 9.79 Of the eight sites identified, three schemes are within 700m of the Proposed Development site: 'Bicester Village Phase 4', 'Bicester Gateway Retail' and 'Graven Hill'. Sensitive receptors located within 350m of these schemes and the Proposed Development could therefore experience cumulative construction dust impacts, may the works occur simultaneously. Of the receptors located within 350m of the site, those located along Haydock Road and Saxon Fields could be affected by cumulative construction dust impacts associated with the 'Bicester Gateway Retail' scheme. One residential property is located between the Proposed Development and Graven Hill, and could be affected by the two schemes in terms of construction dust. There are no sensitive receptors located within 350m of 'Bicester Village Phase 4' and the Proposed Development, and there is thus no potential for cumulative construction dust impacts to occur with these two schemes.
- 9.80 Properties located along Haydock Road and Saxon Fields are approximately within 300m of 'Bicester Gateway Retail' and within 110m of Proposed Development, while the residential property located between the site of Proposed Development and Graven Hill development site is situated more than 250m from both future construction areas. At such distances, and considering that good practice will be applied on all schemes, cumulative dust impacts, if arising, would be considered negligible, which is considered 'not significant'.

### Operational Phase

- 9.81 The traffic data used in the 2026 without Proposed Development scenario incorporates traffic flows associated with all cumulative schemes which would affect the roads included in this assessment. As such, future predictions presented in this chapter take account of cumulative impacts.
- 9.82 Operational impacts, including cumulative schemes, have been shown to be 'not significant'.

### Conclusions

- 9.83 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. With these measures in place, it is expected that any residual effects will be 'not significant'.
- 9.84 The operational impacts of increased traffic emissions arising from the additional traffic on local roads, due to the Proposed Development, have been assessed. Concentrations have been modelled for four worst-case receptors, representing existing properties where impacts are expected to be greatest. In the case of nitrogen dioxide, a sensitivity test has also been carried out which considers the potential under-performance of emissions control technology on modern diesel vehicles.
- 9.85 It is concluded that concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> will remain below the objectives at all existing receptors in 2026, whether the Proposed Development is developed or not. This conclusion is consistent with the outcomes of the reviews and assessments prepared by CDC, which show that exceedances of the PM<sub>10</sub> objective are unlikely at any location.
- 9.86 In the case of nitrogen dioxide, the annual mean concentrations remain below the objective at all existing receptors in 2026, whether the Proposed Development is developed or not and taking account of the worst-case sensitivity test.
- 9.87 The additional traffic generated by the Proposed Development will affect air quality at existing properties along the local road network. The assessment has demonstrated that the increases in concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> at relevant locations, relative to the objectives, will be 2% at most (when rounded) and the impacts will all be negligible. In the case of nitrogen dioxide, the percentage increases are predicted to range from 1% to 4% for the official predictions, and from 1% to 6% for the worst-case sensitivity test. Future concentrations and predicted impacts are expected to lie between the two sets of results, and effects at receptor locations have been judged as 'not significant'.
- 9.88 The overall operational air quality effects of the development are considered 'not significant'. This conclusion, which takes account of the uncertainties in future projections, in particular for nitrogen dioxide, is based on the concentrations being below the objective for nitrogen dioxide.

# BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

10

## Introduction

- 10.1** This chapter of the Environmental Statement (ES) reports the findings of an assessment of the likely significant effects on buried heritage and built heritage as a result of the construction phase and during the operation of the Proposed Development.
- 10.2** This chapter sets out the relevant planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on buried and built heritage as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 10.3** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 13: Effect Interactions of this ES (Volume I).
- 10.4** This chapter is supported by the following appendices provided in ES Volume II: Appendix 10.1 to 10.5:
- Appendix 10.1: Site Gazetteer;
  - Appendix 10.2 Setting Assessment Methodology;
  - Appendix 10.3 Legislative and Planning Policy Context;
  - Appendix 10.4: Site Walkover;
  - Appendix 10.5: Plates and Figures; and
  - Appendix 10.6: Written Scheme of Investigation

## Legislative and Planning Policy Context

- 10.5** Full details of the following are provided in Appendix 10.3:
- Planning policy National Planning Policy Framework (NPPF), Chapter 12;
  - Planning Policy: Local Planning Policy: Cherwell Local Plan, Policy ESD 15; and
  - National Guidance; Paragraph 13.

## Assessment Methodology

- 10.6** The primary source of information relating to the presence and significance of known non-designated historic/archaeological remains in the area has been the Oxfordshire Historic Environment Record (who hold the HER for the Cherwell District Council (CDC)). An extract was received from the HER in May 2017. Up to date information on Scheduled Monuments, Listed Buildings and Registered Parks and Gardens was obtained from Historic England (HE) in May 2017, together with GIS data recording their locations and extent. Information on boundaries of Conservation Areas was obtained from CDC; one conservation area falls within the northern part of the study area; Bicester Conservation Area.
- 10.7** All heritage assets, whether designated or not, within a distance of up to 1km from the boundary of the site have been identified within the EIA and these are recorded in Appendix 10.1. The locations of all assets are illustrated on Figure 10.1.

**10.8** An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2. .

**10.9** A formal scoping response from Oxfordshire County Council's Planning Archaeologist was included in the Scoping Opinion. The scoping response considered archaeological and built heritage requirements for this chapter of the EIA. The opinion requested the assessment be in line with the Chartered Institute for Archaeology standards and guidance and stated a requirement to submit a written scheme of investigation (WSI) to ensure that the scope of assessment was agreed. The WSI was submitted to the Planning Archaeologist on 15 August 2017. The opinion also stated that there would likely be a requirement for a programme of archaeological investigation to be undertaken ahead of determination of any planning application for the site. This was discussed with the Planning Archaeologist on 15 August 2017 and confirmation requested that further investigations at the site would be as a condition of planning. A decision is awaited.

## Assessment of Significance / Assessment Criteria

**10.10** This sub-section sets out the methodology for assessing direct effects upon heritage assets. The methodology for assessing indirect effects upon heritage assets is contained within Appendix 10.2. It takes account of the NPPF, its practice guide and Historic England's Good Practice Advice Note 3: the setting of heritage assets<sup>1</sup>, and *Standards for Field Archaeology in the East of England*<sup>2</sup> as set out above.

## The Assessor

**10.11** AOC Archaeology Group conforms to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Code of Conduct<sup>3</sup>, the ClfA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology<sup>4</sup>, the ClfA Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations<sup>5</sup>.

**10.12** 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 internal systems, standards and skills development.

## Assessing Cultural Value (Significance) & Importance

**10.13** 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. This definition has since been adopted by heritage organisations around the world, including 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."*

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

**10.15** 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

<sup>1</sup> Historic England (2015) The Setting of Heritage Asset - Historic Environment Good Practice Advice in Planning:3

<sup>2</sup> David Gurney, 2003. 'Standards for Field Archaeology in the East of England', *East Anglian Archaeology Occasional Papers 14*

<sup>3</sup> Chartered Institute for Archaeologists (2014) Code of Conduct

<sup>4</sup> Chartered Institute for Archaeologists (2008) Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology

<sup>5</sup> Chartered Institute for Archaeologists (2014/2017) Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations

## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

their importance has already been established through the designation (i.e. scheduling, listing and register) processes applied by HE.

**10.16** The criteria used to establish importance in this assessment are presented in Table 10.1 below and are drawn from the Department of Media, Culture and Sports publication, Principles for Selection of Listed Buildings<sup>6</sup>, and the Scheduled Monuments Policy Statements published by the same body<sup>7</sup>, which outline the criteria for designating heritage assets.

**Table 10.1 Criteria for Establishing Importance**

Importance	Criteria
International and National	<ul style="list-style-type: none"> <li>World Heritage Sites;</li> <li>Scheduled Monuments (Actual and Potential);</li> <li>Grade I and II* Listed Buildings;</li> <li>Grade I and II* Registered Parks and Gardens;</li> <li>Registered Battlefields;</li> <li>Fine, little-altered examples of some particular period, style or type.</li> </ul>
Regional	<ul style="list-style-type: none"> <li>Grade II Listed Building;</li> <li>Grade II Registered Parks and Gardens;</li> <li>Conservation Areas;</li> <li>Major examples of some period, style or type, which may have been altered;</li> <li>Asset types which would normally be considered of national importance that have been partially damaged (such that cultural heritage value has been reduced).</li> </ul>
Local	<ul style="list-style-type: none"> <li>Locally Listed Heritage Assets;</li> <li>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;</li> <li>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).</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>Relatively numerous types of remains;</li> <li>Findspots or artefacts that have no definite archaeological remains known in their context;</li> <li>Asset types which would normally be considered of local importance that have been largely damaged (such that their cultural heritage value has been reduced);</li> </ul>

### Methodology for assessing direct physical effects

**10.17** 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 has been rated using the classifications and criteria outlined in Table 10.2 below.

**Table 10.2 Criteria for establishing magnitude of physical change**

Physical effect	Criteria
High	<ul style="list-style-type: none"> <li>Major loss of information content resulting from total or large-scale removal of deposits from a site;</li> <li>Major alteration of a monument's baseline condition.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Moderate loss of information content resulting from partial removal of deposits from a site;</li> <li>Moderate alteration of a monument's baseline condition.</li> </ul>
Low	<ul style="list-style-type: none"> <li>Minor detectable changes leading to the loss of information content;</li> <li>Minor alterations to the baseline condition of a monument.</li> </ul>
Marginal	<ul style="list-style-type: none"> <li>Very slight or barely measurable loss of information content;</li> <li>Loss of a small percentage of the area of a site's peripheral deposits;</li> <li>Very slight alterations to a monument.</li> </ul>
None	<ul style="list-style-type: none"> <li>No physical change anticipated.</li> </ul>

**10.18** The predicted level of direct effect upon each asset was 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 10.3 below:

**Table 10.3 Method of rating level of direct effects on heritage assets by the Proposed Development**

Magnitude of Change	Importance of Asset			
	Negligible	Local	Regional	National/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 dark grey highlighted cells are considered to have the potential to be 'significant'  
Note: Unless specifically noted that level of effects are beneficial, it is presumed all levels of effect are **Adverse**.

### Harm

**10.19** The NPPF, where designated heritage assets are concerned, requires an assessment to be made 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'. 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 Appendix 10.3.

<sup>6</sup> DMCS (2010). Principles for Selection of Listed Buildings.

<sup>7</sup> DMCS (2013). Scheduled Monuments Policy Statements.

# BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

# 10

**10.20** There would 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.

**10.21** The NPPG notes that the '*substantial*' harm is a '*high test*' and that as such it is unlikely to result in many cases. As noted in Appendix 10.2 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.

**10.22** In terms of effects upon the setting of designated heritage assets, it is considered that only those effects identified as 'significant' in this assessment 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 noted in Appendix 10.2, 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.

**10.23** 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 Appendix 10.2, Table 2 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 the effects are neutral, there will be no harm.

**10.24** 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 this 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.

## Limitations

**10.25** This assessment is based upon data obtained from publicly accessible archives as described in paragraph 10.27 below, and a walkover survey. Data was received from Oxfordshire County Council HER and downloaded from the HE website in May 2017. The assessment does not contain records added after this date.

**10.26** The setting assessment was conducted in May 2017 – the strategy for assessing heritage assets on private property involved establishing a view point from the closest public footpath or road. It should be noted that the site walkover and the setting assessment site visits were undertaken in late spring with maximum tree coverage.

## Baseline Conditions

**10.27** The following data sources were consulted during preparation of this assessment:

- Oxfordshire Historic Environment Record (who also curate the HER for CDC);
- Oxfordshire County Council Archaeological Officer (who advises CDC);
- Oxfordshire Records Offices;
- Oxford Local Studies Library;
- Oxfordshire Historic Landscape Characterisation Project (online)
- LiDAR Data via the Environment Agency
- Historic England;

- Historic England Designated Data set (downloadable from <https://services.historicengland.org.uk/NMRDataDownload/default.aspx>)
- The Historic England Archive (formerly the National Monuments Record) (Historic England, Fire Fly Avenue, Swindon);
- The National Heritage List For England; and
- National Map Library (National Library of Scotland, Causewayside, Edinburgh).

**10.28** This assessment is based upon data obtained from publicly accessible archives as described above, and from visits to designated heritage assets undertaken during May 2017. All site visits to designated heritage assets were undertaken in clear weather and a photographic record was maintained.

## Site Context

**10.29** Data for designated heritage assets was downloaded from HE in May 2017, and designated heritage assets within 1km of the site, have been identified (Figure 10.1 and Appendix 10.1). No designated assets are located within the site.

**10.30** One Scheduled Monument is located within 1km of the site; Alchester Roman site (site 195).

**10.31** One hundred and twelve Listed Buildings stand within 1km of the site. These are all Grade II Listed, with the exception of: Church of St Edburg, Church Street (site 44), 0.83km to the north-west, which is Grade I Listed, and The Old Priory and Attached Garden Walls, Priory (site 112), 0.83km to the north-east, and The Old Vicarage, Church Street (site 113), 0.78km to the north-east which are both Grade II\* Listed. The Listed Building which lies in closest proximity to the site at c.0.4km to the east is the Grade II Listed Langford Park Farmhouse, A41 (site 116). The remaining Grade II Listed Buildings are all concentrated to the north of the site within Bicester town centre.

**10.32** The site itself does not fall within a Conservation Area. The Bicester Conservation Areas falls within 1km of the site; 0.6km to the north.

**10.33** Data regarding heritage assets was obtained from the Oxfordshire HER in May 2017. This identified 83 heritage assets within 1km of the site (Figure 10.2 and Appendix 10.1). The data extract included area records, highlighting portions of land where archaeological remains have been identified, point records, locating more discrete features such as find spots and linear records highlighting features such as prehistoric trackways. Taken together these entries record sites and artefacts dating from the Neolithic to the 20<sup>th</sup> century.

**10.34** The HER data includes three records relating to archaeological sites, finds discoveries or events within the site itself. A Mesolithic flint scatter with later prehistoric and Roman features (site 180) was recorded within the north of the site during an evaluation for Bicester Business Park (site 220). A watching brief for a power line replacement took place on the site, but no archaeological remains were recorded (sites 235 & 247).

**10.35** The HER data includes five records relating to archaeological sites, finds or discoveries adjacent or close to the site boundary. These include the site of a post-medieval floated water meadow (site 15) to the south-east of the site, and a Neolithic Axe head (site 61) recovered in connection with the Thames Water Authority, directly to the east. Adjacent to the site, across the A41 to the west, late Iron Age settlement was found during an evaluation (site 185). The same evaluation also recorded Romano-British quarries (site 187) and Bronze Age Round Barrows (site 601) which were also seen on aerial photography and identified through geophysical survey.

**10.36** No World Heritage Sites, Registered Parks and Gardens or Registered Historic Battlefield's fall within 1km of the site.

## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

### Prehistoric and Roman (pre AD410)

- 10.37** Oxfordshire lies close to the limits of Palaeolithic occupation and, as a result of the climatic fluctuations which characterised the Pleistocene, hominid presence in the county must have been intermittent. It is also characterised by marked differences in the availability of lithic resources. This variation is to some extent reflected in the distribution of artefacts and must have exerted some influence on hominid behaviour. Although the Palaeolithic evidence from the county is not exceptionally rich, these circumstances give it a particular interest<sup>8</sup>. No evidence for early human occupation is recorded within the 1km study area.
- 10.38** The Mesolithic evidence from Oxfordshire is not rich. Of the Mesolithic sites recorded in the HER data 66% are classified as findspots, a further 19% as artefacts scatters (including artefacts scatters of mixed date) and 14% as finds from sites predominantly related to activity of other periods<sup>9</sup>.
- 10.39** The HER records two heritage assets of Mesolithic date within 1km of the site. One record falls within the site boundary: a Mesolithic flint scatter (site 180) recorded during trial trenching evaluation of the site. The other record is also a Mesolithic flint assemblage contained within tree throw holes situated to the north-east of the site (site 191).
- 10.40** In contrast to the Mesolithic, the evidence for the Neolithic in Oxfordshire is rich, and has benefited from a long history of research. The HER records four heritage assets of Neolithic date within 1km of the site, including a small assemblage of artefacts dating to the Neolithic recovered during an excavation of middle Iron Age to Roman Settlement (site 6) and a Neolithic axehead found c. 270m west of the site (site 61). The evaluation (site 180) which took place within the site itself recorded features such as postholes and ditches which date to prehistory; possibly even as early as the Neolithic. A fragment of a Neolithic polished flint axe was the earliest find recorded during an evaluation to the south-east of the site (site 192).
- 10.41** Many of the evaluations and excavations carried out in the vicinity of the site have recorded multi-period settlement including evidence from the Bronze Age. The Bronze Age provides a useful bias towards standing monuments and in Oxfordshire such monuments consist largely of barrows and cairns. Evidence of Bronze Age monuments was recorded at the multi-period site investigated to the west of the site (site 181) which revealed evidence of possible Bronze Age round barrows (site 601) and finds of collared urn pottery sherds. Other HER records from this period include a Bronze Age ditch enclosure which was recorded to the north-east of the site (site 191) and a burial recorded during extensive investigations to the south of the site during the Wendlebury-Bicester A421 Dualling works (site 230).
- 10.42** The majority of Iron Age evidence within 1km of the site goes hand in hand with Roman activity recorded. Iron Age pottery was found within a ditch which was potentially the same date at St Edburga's Priory (site 42) which was significant as; in general, the period is poorly represented apart from in an early Roman transitional period. An extensive arrangement of shallow curvilinear ditches and larger linear ditches dating from the late Iron Age (site 193) were recorded at the Bicester MOD site to the south and east of the site; again, this was a multi-period site.
- 10.43** There has been a settlement at or near Bicester since Roman times. In the middle of the first century AD the Romans established and fortified the town of Alchester at the intersection of Akeman Street (Cirencester to St Albans) and a road from Towcester to Dorchester, a location approximately 1.5 kilometres south of the present town<sup>10</sup> and directly south of the site. The Roman Town of Alchester is a Scheduled Monument (site 195).

Multiple investigations in and around the Alchester site have produced evidence of the Roman settlement as well as earlier activity in the area (For further details see Appendix 10.1, Figure 10.2).

- 10.44** To the west of the site, multiple investigations revealed an Iron Age to Roman farmstead (site 57, 69, 181, 185-188) and to the east of the site, further Roman activity was recorded (site 192) where earlier activity had been also found. To the north of the site, prior to the development of Bicester Village, investigations revealed remains of a low status rural Romano-British settlement (site 58) which showed evidence of possible water management. Finally, a ditch (site 176) dating to the Roman period was recorded to the north-east of the site within Bicester Town Centre.

### Early Medieval and Medieval (AD410 – AD 1485)

- 10.45** The early medieval period is one of important social, political, economic, cultural and ethnic change. Archaeological evidence, traditionally given second place in terms of authority to documentary evidence, is being given increasing precedence in efforts to resolve the difficulties of interpreting the early medieval period<sup>11</sup>. The modern settlement of Bicester evolved with the Anglo-Saxon farmers who settled on the Cornbrash, a flaggy type of limestone, either side of a ford over the River Bure and close to the existing Saxon Minster of St Edburga's. The first group of farms were established in the vicinity of what became the Manor of King's End (site 35) followed by a later settlement on the east side of the Bure which became the Manor of Market End<sup>12</sup>.
- 10.46** The HER records multiple heritage assets within 1km of the site dating to this period; many of which are within and associated with the historic core of Bicester. Assets of note include an evaluation behind the Kings Arms Hotel (site 8) which revealed possible Saxon structures including Grubenhau and a series of ditches and gullies. An Anglo-Saxon ditch orientated north to south was found underlying possible horticultural deposits of medieval date during an evaluation on Chapel Street (site 16). Possible fishponds of medieval date (site 30) were likely built for Bicester Priory on marshy ground to the north-east of the site and further evidence of this period was revealed at the Minster and Priory (site 31) itself when excavation recorded features of late Saxon to post-medieval date. Prior to construction of a housing development, medieval remains (site 38-40) in the form of building foundations, a Holloway, causeway, quarries and ridge and furrow were recorded. A medieval inhumation was recorded during the extension of Bicester Library and was thought to be associated with St Edburga's Priory (site 41).

### Post-Medieval and Modern (AD1485 – Present)

- 10.47** Bicester is a market town formed from the coalescence of three, originally separate, settlements - King's End, Market End and Crockwell - the social standing and architectural character of each of these settlements being noticeably different, reflecting their separate social histories. The form of the town settlement is very much dictated by the presence of the River Bure and from examination of historic maps can be seen to have changed little throughout post-medieval to modern period; particularly at the site which has remained open field to present day. This is demonstrated in the King's End and Market End pre-enclosure map of 1752 (Figure 10.3). It is only in the later decades of the 20<sup>th</sup> century that the town under-went rapid expansion with the construction of successive waves of housing estates in-filling and around the periphery of the historic core. The Oxfordshire Historic Land Characterisation shows the proposed development site to lie within an area of 'unenclosed land reorganised through boundary gain in the 19<sup>th</sup> century' (HOX3701). The change from unenclosed land in 1751 to enclosed land in the 19<sup>th</sup> century is document by Figure 10.3 and 10.4.
- 10.48** The HER records various heritage assets within 1km of the site dating to this period, many of which are Listed Buildings recorded in the historic core of Bicester; details of which can be found in Appendix 10.1. One heritage

<sup>8</sup> Mullin D, Booth, P, Hardly, A & Scott, I, Hayden, C, Hind, J & Spandl, K 2011 The Oxfordshire Aggregates and Archaeology Assessment (EH Proj. no. 5784)

<sup>9</sup> Mullin D, Booth, P, Hardly, A & Scott, I, Hayden, C, Hind, J & Spandl, K 2011 The Oxfordshire Aggregates and Archaeology Assessment (EH Proj. no. 5784)

<sup>10</sup> Cherwell District Council North Oxfordshire 2011 Bicester Conservation Area Appraisal

<sup>11</sup> Mullin D, Booth, P, Hardly, A & Scott, I, Hayden, C, Hind, J & Spandl, K 2011 The Oxfordshire Aggregates and Archaeology Assessment (EH Proj. no. 5784)

<sup>12</sup> Cherwell District Council North Oxfordshire 2011 Bicester Conservation Area Appraisal

# BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

10

asset dating to this period lies beyond the historic core of Bicester. This comprises a floated water meadow constructed in 1835 (site 15), located c. 350m to the south-east of the site.

**10.49** Ordnance Survey (OS) mapping indicates little, if any, change between the enclosure map of 1752 and 20<sup>th</sup> century maps. A small structure is noted within the north-west corner of the Site on the OS map of 1900 (Figure 10.4); however it no longer exists on the site and is not depicted on the OS map of 1951 (Figure 10.5).

## Aerial Photographic Evidence

**10.50** Aerial Photographic evidence ranging from 1948 to the present day was assessed through a visit to the Historic England Archive at Swindon in May 2017. Both vertical and oblique sources were consulted. In general, the aerial photographs depicting the site demonstrate that, with the exception of the construction of the A41 to the north and west of the site, the area remained fairly unchanged, being characterised by enclosed agricultural land, during this period.

**10.51** The following features and changes to the Proposed Development site were noted:

- A large shadow anomaly spreads over the western area of the site which continues north. This is visible on multiple Aerial Photographs and it is likely geological in nature;
- Rig and furrow can be seen in the eastern portion of the site in the earlier aerial photos. A field boundary running east to west divides the northern portion of the site (no longer present within the site);
- A circular cropmark anomaly on the northern boundary of the site, to the east of a building (which is no longer present on the site). Visible on various Aerial Photographs. The cropmark may no longer be present due to the building of the road along the northern periphery of the site;
- Two thin linear cropmarks running E-W and a thinner one to the north are visible in the eastern portion of the site (RAF/540/1400: 141 & 142). A rectangular anomaly is visible on the northern boundary of the site (different to the above circular anomaly but in the same area). These anomalies, along with the circular anomaly above, likely relate to agriculture; perhaps field boundaries and enclosures; and
- Later aerial photos show the building on the northern perimeter to be removed. Rig and furrow lines can still be seen below new crop patterns in the eastern portion of the site.

**Table 10.4 Aerial Photographs consulted**

Sortie	Library No.	Frame No.	Centre Point	Date
RAF/106G/UK/620	1	3154	SP 577 219	10-Aug-45
RAF/106G/UK/620	1	3155	SP 580 216	10-Aug-45
RAF/106G/UK/620	1	3156	SP 583 213	10-Aug-45
RAF/CPE/UK/1897	562	3312	SP 585 224	12-Dec-46
RAF/CPE/UK/1897	562	3313	SP 579 224	12-Dec-46
RAF/CPE/UK/1897	562	3314	SP 573 223	12-Dec-46
RAF/540/1400	1563	141	SP 576 215	01-Sep-54
RAF/540/1400	1563	142	SP 582 216	01-Sep-54
RAF/543/673	2114	12	SP 571 211	24-Aug-59
RAF/543/673	2114	13	SP 580 215	24-Aug-59
RAF/543/673	2114	14	SP 588 219	24-Aug-59
RAF/542/1	2577	4	SP 569 212	04-Aug-54
RAF/541/340	2661	4119	SP 585 217	26-Jul-49
RAF/541/340	2661	4120	SP 577 217	26-Jul-49

Sortie	Library No.	Frame No.	Centre Point	Date
RAF/541/340	2661	4121	SP 571 217	26-Jul-49
US/7PH/GP/LOC267	6914	5028	SP 583 215	10-Apr-44
US/7PH/GP/LOC267	6914	5029	SP 578 205	10-Apr-44
OS/70023	10537	32	SP 575 219	23-Mar-70
OS/66042	11626	72	SP 577 217	29-Apr-66
OS/66042	11626	73	SP 583 217	29-Apr-66
OS/75312	12174	87	SP 576 210	05-Jul-75
OS/75312	12174	88	SP 584 210	05-Jul-75
OS/75392	12197	190	SP 578 210	21-Sep-75
OS/75392	12197	191	SP 586 210	21-Sep-75
OS/84243	12669	1019	SP 574 206	26-Nov-84
OS/84243	12669	1020	SP 574 215	26-Nov-84
OS/89440	13628	5	SP 586 214	23-Sep-89
OS/91258	13884	23	SP 577 216	19-Sep-91
OS/91258	13884	24	SP 583 216	19-Sep-91
OS/93002	14193	22	SP 572 214	19-Feb-93
OS/93002	14193	23	SP 576 218	19-Feb-93
OS/93002	14193	24	SP 580 222	19-Feb-93
OS/94214	14692	21	SP 578 210	28-Jun-94
OS/94214	14692	22	SP 578 215	28-Jun-94
OS/94214	14692	23	SP 579 220	28-Jun-94
OS/96633	15201	88	SP 579 214	15-Jun-96
OS/96633	15201	89	SP 574 214	15-Jun-96
RAF/540/673	15636	4443	SP 571 212	12-Feb-52
RAF/540/673	15636	4444	SP 570 218	12-Feb-52

## LiDAR Data

**10.52** LiDAR Data was consulted through the Environment Agency Website in August 2017. Composite Digital Surface Models (DSM) – 1m, dating to 2011, showed no obvious suggestion of below ground archaeological features.

**10.53** Historic England was also contacted to obtain information on the Alchester cropmark transcripts following advice from the Planning Archaeologist. This information was received on 27 September 2017 and studied on Geographical Information System software. Extensive cropmarks are mapped within the Scheduled area of Alchester Roman Town (Site 195) and extend beyond into neighbouring fields; however no cropmarks extend into the Proposed Development site; the nearest plotted cropmark being located c.300m to the south of the southern point of the site.



## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

### Archaeological and Cultural Heritage Importance

**10.54** The Cultural Heritage Importance of the heritage assets recorded within the site has been classified according to the method shown in Table 10.1 and the results are shown in Table 10.5.

**Table 10.5 Importance of Heritage Assets**

Site no.	Site Name	Status	Description	Cultural Heritage Importance
180	Mesolithic Flint scatter with Later Prehistoric and Roman features	Non-designated	Evaluation recorded well preserved in situ Mesolithic worked flint and cores. Also found were evidence of later prehistoric and Roman settlement and agricultural land management, as well as Post Medieval features.	Local
285	Ridge and Furrow	Non-designated	Ridge and furrow identified from Aerial Photographic source (RAF/CPE/UK/1897) in eastern part of field. These are visible in both a north-south and east-west orientation	Negligible
286	Circular cropmark from aerial photography	Non-designated	Circular anomaly cropmark identified from Aerial Photographic source (RAF/CPE/UK/1897-3113), east of a house (which is no longer present-May 2017) on a field boundary.	Negligible
287	Field boundaries (extant and buried)	Non-designated	In addition to the extant boundaries within the site, two thin linear features running E-W and a thinner one to the north are visible in the eastern	Negligible

Site no.	Site Name	Status	Description	Cultural Heritage Importance
			portion of the site (RAF/540/1400: 141 & 142). A rectangular anomaly is visible on a northern field boundary which is no longer present. These likely relate to agriculture; perhaps field boundaries and enclosures.	

**10.55** The Mesolithic flint scatter and late prehistoric and Roman features (site 180) were recorded during evaluation of the site in 2007. Excavations prior to the Tesco Superstore directly to the north of the site uncovered similar archaeological evidence. The heritage asset groups well with the other significant remains recorded in the vicinity and therefore is judged to be of Local Importance.

**10.56** Three heritage assets were recorded through studying of aerial photography. Evidence of the ridge and furrow in the east of the site (site 285) is not visible as an extant monument and was not confirmed during the site walkover. Examples of well-preserved ridge and furrow have been recognised by Historic England as significant<sup>13</sup>. However, the ridge and furrow within the site is not well preserved and is therefore considered of Negligible Importance.

**10.57** The site is predominately contained within the existing field systems however the development requires total loss of the internal sub-surface field boundaries and of the extant field boundaries. There is no evidence on the surface of the cropmarks recorded through aerial photography, or of the field boundaries previously in existence on the site. The circular cropmark and field boundary may have previously been investigated and removed during the construction of the Tesco Superstore. As the field boundaries are not shown on the pre-enclosure map of 1752, it is likely they came into existence in the 19<sup>th</sup> century. Therefore the boundaries are considered to be of Negligible importance.

### Assessment of Effects

#### Construction Phase

**10.58** Effects on heritage assets deriving from the construction phase of the Proposed Development are predominantly related to direct effects on heritage assets due to the fact that there is a possibility of disturbing, removing or destroying *in situ* remain and artefacts during groundbreaking works. The potential for indirect effects on the settings of heritage assets is discussed within the Operation of the Proposed Development section below.

#### Direct Effects: Known Remains

**10.59** Potential effects on known or unknown buried archaeological remains which may survive relate to the possibility of disturbing, removing or destroying *in situ* remains and artefacts during groundbreaking works (including excavation, construction and other works associated with the Proposed Development) within the site boundary.

<sup>13</sup> Gloucestershire County Council for Historic England (2012) NHPP 2D1: Agriculture and Forestry Impacts Project No. 6468 Turning the Plough Update Assessment 2012

# BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

**10.60** Four cultural heritage assets are located within the site boundary. An assessment of potential direct effects on heritage assets is summarised below. Table 10.6 outlines the predicted level of effect that the Proposed Development could have upon the remains of Negligible or greater Cultural Heritage Importance located within the site boundary. Its conclusions have been formulated using the criteria laid out in Tables 10.1 to 10.3.

**Table 10.6 Direct Effects on Heritage Assets**

site no.	Site Name	Cultural Heritage Importance	Magnitude of Direct Change from Proposed Development	Level of Effect
180	Mesolithic Flint scatter with Later Prehistoric and Roman features	Local	High	Moderate Adverse
285	Ridge and Furrow	Negligible	High	Minor Adverse
286	Circular cropmark from aerial photography	Negligible	High	Minor Adverse
287	Field boundaries (extant and buried)	Negligible	High	Minor Adverse

**10.61** The Proposed Development requires reduction of the existing ground level within the majority of the site to accommodate the construction of the new Business Park. This will require complete removal of areas of sub-surface archaeological remains recorded previously as a Mesolithic flint scatter and prehistoric and Roman features (site 180). The magnitude of direct change from the construction of the Proposed Development is therefore considered High. Taking into consideration the Local importance of this asset, these changes would result in a *moderate* impact, which is considered significant.

**10.62** The requirements of the construction of the Proposed Development will also result in the complete removal of areas of ridge and furrow (site 285) and field boundaries and cropmark anomalies (sites 286 & 287). The magnitude of direct change from the Proposed Development is therefore considered High. Taking into consideration the negligible importance of these assets, these changes would result in a minor impact, which is not significant.

**Direct Effects: Unknown Remains**

**10.63** The assessment has established that the site is likely to form part of the agricultural hinterland of Bicester from the 16th century through the post-medieval period. Significant unrecorded finds or features from these periods are considered unlikely. However, the site lies in close proximity to a number of earlier medieval sites, including the historic town of Bicester itself and it is located on a historic route in and out of Bicester, in place since Roman times (Alchester to Towcester Road - site 3).

**10.64** The site lies in close proximity to the Roman town of Alchester (a Scheduled Monument) and multiple heritage assets dating from early prehistory to the Roman period are recorded within the vicinity of the site. Within the site, evidence has been recorded through evaluation of archaeological features dating from early prehistory through to the Roman period. It is likely these remains will extend somewhat beyond the trenching area and therefore the potential for further prehistoric and Roman finds or features is considered high.

**10.65** Thus, deep groundworks across the site associated with the Proposed Development, including in particular construction of deep foundations, piling and deep services have the potential to encounter and impact upon such remains. This could result in a High magnitude of direct change from the Proposed Development, resulting in a moderate adverse level of effect on unknown remains.

**Operation of the Proposed Development**

**Introduction**

**10.66** Effects on heritage assets resulting from the presence of the Proposed Development once each phase of construction has finished are likely to be limited to indirect effects on the settings of heritage assets. No direct effects are predicted during the Operation of the Proposed Development. Therefore, this assessment is limited to indirect effects on the settings of heritage assets.

**10.67** There are other, non-visual factors which could potentially result in setting effects of heritage assets. Such factors could be other sensory factors, e.g. noise or smell, or could be associative (See Methodology for assessing indirect effects upon setting – Appendix 10.2). As the Proposed Development would be located adjacent to the existing A41 corridor, it is considered that it would not give rise to any significant adverse effects on settings with regards to odour and noise. It should be noted that the Noise and Air Quality Assessments set out in Chapters 8 and 9 have not identified any significant effects. Thus, this assessment focuses on visual changes to the settings of heritage assets.

**10.68** A screening exercise has been undertaken, using GIS analysis, desk-based survey of the assets, site visits/area visits and Google Maps, which has resulted in the scoping out all of the heritage assets from detailed consideration in this assessment and explained below.

**10.69** As a result of the above screening exercise, it was concluded that all of the Listed Buildings within the 1km study area would have no clear visibility with the Proposed Development due to topography and built structures, mainly within the town of Bicester, and vegetation. Whilst glimpses of the Proposed Development cannot be discounted for all of these assets, the Proposed Development would be seen at a distance and beyond other urban built features. As such effects are likely to be non-material in that they would not result in a change to the setting of the asset such that there would be a reduction in the cultural value of the asset.

**10.70** One Scheduled Monument is located within 1km of the site. Alchester Roman site (site 195) is located 0.9km to the south of the site. The scheduling covers a large area located within private grounds. No inter-visibility with the site was possible from the closest publicly available position due to topography, built structures and vegetation (Plate 7). It should be noted that the site visit took place in late May whilst vegetation was at its peak. Glimpses of the Proposed Development may be visible during winter months, however these are still likely to be very limited and any effects are likely to be non-material in that they would not result in a change to the setting of the asset such that there would be a reduction in the cultural value of the asset. As such, the level of effect on setting of this designated asset is considered Minor and has not been taken forward for detailed assessment.

**Harm**

**10.71** No effects have been found, or are expected, on the setting of designated heritage assets from the Proposed Development. Therefore, there will be no harm to designated heritage assets.

## BURIED HERITAGE (ARCHAEOLOGY) & BUILT HERITAGE

### Mitigation

- 10.72** The NPPF<sup>14</sup> and associated guidance, as well as local planning policies (all outlined in Appendix 10.3) require a mitigation response that is designed to eliminate, reduce or compensate for the effects of the Proposed Development on the heritage assets within the site.
- 10.73** Before mitigation there is potential for a *moderate impact*, which is considered significant, upon identified Mesolithic, prehistoric and Roman finds and features found within the site (site 180). The assessment has also identified potential for previously unrecorded finds and deposits or prehistoric (including paleoenvironmental) to medieval periods to survive within the site. As such, a programme of strip, map and record will take place. This will be focused on areas of known archaeology highlighted within the evaluation. An archaeological watching brief will also take place on topsoil stripping in areas not included in the strip, map and record. This will allow the identification, assessment and recording of any further surviving remains in advance of construction of the Proposed Development.
- 10.74** Before mitigation a minor impact, the effect of which is not considered significant is predicted, upon the ridge and furrow (site 285) in the east of the site, the circular cropmark (site 286) on the northern boundary of the site and the extant and buried field boundaries (site 287) across the site. This effect is not considered significant. The quality / preservation of the ridge and furrow and field boundaries on site is not considered to be of sufficient importance to warrant recording through topographical survey. The existing aerial photographs described within this assessment provide a permanent record of these features.
- 10.75** The exact scope of any further investigations and / or mitigation would need to be agreed with Oxfordshire County Archaeological Services on behalf of the planning authority.
- 10.76** This assessment found that no significant effect upon the setting of heritage assets is predicted. Consequently, no mitigation is considered necessary.

### Residual Effects and Conclusions

- 10.77** The Proposed Development has the potential to cause a direct effect with a *moderate impact*, the effect of which is considered significant, upon identified prehistoric and Roman archaeological remains (site 180). It has a potential to cause minor impact, which is considered not significant, upon ridge and furrow (site 285) cropmarks (site 286) and extant and buried field boundaries within the site (site 287).
- 10.78** The assessment has identified the potential for previously unrecorded finds and deposits of prehistoric (including paleoenvironmental) to medieval periods to survive within the site. Taken into consideration the known archaeological remains within the site, a programme of strip, map and record will be undertaken to establish the extent of any surviving archaeological remains that might be damaged during construction of the site. Further to that an archaeological watching brief will take place on areas not included in the strip, map and record. This will be secured as a condition of planning.
- 10.79** With the mitigation outlined above being undertaken, this would ensure preservation by record of the known heritage assets within the site and would enable identification and preservation by record of any hitherto unrecorded archaeological remains. Following the implementation of the outlined mitigation residual effects upon the assets within the site would be **negligible** and not significant.

Table 10.7 Residual effects on Heritage Assets post-mitigation

site no.	Site Name	Cultural Heritage Importance	Mitigation	Magnitude of Direct Change from Proposed Development post-mitigation	Residual Effect
180	Mesolithic Flint scatter with Later Prehistoric and Roman features	Local	Strip, map and record / watching brief	Marginal	Negligible
285	Ridge and Furrow	Negligible	Strip, map and record / watching brief	Marginal	Negligible
286	Circular cropmark from aerial photography	Negligible	Strip, map and record / watching brief	Marginal	Negligible
287	Field boundaries (extant and buried)	Negligible	Strip, map and record / watching brief	Marginal	Negligible

- 10.80** This assessment has not identified any indirect effects on the settings of designated / undesignated heritage assets; therefore, no harm is expected to designated heritage assets.

### Cumulative Effects

- 10.81** The Proposed Development is situated between the current developments of Bicester Village Outlet Centre and Bicester Avenue Garden Centre. There will be no direct cumulative effects upon heritage assets resulting from the developments. The potential for cumulative effects upon the setting of heritage assets has been considered. However, due to the distance to any assets and intervening landscaping such as hedgerows, there is extremely limited visibility of the developments together when viewed from the assessed assets. As such it is judged that the current developments, taken cumulatively with the Proposed Development, will not give rise to any significant cumulative effects upon the setting of heritage assets.

<sup>14</sup> DCLG: Department for Communities and Local Government (2012). National Planning Policy Framework.

## Introduction

- 11.1 This chapter of the ES reports the findings of an assessment of the likely significant effects on ecology as a result of the Proposed Development.
- 11.2 This chapter sets out the relevant planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on ecology as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 11.3 The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 13: Effect Interactions of this ES (Volume I).
- 11.4 This chapter is supported by a number of appendices provided in Volume 2 of the ES including:
- Appendix 11.1: Preliminary Ecological Appraisal;
  - Appendix 11.2: Bat Survey Report;
  - Appendix 11.3: Great Crested Newt Survey Report; and
  - Appendix 11.4: Legislative and Planning Policy Context.

## Legislative and Planning Policy Context

- 11.5 The planning policy framework for ecology and biodiversity in Bicester, Oxfordshire is nationally through the National Planning Policy Framework (NPPF), and at the local level through policies in the Cherwell Local Plan 2011-2031 in addition to saved policies in the Cherwell Local Plan 1996 and policies in the Non-Statutory Cherwell Local Plan 2011. Any proposed development will be judged in relation to the policies contained within these documents. Full details will be provided in Appendix 11.4.
- The National Planning Policy Framework (NPPF) section 11:
    - Cherwell Local Plan 2011-2031 Planning policy: Strategic Development Site Policy Bicester 4, ESD9, ESD10, ESD11, ESD17;
    - Cherwell Local Plan 1996 (saved policies): C1, C2, C4; and
  - Cherwell Local Plan 2011 (non-statutory interim policy): EN1, EN2, EN13, EN22, EN23, EN24, EN25, EN27.

## Assessment Methodology

- 11.6 This section of the chapter sets out method used for identifying important ecological features that will be effected by the proposed works, and how impacts have been assessed. The method follows the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal - Second Edition'.
- 11.7 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.

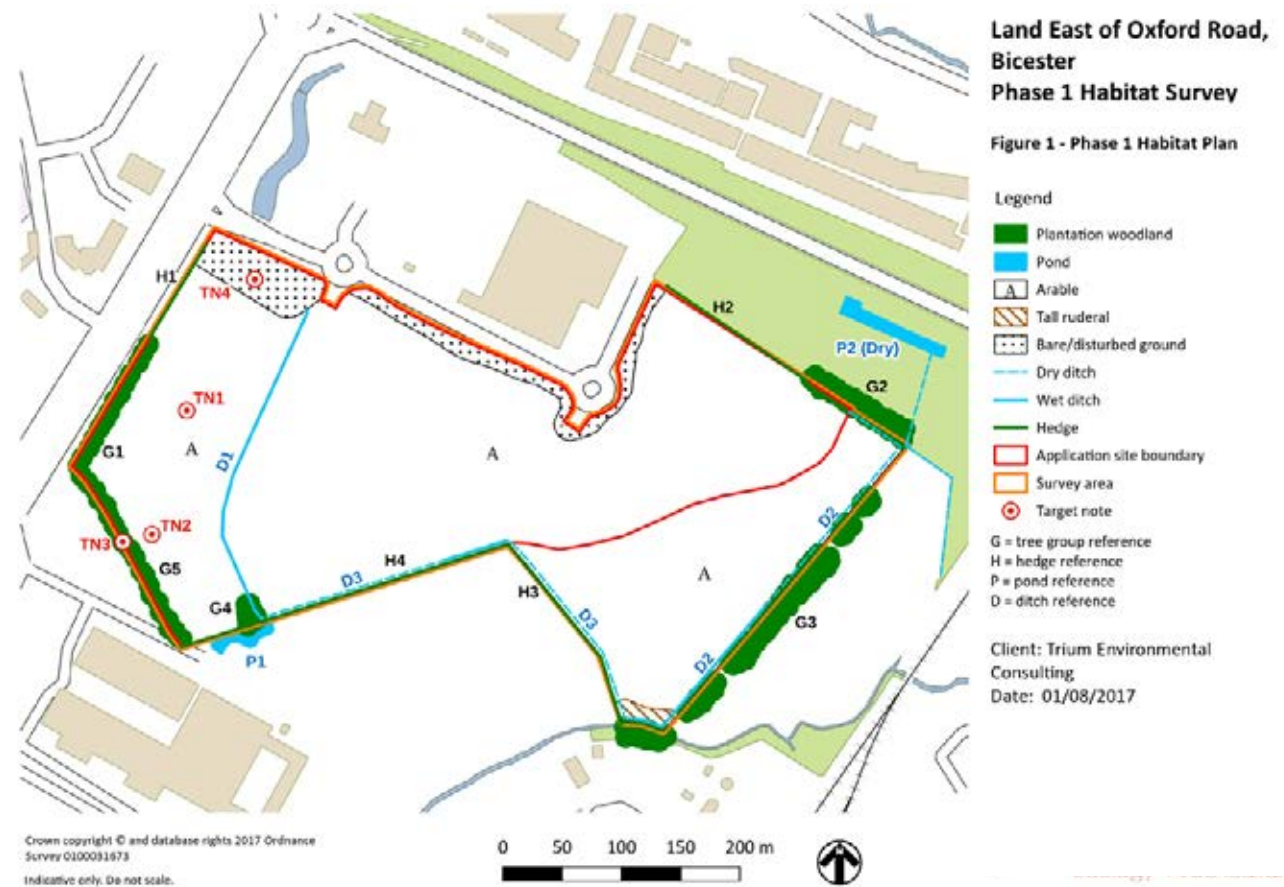
- 11.8 In line with the CIEEM guidelines the terminology used within the chapter draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the chapter these terms will be defined as followed:
- 11.9 Impact – Actions resulting in changes to an ecological feature. For example, demolition activities leading to the removal of a building utilised as a bat roost.
- 11.10 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.
- 11.11 An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2 which confirmed acceptability of the scope and method proposed for the ecology assessment. The Scoping Opinion highlighted that there are known records of otter within Langford Brook (including at the nearby Bicester Village Shopping Centre) and ditches on or near the site could form part of their habitat. However, the preliminary ecology appraisal (Appendix 11.1). undertaken for the site scope otters out of the assessment on the basis that 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.

## Evaluation of Ecological Features

- 11.12 Data received through consultation, desk-based investigations and field-based investigations has been 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.
- 11.13 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 are 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; and
- Negligible (used where the value is lower than the site level).



**Figure 11.1: Habitat Plan**

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

### Characterising potential ecological impacts

11.15 When describing potential impacts (and where relevant the resultant effects) reference are made to the following characteristics:

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

11.16 For each receptor only those characteristics relevant to understanding the ecological effect and determining the significance are described.

### Significance Criteria

11.17 Potential impacts on relevant ecological features are 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.

11.18 The CIEEM guidelines state that:

*'For the purposes of EclA 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'.....*

*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).*

11.19 For designated sites, defined sites and ecosystems the assessment considers how the proposals are likely to affect the conservation objectives for the site and/or its interest/qualifying features. For ecosystems, consideration is given to whether the proposals are likely to result in a change in ecosystem structure and/or function.

11.20 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.*

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

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

11.23 For those effects considered significant, the effect is also 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).

11.24 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.

### Baseline Conditions

11.25 Full baseline conditions are given in the reports in Appendix 11.1-11.3 in Volume 2 of this ES. In summary, the site is part of an arable field to the south of Bicester. The whole field has hedge and tree lines to most

# ECOLOGY

11

boundaries, except where a supermarket has been constructed in the north west of the site. Here, a bund has been created and seeded with grass. There is a ditch running into the site in the south west. The ecological features present within the zone of influence are shown in Table 11.1 below. Features of negligible value have been omitted. No designated sites are included in the assessment as direct or indirect effects to these have been scoped out.

**Table 11.1 Important Ecological Features within the Zone of Influence**

Feature	Description	Value (geographic frame of reference)
<b>Field Margins</b>	The grass field margins are approximately 2m 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.	<b>Local:</b> The habitat is species poor and common in the area. However, in conjunction with the site's hedgerows and ditches, the habitat provides a commuting and foraging corridor for bats, and possibly other species.
<b>Hedgerows</b>	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 / H4) has five woody hedge species and a further three have taller standard trees.	<b>Borough:</b> Most of the habitat is species poor and all are common in the area. However, in conjunction with the site's hedgerows, the habitat provides a commuting and foraging corridor for bats, and possibly other species.  Also, the habitat is recognised nationally as a habitat of principal importance. H4 qualifies as important under the hedgerow regulations.
<b>Trees</b>	This includes tree lines formed from former hedgerows and standard trees in hedges.  Many trees include some features which are suitable for roosting bats (assessed as low to high suitability)	<b>Borough:</b> The mix of tree species is common and there will be many trees in the local area that are suitable for bats to roost in. However, in association with local habitats (such as the wetland reserve) and the results of bat activity surveys, these form part of a more important network of habitats for bats in the area.
<b>Ditches</b>	The site's ditches include standing water and wet mud (Ditch 1 (D1) and Ditch 2 (D2)). At the juncture of D2 and Ditch 3 (D3) is a stream (off site). These areas have pond-like vegetation.  D1 is the most biodiverse area of the site.	<b>Borough:</b> The habitat is not common in the area; the pond-like standing water will provide a resource for invertebrates and amphibians. Also, in conjunction with the site's hedgerows and field margins, the habitat provides a commuting and foraging corridor for bats, and possibly other species.
<b>Log pile</b>	Two large piles of wood, which appear to comprise trees felled from clearance of bank side vegetation.	<b>Local:</b> The logs may provide a habitat for wintering hedgehogs and reptiles, a nesting site for birds and habitat for dead-wood invertebrates.
<b>Reptiles</b>	The site's rough field margins are suitable for common lizard <i>Zootoca vivipara</i> and slow worm <i>Anguis fragilis</i> .  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,	<b>Local:</b> On the assumption that reptiles are present, the population size will be very limited and confined to small areas of the site.  However, the field margins may form part of a wider habitat connected in the local area.

Feature	Description	Value (geographic frame of reference)
	however, it is considered unlikely that there is a large 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.  The EIA assessment makes an assumption that reptiles are present as full surveys were not considered warranted.	
<b>Birds – nesting in hedgerows</b>	A number of birds associated with hedgerows in arable land were recorded in the desk study. Some of these are declining species and listed as amber or red in Birds of Conservation Concern. It is assumed that the site supports small number of most of these species during the breeding season and foraging habitat for those species which winter here.	<b>Local:</b> The site's hedgerows may support a number of nesting birds typical of arable land. This is likely to include some species which are listed as amber or red conservation concern (such as song thrush or bullfinch). However, the amount of hedgerow habitat is limited.
<b>Birds – skylark</b>	Based on observations during the Preliminary Ecological Appraisal, the site may include three skylark (red listed and species of principal importance) nests. Skylark nest on the ground and so the suitability of the site will vary from year to year, depending on the cropping and management regime.	<b>Local:</b> The site provides occasional resources for breeding skylark, however the ability of skylark to breed here may not be consistent between years.
<b>Birds – Red kite</b>	During bat surveys, red kite have been observed roosting (not breeding) on a tree at the north boundary of the site.	<b>site:</b> Breeding red kite and their <i>nests</i> are protected, but their roost sites are not. There are many other mature trees within the landscape that red kite could use.
<b>Badgers</b>	A single large mammal hole was recorded in the south west of the site, near the site boundary. The hole is of a size and shape consistent with badgers, but no signs of current occupation.	<b>Negligible:</b> This feature has only been included as badger setts receive legal protection and mitigation is required. A single outlier sett is not a significant feature in term of the EIA.
<b>Bats</b>	At least six species of bat occur in the Study Area (Common pipistrelle <i>Pipistrellus pipistrellus</i> , Soprano pipistrelle <i>Pipistrellus pygmaeus</i> , Brown long-eared bat <i>Plecotus auritus</i> , Noctule bat <i>Nyctalus noctula</i> , Serotine <i>Eptesicus serotinus</i> and at least one species of <i>Myotis</i> bat).  <i>Pipistrellus</i> species bats dominated activity levels, the majority being common pipistrelle. Common pipistrelle were evenly distributed across the site, however, soprano pipistrelles were concentrated in the southwest and eastern area.  <i>Nyctalus</i> species bat activity was higher than normally expected for these habitats, with levels highest in the western area of the site. As the western boundary and the northern boundary are	<b>Borough:</b> A number of species of bat forage within the site at relatively high levels of activity. The site's value seems to be limited to commuting and foraging, and does not support confirmed roosting or hibernating sites.

# ECOLOGY

11

Feature	Description	Value (geographic frame of reference)
	<p>flooded with light, it is likely the bats are foraging over the field.</p> <p>Other species of bat were recorded, but all at relatively low levels of activity. No regular activity close to typical emergence time were recorded for any species. The results suggest that roosts are not in the immediate area to the Study Area during the time of surveys.</p> <p>However, with activity higher during the middle of the night the site is of importance for foraging bats.</p>	

## Assessment of Effects

### Construction

11.26 Construction will be completed over four phases over an 8 – 9 year period. Access to the site is via the two existing vehicular access points from Lakeview Drive. Further construction details are provided in Chapter 5: Construction.

11.27 The following effects and impacts (without mitigation) have been identified. Where assumptions of general practice are made these are stated here.

**Table 11.2 Assessment of Construction Impacts and Effects (without mitigation)**

Feature	Impact	Effect
<b>Field Margins</b>	Loss of 725m arable margin within the site, likely to be phased as construction progresses.	Adverse, permanent. Significant at site Level.
<b>Hedgerows</b>	None. (assumed protection of hedgerows to BS 5837:2012)	None.
<b>Trees</b>	None. (assumed protection of hedgerows to BS 5837:2012)	None.
<b>Ditches</b>	Loss of Ditch 1 (300m x 2 m)  Possible pollution of Ditch 2 and 3 from sediment loaded run-off, dust settlement or pollution incident.	Adverse, permanent. Significant at Local Level.  Possible adverse, temporary or reversible (depending on incident). Significant at Borough Level.
<b>Log pile</b>	Removal of log pile habitats	Adverse, permanent. Significant at Local Level.
<b>Reptiles</b>	Removal of habitat which may support a small population of common reptiles.  Killing or injury of individual reptiles	Adverse, permanent. Significant at Local Level.  Adverse, permanent. Significant at site Level (not all of the population's individuals are likely to be effected).
<b>Birds – nesting in hedgerows</b>	Disturbance through noise, dust and lighting	Adverse, temporary. Significant at site Level only – some birds will be able to nest during construction, although the range of species may change to those more tolerant of disturbance.

Feature	Impact	Effect
<b>Birds – skylark</b>	Gradual reduction in nesting habit as each phase commences. Disturbance through noise, dust, vibration.	Will prevent successful breeding on site and immediate area during construction; possible that reduced numbers will be able to breed until the last phase. Adverse impact at local Level.
<b>Birds – Red kite</b>	Disturbance of roosting habitat through noise and lighting.	Adverse, temporary impact at site Level.
<b>Badgers</b>	Destruction of outlier sett. Potential disturbance or injury of badger if occupied.	Not significant in EIA terms, but included for animal welfare and legal grounds (required mitigation).
<b>Bats</b>	Disturbance of some species of bat through lighting (most significantly long-eared bats and myotis bats). Reduced foraging habitat over fields (most significantly Serotine and Nyctalus bats)	Adverse effect significant at a Local Level.

### Completed Development

11.28 The majority of impacts and effects relating to ecology will occur at the construction stage e.g. through changes to habitats. Impacts during the operation of the development are likely to be limited to disturbance of bats and birds.

**Table 11.3 Assessment of Completed Development Impacts and Effects (without mitigation)**

Feature	Impact	Effect
<b>Field Margins</b>	No further impact	None.
<b>Hedgerows</b>	None.	None.
<b>Trees</b>	None.	None.
<b>Ditches</b>	None.	None.
<b>Log pile</b>	No further impact	None.
<b>Reptiles</b>	No further impact	None
<b>Birds – nesting in hedgerows</b>	Disturbance through transport noise, presence of people and lighting (from buildings, streetlight and car parks)	Adverse, permanent. Significant at site Level only – some birds will be able to nest during operation of the site, although the range of species may change to those more tolerant of disturbance.
<b>Birds – skylark</b>	No further impact	None
<b>Birds – Red kite</b>	No further impact	None
<b>Badgers</b>	No further impact	None
<b>Bats</b>	Disturbance through transport noise and lighting (from buildings, streetlight and car parks)	The bats most commonly recorded at the site (pipistrelles) are likely to continue to use the site, although possibly at reduced numbers. Myotis, long-eared bat, noctule and serotine bat activity may be completely removed from the site on to other areas.  Adverse effect significant at a Local Level.

## Mitigation, Compensation and Monitoring

### Construction

#### Pollution Prevention

- 11.29 An appropriate pollution prevention and control method statement will be produced to control construction activities. This will include (but not be limited to), dust, run-off and chemical spills.
- 11.30 In addition to a standard pollution CEMP, the plan will include avoiding illuminating the bat corridors between March and October (bat activity will be very limited November – February).

#### Site Preparation

- 11.31 All retained trees and hedgerows will be protected in accordance with BS 5837:2012. If works are required to trees for health and safety or to clear overhanging branches, these will be subject to individual bat tree assessments to ensure that bat roosts are not directly affected. Fencing in accordance with BS 5837: 2012 will also protect, at least initially, arable margins and most habitat suitable to support reptiles.
- 11.32 Before any works in areas that may support reptiles begin (arable margins, log piles, any other ruderal, scrub or tall grassland habitats other than arable crop) the area will be cleared of vegetation in a staged manner. The vegetation will be cut to 200 mm, left over night, then cut to ground level. Movement of operators with brush cutters will be from west to east so that any animals disturbed will move away from the site into the flood plain area (which will not be developed).
- 11.33 The large mammal hole will be monitored for 21 days prior to construction. Monitoring may be using a camera trap, or with hair traps and sand (to capture paw prints). If no badger activity is observed, the hole can be soft closed (filled with loose soil) without a licence. If badgers are recorded a Natural England licence will be obtained to lawfully close the sett with a staged closure.

### Completed Development

#### Scheme Design

- 11.34 In order to retain flight corridors for bats across the site to the wider landscape an east – west and north-south bat corridor has been identified (this has been included in the scheme design evolution based on the outline plan below). The corridors will include a vegetated path along hedge and ditches which will be subject to careful control of lighting and will be approved by a suitably qualified ecologist.
- 11.35 Where external lighting (e.g. street lights or security lights) are required in proximity to the bat corridor, they will be designed to include appropriate height, cowling or other deflection devices to minimise light spill to a maximum of 1 lux at ground level within the dark corridor. Should and buildings be situated within 20 m of a dark corridor, further screening (such as evergreen hedges or fencing) will be provided to maintain the dark corridor. The lighting scheme will be approved by a suitably qualified ecologist.
- 11.36 To compensate for the loss of arable margin habitats and provide habitat for reptiles and nesting skylark, a strip of wildflower meadow will be created between the site and the flood zone to the south east (green area of the plan). A management plan for the meadow will be produced to set out preparation, control, monitoring, responsibility for intervention and maintenance. This will be agreed by a suitably qualified ecologist.
- 11.37 The meadow will include three 3x3m skylark plots 24m from each other and from buildings. Plots will be managed to provide areas of lower / more sparse vegetation within the sward.
- 11.38 Two log pile habitats (using logs from the piles within the site) will be created to provide habitat for invertebrates and hibernating reptiles. It is unlikely that all of the material from the existing log piles will be used, but to

maximise the use of space the log piles will include a 3 x 4m wide and 2m deep pit, filled with logs to a height of 2m.

- 11.39 The landscape strategy will include a water feature which includes no less than 600m<sup>2</sup> of shallow margins planted with native aquatic and semi-aquatic species. The landscape strategy will be agreed by a suitably qualified ecologist.

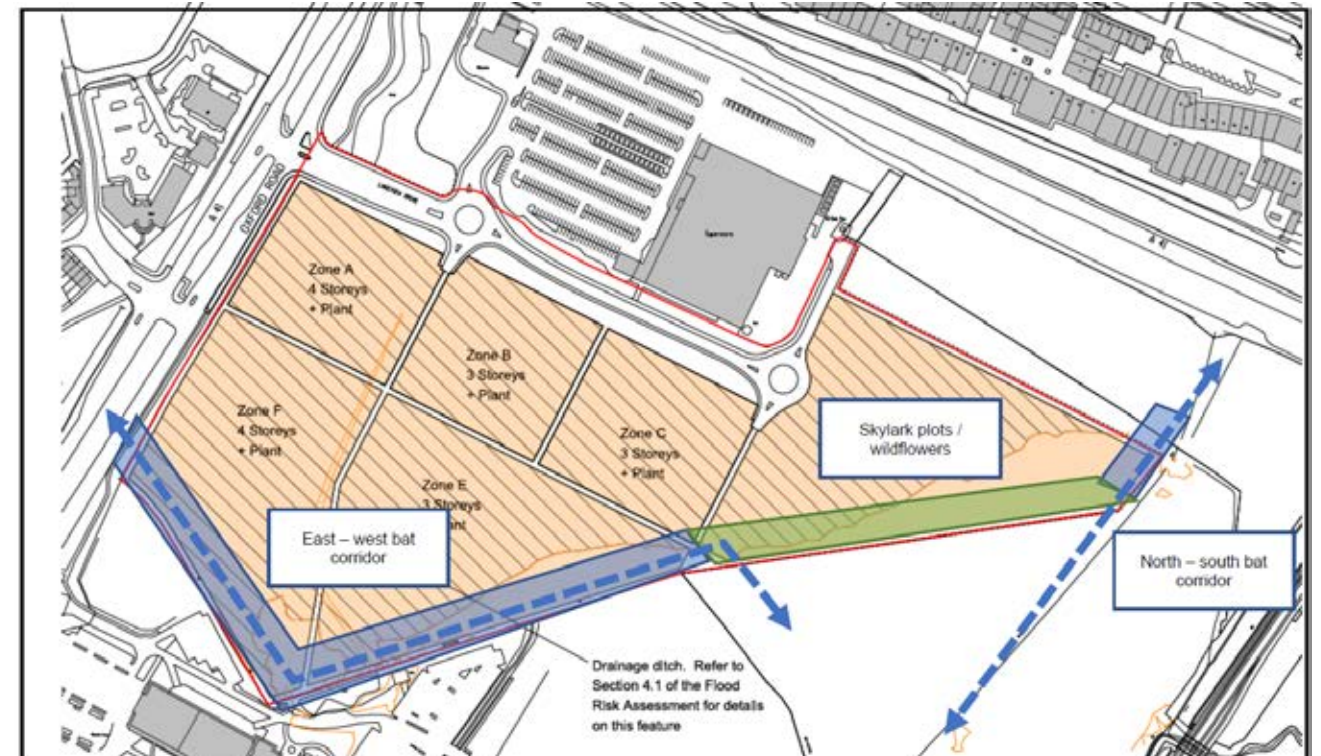


Figure 11.2: Proposed Bat Corridors

## Residual Effects

Table 11.4 Summary of Residual Effects

Feature	Residual Effect (Post Mitigation)
<b>Construction</b>	
Field Margins	Temporary loss of habitat until new habitat established, Local level significance reducing to no significant impact over approximately 1 year
Hedgerows	None
Trees	None
Ditches	Temporary loss of habitat until new habitat established, Local level significance reducing to no significant impact over approximately 3 years
Log pile	Temporary loss of habitat until new habitat established, Local level significance reducing to no significant impact over approximately 1 year



Feature	Residual Effect (Post Mitigation)
<b>Construction</b>	
<b>Reptiles</b>	Temporary disturbance and loss of habitat until new habitat established, adverse effect of local level significance reducing to no significant impact over approximately 3 years
<b>Birds – nesting in hedgerows</b>	Temporary disturbance during construction (over 8-9 years), adverse significant effect at site level only
<b>Birds – skylark</b>	Temporary disturbance and loss of habitat until new habitat established, adverse effect of local level significance reducing to not significant impact over 8-9 years
<b>Birds – Red kite</b>	Temporary disturbance over 8-9 years, adverse effect significant at site level only.
<b>Badgers</b>	Destruction of outlier sett. Potential disturbance of badger if occupied whilst being closed under licence, not significant in EIA terms, included for legal protection.
<b>Bats</b>	Reduced foraging habitat over fields (most significantly Serotine and Nyctalus bats), but limited effect on other species and commuting bats. Permanent adverse effect, significant at a site level only.
<b>Operation</b>	
<b>Field Margins</b>	No further impact
<b>Hedgerows</b>	None.
<b>Trees</b>	None.
<b>Ditches</b>	None.
<b>Log pile</b>	No further impact
<b>Reptiles</b>	No further impact
<b>Birds – nesting in hedgerows</b>	Disturbance through transport noise, presence of people and lighting (from buildings, streetlight and car parks), likely to change species present, but not reduce number of birds. Permanent adverse effect significant at site level only.
<b>Birds – skylark</b>	No further impact
<b>Birds – Red kite</b>	No further impact
<b>Badgers</b>	No further impact
<b>Bats</b>	No further impact.

## Monitoring

11.40 The following monitoring will be required to assess the success of mitigation and compensation and identify whether modifications to the proposed measures is required. All monitoring will be undertaken by a suitably qualified ecologist.

- Trees and hedgerows – prior to construction an arborist will inspect protective fencing;
- Badgers – monitor mammal hole for 21 days three months prior to development;

- Bats – monitor bat activity to ensure that bat corridors have been successful, static detector surveys in spring, summer and autumn every other year during construction and for one year after construction. Use method as for baseline surveys to allow comparison;
- Birds – monitor use of skylark plots every other year during construction and for one year after construction; and
- Habitats – the meadow will be monitored regularly during preparation and establishment (year 1) whilst there is a risk of weeds encroaching (frequency will depend on timing of sowing meadow and condition of soil), annually for three years, then every other year until one year after construction is complete.



Figure 11.3 Local Cumulative Schemes Connected to the Bat Corridor

## Cumulative Effects Assessment

- 11.41 Bicester and the surrounding land is subject to many large allocations for development (e.g. NW Bicester zero carbon village – 690 ha). These schemes are likely to have in combination effects *with each other*, in particular arising from loss of arable land and those plants, invertebrates and birds associated with it.
- 11.42 Given the relative size of this site compared to the other allocations in Bicester, the additional loss of arable land will not be significant in combination with the other schemes. With the creation of new habitats and careful scheme design, no impacts are predicted that would work in combination with other schemes to create a significant effect through addition of effects (e.g. adding loss per hectare of habitats).

# ECOLOGY

11

- 11.43 However, the schemes in the cumulative assessment could have a landscape wide effect on the movement of animals; a reasonably likely scenario that could create in combination effects with the development of the site are where habitats that are linked to the site are going to be removed, and therefore the placement of bat corridors in the Proposed Development are made redundant (and therefore assumptions of the success of proposed mitigation are also redundant).
- 11.44 The bat corridor allows the movement of bats north - south on the east side of the site and east west on the southern boundaries. The image below shows the local schemes that are connected to this bat corridor.
- 11.45 It can be seen that in time, the east-west bat corridor may in time become redundant if bats use of land at South West Bicester Phase 1 or at Graven Hill is reduced (effects at Graven Hill are likely to be limited as the allocation in this area is small and much of the area of Graven Hill is a Local Wildlife site and unlikely to be developed. However, bats passing through the site north – south, for example from roosts in Bicester to the Bicester Wetland Reserve and the open countryside further south and west will be protected by the proposed bat corridor.

## Conclusions

- 11.46 The application site is a large arable field with trees, hedges and ditches. The site is not of sufficient ecological value to warrant whole scale protection from development. However, the site does support nesting birds (including skylark) and is used by commuting and foraging bats. The assessment includes proposals to ensure that habitat loss is compensated, and that bats can continue to move through the site through bat corridors. In time one of these corridors may become less used by bats due to development of land outside of the site, but the proposed north-south corridor may become more important in time. No long-term adverse effects of the Proposed Development are significant above a site level.

## Introduction

**12.1** This chapter of the ES reports the findings of an assessment of the likely significant landscape and visual effects resulting from the construction phase and during operation of the Proposed Development. This landscape and visual assessment has been prepared by Hyland Edgar Driver Ltd. The report is supported by information located in the following appendices:

- Appendix 12.1: Drawings and Photographs;
- Appendix 12.2: Legislative and Planning Policy Context;
- Appendix 12.3: Assessment Methodology; and
- Appendix 12.4: Photography Methodology.

**12.2** Landscape impacts are defined as those that derive from physical changes to the landscape and changes to the character of the landscape and to the landscape setting, whilst visual impacts are those that derive from changes to views and visual amenity resulting from the Proposed Development.

## Legislative and Planning Policy Context

**12.3** A review of legislation and planning policy has been undertaken, which considers the relevant local, sub-regional and national planning policies, comprising:

- National Planning Policy Framework, Section 7: Requiring Good Design<sup>1</sup>;
- National Planning Policy Framework, Section 11: Conserving and Enhancing the Natural Environment<sup>2</sup>;
- Cherwell Local Plan 2011-2031 Part 1 (incorporating Policy Bicester 13 re-adopted on 19 December 2016) (part 1 of 3): Policy ESD15: The Character of the Built and Historic Environment;
- Strategic Development: Bicester 4 – Bicester Business Park Policy Bicester 4: C.65 and C.66
- Public Rights of Way - The Countryside and Rights of Way Act, 2000; and
- Tree Preservation Orders - Town and Country Planning (Tree Preservation) Regulations 2012.

**12.4** The full legislative and planning policy review is included in the Volume 2: Technical Appendix 12.2.

## Assessment Methodology

**12.5** The methodology for this assessment has followed current best practice, the Guidelines for Landscape and Visual Impact Assessment (GLVIA)<sup>3</sup> as defined by the Landscape Institute and Institute of Environmental Management & Assessment and is based on the following three main stages:

- Stage 1 - establishment of the study area;
- Stage 2 - description of the landscape and visual baseline conditions; and
- Stage 3 - landscape and visual assessment of the likely significant effects of the proposed facilities.

**12.6** The updated third edition GLVIA methodology concentrates on the principles and process of LVIA and has opted not to provide a detailed or formulaic 'recipe' for the assessment of likely significant effects. When considered appropriate to this assessment, definitions and detailed methodologies from the earlier second edition of the GLVIA have been used.

**12.7** The landscape in the study area has been examined and describes the baseline physical landscape elements such as vegetation and topography in addition to landscape character and qualities.

**12.8** The nature of the landscape receptor (sensitivity) will also form part of the baseline studies and will include an evaluation of the landscape value and or quality and condition.

**12.9** Landscape sensitivity is a measure of the value of a particular landscape and its capacity to accept change resulting from a particular development type. Landscape sensitivity identifies the vulnerability of the landscape to change through the introduction of the new features, such as housing, or the loss of existing valued features such as mature hedgerows.

**12.10** Experience based professional judgement is used to identify the magnitude of the potential change that would result from the identified landscape impact. The magnitude of the impact is the degree of change experienced by a receptor to identify the significance of effect.

**12.11** The significance of the predicted landscape effects has then been identified using a matrix form of evaluation. Effects have been 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).

**12.12** The GLVIA defines the sensitivity of a landscape as varying with a combination of:

- Landscape sensitivity resulting from existing land use, the pattern and scale of the landscape/townscape;
- Visual sensitivity resulting from visual enclosure/openness of views, and distribution of visual receptors;
- The value placed on the landscape/townscape; and
- The scope for mitigation, which would be in character with the existing landscape/townscape.

**12.10** The baseline assessment will be applied to the construction phase and operation of the Proposed Development using the methodology criteria.

**12.13** For a detailed description of the assessment methodology refer to Volume 2, Appendix 12.3.

## Stage 1 - The Study Area

**12.14** The study area for the assessment of landscape and visual effects is approximately 1km from the centre of the site. Within this initial study area the potential visibility of the site has been considered in relation to the key landscape and visual receptors.

## Stage 2 - Description of the Landscape and Visual Baseline Conditions

**12.15** For the purposes of this assessment the terms landscape and townscape are interchangeable, e.g. landscape character assessment can be applied to the assessment of landscape character within rural or urban areas.

**12.16** The landscape in the study area has been described using a combination of desk-based study and site survey. This has examined physical landscape elements, such as vegetation and topography, in addition to landscape character, sensitivity, value and quality.

**12.17** Baseline visual and landscape receptors have been 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:

<sup>1</sup> 'National Planning Policy Framework', Section 7: Requiring Good Design, Department for Communities and Local Government, (March 2012)

<sup>2</sup> 'National Planning Policy Framework', Section 11: Conserving and Enhancing the Natural Environment, Department for Communities and Local Government, (March 2012)

<sup>3</sup> 'Guidelines for Landscape and Visual Impact Assessment', Third Edition, published by the Landscape Institute and Institute of Environmental Management & Assessment (2013). (GLVIA)

- 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;
- Transport routes e.g. classified and unclassified roads (country lanes), cycle routes; and
- Sites of natural or historic importance.

## Stage 3 - Landscape and Visual Assessment of the Likely Significant Effects of the Proposed Facilities

- 12.18** The assessment methodology has followed the standard GLVIA approach of assessing the impact of the Proposed Development against the baseline condition.
- 12.19** Predicted effects have been identified for each receptor, and the magnitude of the identified landscape and visual changes evaluated by professional judgement. The significance of these effects has been determined by the inter-relationship of magnitude of impact and receptor sensitivity; a standard and accepted principle that is described in more detail in Appendix 12.3.

### Baseline Conditions

#### The Site

- 12.20** There are no Scheduled Ancient Monuments (SAM), Conservation Areas or Listed Buildings on or directly adjacent to the site.
- 12.21** A Schedule Ancient Monument is located approximately 650m to the south west of the boundary of the site, and consists of the site of a Roman town. There will be no physical or visual impact on this designation.
- 12.22** A Conservation Area is located approximately 420m to the north east of the site boundary and is a Conservation Area that covers the whole of the centre of the town of Bicester. A further Conservation area for the village of Chesterton lies over a 1km to the west. Neither of these two areas will be affected physically or visually.
- 12.23** A single Listed Building is located approximately 550m to the south east of the site boundary, this is part of Langford Park Farm. There are a number of further listed buildings in the town centre of Bicester which are within the Conservation Area previously mentioned. None of the Listed Buildings would be physically affected by the Proposed Development or be visible from the site.
- 12.24** There is only one Public Right of Way (129/6) close to the site (shown on drawing HED.1288.004 in Appendix 12.1.) which starts in the centre of Bicester town and runs south west around the edge of Bicester Village development and then around the Kingsmere Residential Estate before changing to 161/13 and 161/2.
- 12.25** There would be views from this footpath for a short length as it comes close to the corner of the site on the A41 Oxford Road, these are discussed further in the visual section of this report.
- 12.26** Tree Preservation Order's (TPO) are created and protected under the Town and Country Planning Act 1990 and the Town and Country Planning (Tree Preservation) (England) Regulations 2012.

- 12.27** A TPO is made by a Local Planning Authority to protect specific trees or a particular area, group or woodland from deliberate damage and destruction. Felling, lopping, topping, uprooting or otherwise willful damaging of trees cannot occur without the permission of the Local Planning Authority with exceptions.

- 12.28** None of the trees on the site or adjacent to the boundary are covered by a TPO.

### Landscape Physical Baseline

- 12.29** The landscape baseline is comprised of the landscape character and its aesthetic characteristics and physical landscape elements, such as topography and vegetation.

### Landscape Character

#### National Character Areas

- 12.30** At a national level the character area profile are very broad assessments as identified by Natural England in their National Character Area Profiles 2013 (NCA). The relevant profile that covers the site area is No.108: Upper Thames Clay Vales<sup>4</sup>.
- 12.31** The Upper Thames Clay Vales National Character Area (NCA) covers an extensive area of low-lying land extending from west of Swindon through to Aylesbury in the east, and completely encircles the Midvale Ridge NCA. The site is located on the north east boundary of this character area with the Cotswolds (NCA 107) located directly to the north.

- 12.32** The landscape character comprises contrasting landscapes, including enclosed pastures of the claylands with wet valleys, mixed farming, hedges, hedge trees and field trees and more settled, open, arable lands. Typical key characteristics of the landscape as described in the document and relevant to the study area are:

- Mature field oaks provide a parkland feel in the study area;
- Low-lying clay-based flood plains encircle the Midvale Ridge;
- Superficial deposits, including alluvium and gravel terraces, spread over 40% of the area, creating gently undulating topography;
- The Upper Jurassic and Cretaceous clays and the wet valley bottoms give rise to enclosed pasture, contrasting with the more settled, open, arable lands of the gravel;
- Woodland cover is low at only about 3%, but hedges, hedgerow trees and field trees are frequent. Watercourses are often marked by lines of willows;
- Fields are regular and hedged;
- In the river corridors, grazed pasture dominates, with limited areas of historic wetland habitats including wet woodland, fen, reedbed and flood meadow; and
- There are also rich and extensive ditch systems. This site itself has a ditch which runs in a north south direct across the site.

#### County Character Areas

- 12.33** The Oxfordshire Wildlife and Landscape Study<sup>5</sup> (OWLS) is the current landscape character assessment for Oxfordshire. The site falls within Type 3 – Clay Vale character area as identified by the county landscape assessment. It is very close to the boundary with Type 1 – Alluvial Lowlands and therefore key characteristics

<sup>4</sup> 'National Character Area Profiles', No.108: Upper Thames Clay Vales, Natural England, (September 2013), (NCA).

<sup>5</sup> 'The Oxfordshire Wildlife and Landscape Study' (OWLS), Oxfordshire County Council, Natural England and The Earth Trust, (2004)

of both that are relevant to the site have been identified in the following paragraph with the source noted. The following are the relevant key characteristics of the character area to the site as identified by the assessment:

- Broad alluvial plains (1);
- Densely scattered hedgerow trees of ash and willow (1);
- Dense willow corridors bordering a large number of ditches (1);
- A flat, low-lying landform (3);
- Mixed land uses, dominated by pastureland, with small to medium-sized hedged fields (3); and
- Many mature oak, ash and willow hedgerow trees (3).

### **Local Character Areas**

**12.34** A site Landscape Character Plan which assesses the study area has been carried out and this is shown on Figure 12.1. The following are typical of the site and the area immediately surrounding it;

- Large retail developments of Bicester Village, Bicester Avenue Garden Centre and the Tesco foodstore;
- The Kingsmere Estate residential area;
- Major road and rail networks on either side of the site including the A41 trunk road;
- Bicester Sewage Treatment Works to the south of the site; and
- River and stream network such as the Pingle Stream and Langford Brook.

**12.35** The plan shows the site being wholly made up of the Clay Vale classification which is the source of the countryside's character. There is retail development to the north and south of the site, built development of Bicester to the west and a main railway line and the main sewage treatment works for Bicester to the east.

**12.36** The site appraisal plan is shown in Figure 12.2: Site Appraisal Plan.

### **Landscape Sensitivity**

**12.37** Landscape sensitivity is a measure of the value of a particular landscape and its capacity to accept change resulting from a particular development type. Landscape sensitivity identifies the vulnerability of each landscape unit to change through the introduction of the new features, such as housing, or the loss of existing valued features such as mature hedgerows.

**12.38** Landscape sensitivity is influenced by a combination of existing land use, the pattern and scale of the landscape, from visual sensitivity (resulting from visual enclosure/openness of views and the distribution of visual receptors), from the value placed on the landscape/ townscape and from the scope for mitigation.

**12.39** The site is adjacent to development on three sides and has the busy A41 as its west boundary. This gives it an urban feel which marks the distinct transition in character from the urbanised areas to the north to the countryside to the south and east.

**12.40** The sensitivity of the site would be graded as low as the landscape is attributed with moderate value characteristics of local value, which would make it potentially tolerant to substantial change.

### **Movement and Access**

**12.41** The A41, a dual carriageway is the nearest arterial route and is located adjacent to the west boundary and to the north as it links the A34/M40 junction to Bicester Town centre and then on to Aylesbury.

**12.42** There is only one PROW close to the site and none that cross the site itself. For detail refer to the legislative and planning policy section that is included in Volume 2: Technical Appendix 12.2.

### **Landform**

**12.43** Topography is important in itself, as a natural feature to be appreciated and preserved and is important for its indirect influences on views and on how the land is used.

**12.44** The 13.1 hectare site is defined by the underlying topography and has a central high point central on the northern boundary. There is a drop in level across the site from north to southwest of approximately 4m with the high point of 68.5m AOD in the north central area and the low point at approximately 64.35m AOD in the southwest corner

**12.45** The topography of the surrounding area and site area is illustrated on drawing HED.1288.004 in Appendix 12.1.

**12.46** The Proposed Development has therefore taken into account the landform and how this influences availability of views towards and from the site during the design and determination of location, density and height of the development as well as retention of existing features and open space.

### **Vegetation**

**12.47** Vegetation is important as a natural feature, often with ecological and cultural associations, but it is also important as an enclosing and screening element which restrict or allow views across the surrounding countryside. The vegetation of the landscape adjacent to the site is shown on Figure 12.2: Site Appraisal Plan.

**12.48** The site is a single open arable field with mature and overgrown hedges to parts of the west and southern boundaries.

**12.49** The western boundary is enclosed for about half its length with the A41 road with a mature unmanaged hedgerow. This hedge is approximately 4m high with frequent trees of 8-10m high and occasional 15-20m high trees. It provides a dense visual barrier to view from the west and from along the A41 road as users approach Bicester.

**12.50** The south western boundary with Bicester Avenue Garden Centre has a mature unmanaged hedgerow along its full length with mature trees within it. This hedge is approximately 4-6m high with frequent trees of 8-10m high and groups of mature trees 20-30m high. It provides a dense visual barrier to view from the south and users within the garden centre.

**12.51** The existing vegetation on the site boundaries are typically of the following species:

- Blackthorn (*Prunus spinosa*);
- Oak (*Quercus robur*);
- Hawthorn (*Crataegus monogyna*);
- Ash (*Fraxinus*);
- Hazel (*Corylus avellana*);
- Willow (*Salix* spp.); and
- Elder (*Sambucus nigra*)

# LANDSCAPE AND VISUAL IMPACT

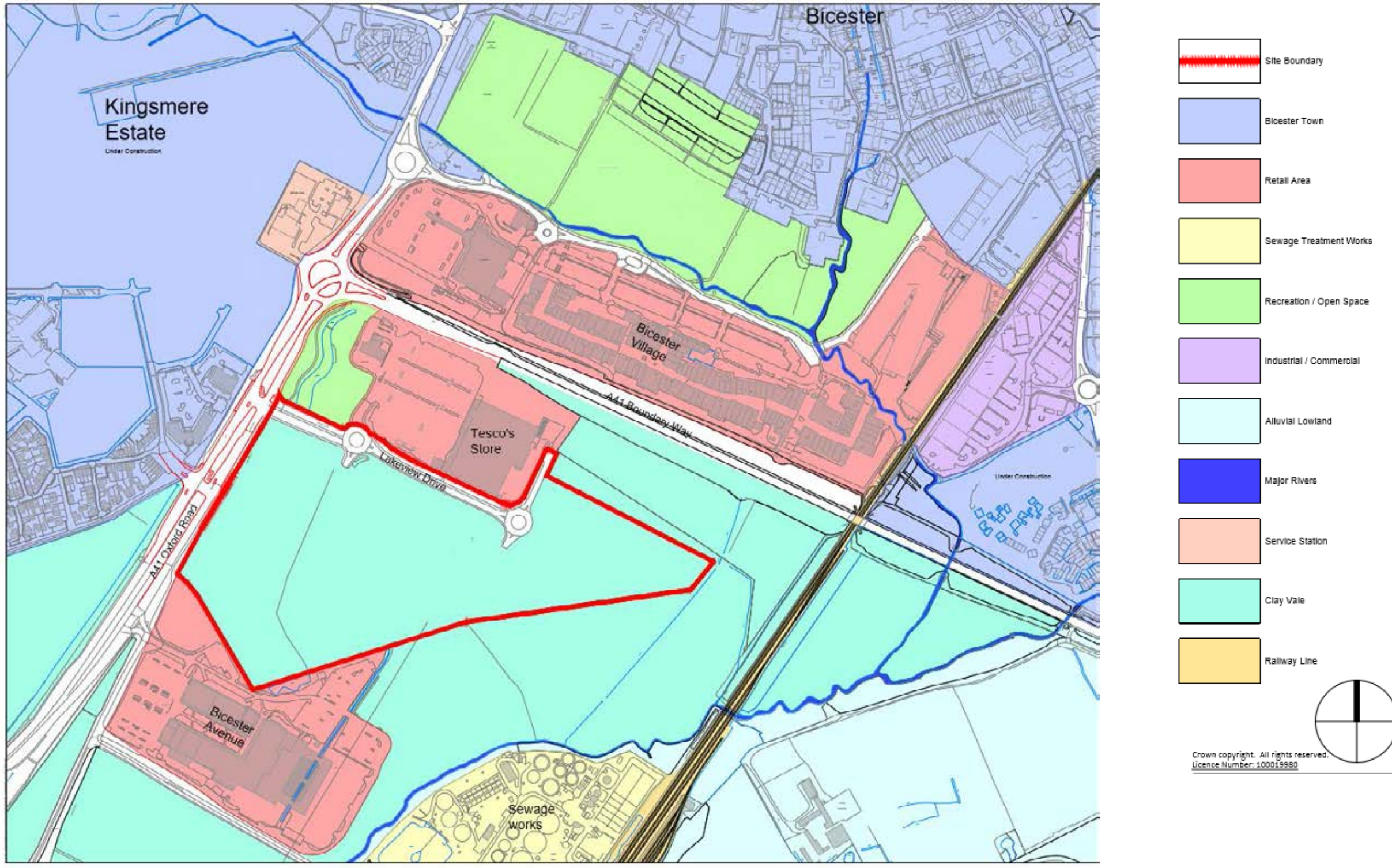


Figure 12.1: Landscape Character Plan

# LANDSCAPE AND VISUAL IMPACT

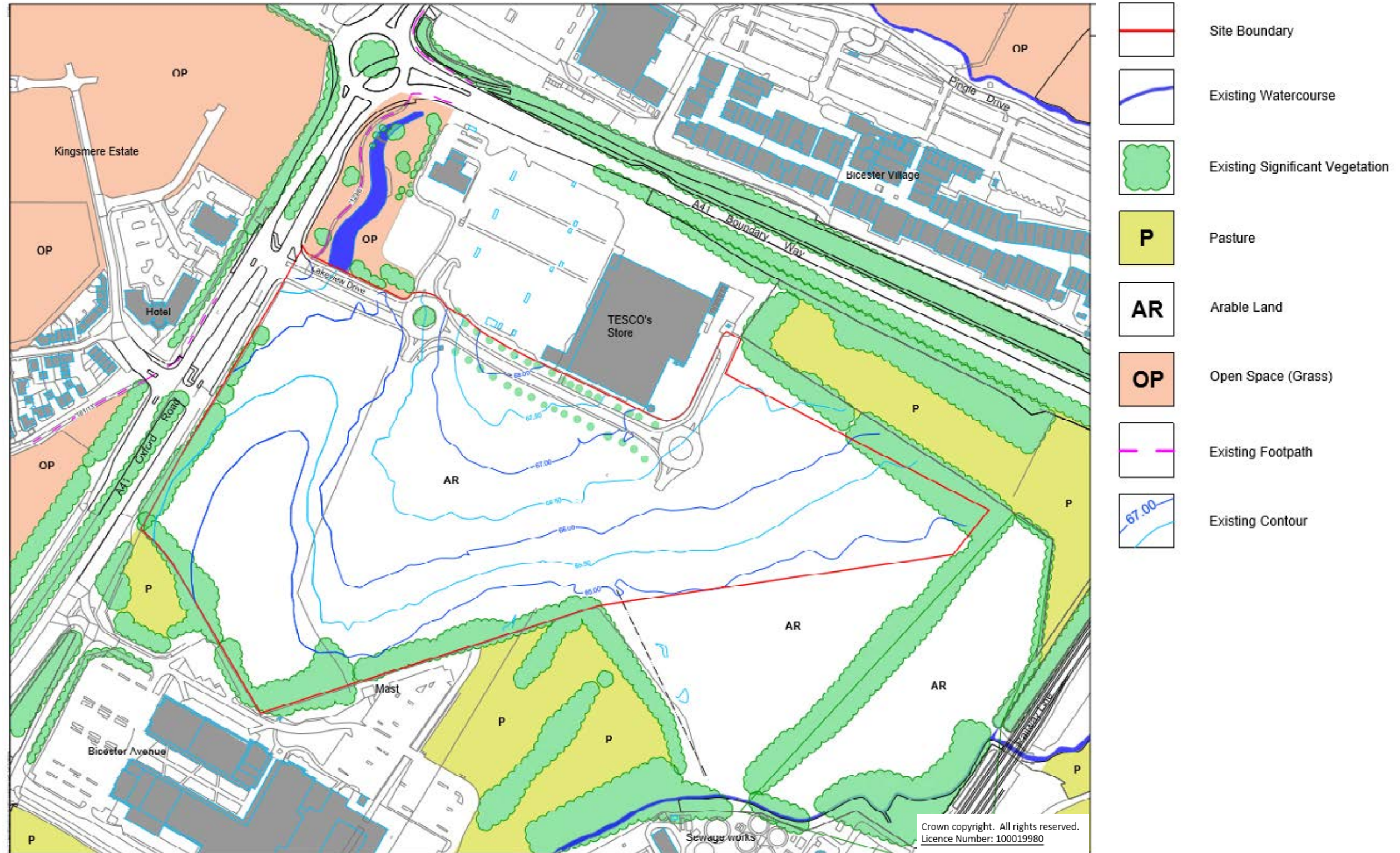


Figure 12.2: Site Appraisal Plan

## LANDSCAPE AND VISUAL IMPACT

### Visual Baseline

- 12.52** The visibility into the site is limited by mature tree and dense hedge planting along the west and southern boundaries and buildings and topography from other directions.
- 12.53** There are some intermittent views into the site from a number of locations mainly from the west of the site.
- 12.54** There are a few glimpsed medium distance views from the new development area of Kingsmere Residential Estate to the west of the site and very limited long distance views from the surrounding countryside from a number of directions, refer to Table 12.1 below for detail of the selected typical views.

### Viewpoint Locations and Receptor Descriptions

A representational coverage of potential visual and landscape effects of the Proposed Development has been assessed from the positions described in Table 12.1 below. The baseline photographs of the views are shown in on plans HED.1288.201 to HED.1288.205 in Appendix 12.1, with their locations shown in Figure 12-3: Photograph Location and also found in Appendix 12.1.

### Short Distance Views from in and around the Site

- 12.55** Receptors in all these locations are either motorists or pedestrians using the A41 Oxford Road or adjacent residential roads or homeowners and occupants of the hotel looking out from these properties. Residents and recreational pedestrians and cyclists etc. would be interested in their visual surroundings and therefore more sensitive to development, but this would be relative to their immediate visual context of a busy trunk road and new development surrounding the location. Motorists would be generally less sensitive due to the fleeting view they would have of the site. Receptor sensitivity is thus summarised as follows:
- Motorists: Low sensitivity due to activity with the limited presence of the site from the A41 Oxford Road;
  - Pedestrians and cyclists: Low to Medium depending upon their context and activity in relation to the Proposed Development; and
  - Residents: Low to Medium sensitivity due to context of surrounding new development.

**Table 12.1: Schedule of Viewpoint**

Proposed Viewpoint	Location/receptor type	Grid Reference	Description/comments
1	View from the northern corner of the site looking south across the site.	51.891436N, - 1.162738W	Open view across the site from the edge of Lakeview Drive. The site can be seen in the view with partial screening through landform. The site boundary hedge and tree line along the A41 can be seen as can the vegetation between the site and Bicester Avenue retail area. In the distance Graven Hill can be seen along with filtered views of the MoD central ordnance depot in front of it.
2	View from north-west of the site looking south-east across the A41 towards the site.	51.890931N, - 1.165335W	View framed by existing residential building and hotel looking across the A41 towards the site. Views are partially restricted by vegetation on the western boundary with traffic on the trunk road visible. To the north there are glimpses of the recently constructed Tesco's building.
3	View from west of the site on the A41 trunk road looking north-east towards the site.	51.889901N, - 1.165332W	View along the A41 towards the town centre of Bicester with the site to the east. Views are restricted by site boundary hedge and tree line which is located on the western site boundary, this prevents all views of the proposed development site. To the left of the view three storey properties on the Kingsmere estate and the hotel are visible. This view is the main approach to Bicester from the south.

4	View from south west of the site on Whitelands Road looking north-east towards the site.	51.888391N, - 1.191816W	View towards the site and town centre of Bicester with land on the Kingsmere Estate allocated for a school in the foreground. Views are restricted by site boundary hedge and tree line which is located on the western and southern site boundary, this prevents all views of the proposed development site. There are glimpses of the recently constructed Tesco's building and Graven Hill can be seen in the distance.
5	View from the south-west of the site looking north east from the A41 overbridge.	51.884386N, - 1.172422W	View from the overbridge over the A41 on the Chesterton road looking towards the site. The view illustrates the wooded nature of the area with the site hidden behind a number of layers of tree blocks and hedgerows. There is a glimpse of the recently constructed Tesco's building but the retail area at Bicester Avenue is completely obscured. Residential properties and the hotel on the west of the A41 can be seen over the roadside tree planting.
6	View from footpath no. 161/3 looking north east towards the direction of the site.	T51.892374N, - 1.183790W	<b>View point from south west of the site on a footpath looking towards the site. All of the site is obscured by dense intervening vegetation as is the A41 trunk road.</b>
7	View from the footpath no.129/7 looking east towards the site.	51.894478N, - 1.166986W	Viewpoint taken on the footpath no.129/7 looking across land that is allocated as part of the Kingsmere estate for residential housing looking towards the site. The site is very obscured by landform and semi-mature hedgerow and trees on the western boundary. There are glimpses of the recently constructed Tesco's building with Graven Hill beyond. Development on the Kingsmere estate can be seen in the form of a play area, residential properties and the hotel.
8	View looking south from footpath no. 129/6a on the edge of the Bicester town.	51.893868N, - 1.154790W	Viewpoint taken from south of the cemetery on footpath no.129/6a looking south west towards the site. Pingle Drive and Bicester Village is visible on the skyline. The A41 Boundary Way road and the site beyond are not visible.
9	View looking west from footpath no. 105/1 looking towards the site.	51.882586N, - 1.130105W	Viewpoint taken from along footpath no. 105/1 east of the site. The A41 Aylesbury Road is hidden behind roadside vegetation but shipping containers on the MoD Central Ordnance Depot is visible as is the top of Graven Hill. The site is completely obscured by landform and vegetation.
10	View looking north towards the site from Langford Lane overbridge (recently constructed as part of the main railway line improvements).	51.872652N, - 1.172280W	<b>Viewpoint taken from overbridge over the main railway line looking north towards the site. Development at Bicester Avenue and the recently constructed Tesco's store can be seen although these are glimpsed and seen through intervening vegetation. No ground level views of the site are possible from this location.</b>
11	View looking north west towards the site from the northern edge of the Bicester 2 development area (Graven Hill) recent commencement of construction.		Viewpoint taken from the northern edge of the Graven Hill development area (Bicester 2) which has recently started on site. Very few viewpoints are available are currently available from this location due to extensive 'layers' of vegetation, existing buildings and the retaining structure of the main railway line. The view shows the existing vegetation between the location and site, the retaining structure of the main railway line and over this the roof of Tesco's and the Kingsmere Estate. There are currently no ground level views of the site but this may alter as the residential development proceeds.



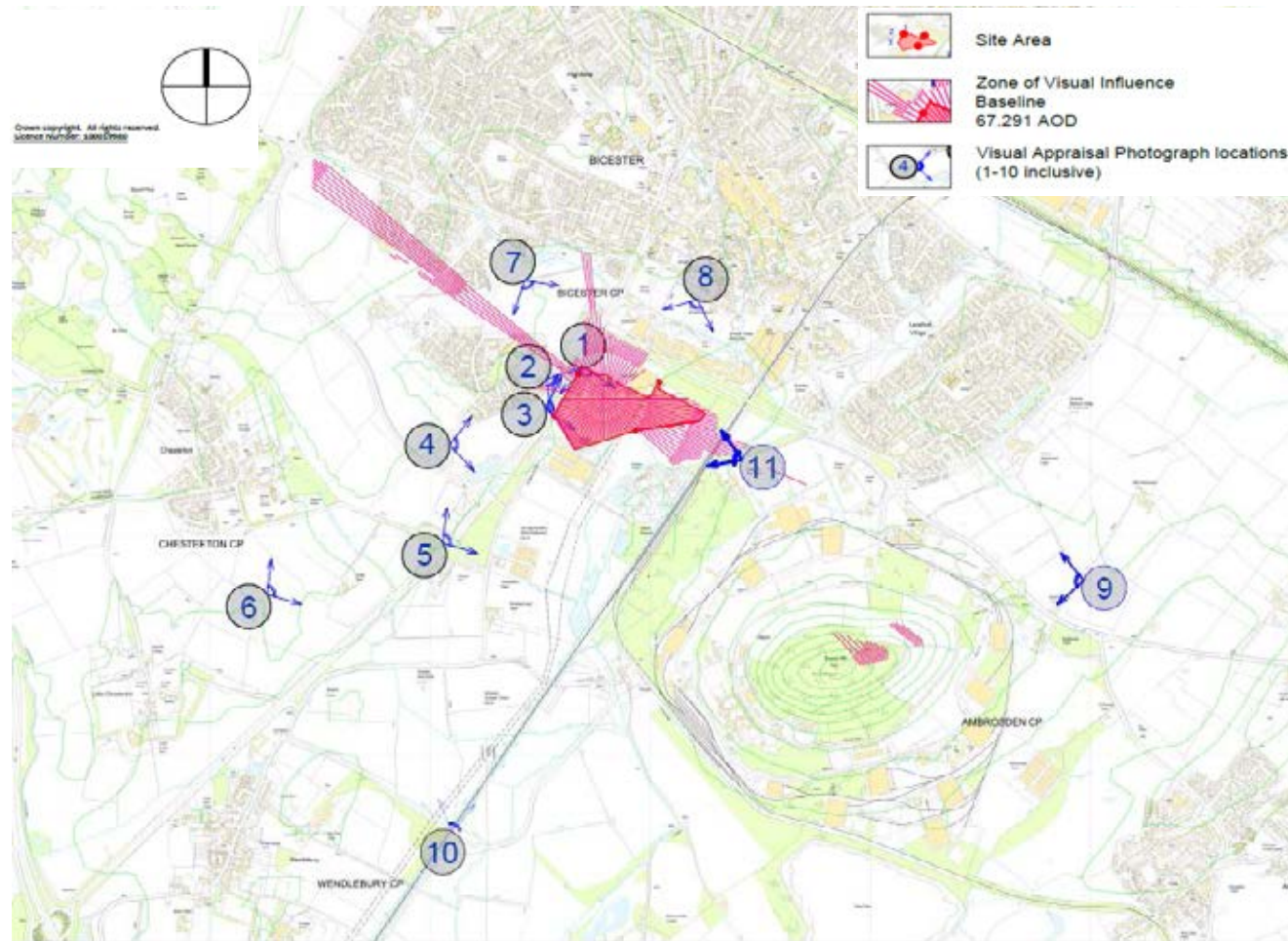


Figure 12.3: Baseline Zone of Visual Influence and Photograph Location Plan

### Medium Distance Views around the Site (non-public locations)

12.56 Receptors in all these locations are either land workers or some homeowners looking out from their properties and future owners of properties on the Bicester 2 development area (Graven Hill). Residents would be interested in their visual surroundings and therefore more sensitive to further development, but this would be relative to their immediate visual context and the distance/view that they can already see. Receptor sensitivity is thus summarised as follows:

- Land workers: Low to Medium depending upon their context and activity in relation to the Proposed Development; and
- Residents: Medium to High sensitivity due to context.

### Summary of the Landscape Physical and Visual Baseline

- 12.57 The site has a high point to the centre of the northern boundary and an even level change to the southern boundary. It is composed of agricultural arable field with native hedgerows to the south and partly west side.
- 12.58 There is a small number of dwellings with views into the site from the west in the new development area of Kingsmere Residential Estate although the hedgerow and trees along the A41 create significantly barrier particularly to the southern part of the site. From the south east on the Graven Hill development area there

will be some future residents that will have views of the Office Park seen in the context of the sewage works, railway line, existing Tesco's foodstore and existing development on the Kingsmere Estate.

- 12.59 There will be views available from the recently built Tesco foodstore building to the north of the site.
- 12.60 There are a significant number of mature trees separating the site from the Bicester Avenue Garden Centre area to the south although filtered views will be possible particularly during the winter months
- 12.61 There will be a single Statutory Right of Way (no.129/6) that is located close to the site which starts in the center of Bicester town and runs south west around the edge of Bicester Village development and then around the Kingsmere Residential Estate before changing to 161/13 and 161/2. There will be views of the site from this footpath at the location of the junction with Lakeview Drive and A41 Oxford Road.
- 12.62 The site sits wholly within the new employment allocation site of Bicester 4.

### Assessment of Effects

#### Environmental Change without the Proposed Development

12.63 In the event that the land south of Lakeview Drive is not developed, it would remain in the state as described in the baseline section.

#### Environmental Change with the Proposed Development

12.64 Any development on the site would potentially generate a range of landscape and visual impacts including:

- Land use change and character impacts on the landscape of the arable field;
- Direct landscape impacts on existing landscape elements such as vegetation and topography;
- Indirect landscape impacts on the adjacent Landscape Character from visual change;
- Visual impacts on residential amenity views from properties looking towards the site; and
- Visual impacts on motorists, recreational walkers and other users of the adjacent footpaths and local roads.

#### Mitigation

12.65 In considering these potential impacts, the parameters have been developed through the iterative LVIA process to avoid and minimise potential landscape and visual impacts through the restriction of building elevation and massing as set out in the parameters plans. Furthermore, a landscape strategy, secured through a planning condition will be developed at detailed design stage in order to ensure:

- Retention of the existing site vegetation, in particular the strong boundary hedges on the western southern and eastern boundaries of the site; and
- Introduction of new tree and shrub planting throughout the site to reinforce the boundaries and filter views throughout the site.

#### Landscape and Visual Effects

12.66 The landscape and visual assessment has followed the defined methodology of assessing receptor sensitivity against the magnitude of change to identify a significance category for each identified effect. This process has been and is used as the basis for the description of the likely significant landscape and visual effects for both the construction and operational phases of the project.

12.67 For the operational phase, effects at day one and at plus 15 years have been examined, this date is from the point of completion of the construction of the whole site which maybe a number of years following start of the construction as the development maybe phased. This is to understand any potential benefits of mitigation

that may accrue through the maturing of the soft landscape that form an intrinsic part of the Proposed Development.

- 12.68** The design principle for the site is to construct an office park off the existing access road as identified in the parameters plan drawing 1105(SK)070 produced by Bennetts Associates. The heights of the buildings will be range between 2 and 5 storeys. The design of the Proposed Development reflects the area in terms of massing but more importantly the Proposed Development will be contained within the existing strong boundary hedge and existing trees.
- 12.69** The proposed access points are off the existing road stubs on Lakeview Drive which will provide access to the Office Park and its associated car parking and open space.
- 12.70** The design of the Proposed Development will minimise impacts on the landscape and visually from the surrounding countryside. This will be done through the control of development building heights and mass as set out in the parameters plans and through a landscape strategy which set outs principles of planting to reduce visual impacts which is secured by way of a planning condition.

### **Construction Phase**

- 12.71** Construction effects have been defined as those resulting from the temporary construction work required to build out the Proposed Development, earth moving, construction movements, etc. As the project is constructed, which may be over a number of phases and over a period of 8-9 years, the permanent effects from the construction of the office buildings are assessed under the Operational Phase section of this report.

### *Landscape Effects*

- 12.72** Construction phase landscape effects may be both direct and indirect. Potential direct landscape effects may result from:
- Temporary effects to topography (e.g. stockpiles);
  - Vegetation loss due to temporary construction measures;
  - Temporary changes to the site character resulting from construction activity;
  - Temporary construction vehicle and operatives activity; and
  - Temporary site cabins and security fencing.
- 12.73** The indirect construction effects on landscape character may result from visual intrusion (reinforced by noise intrusion) and from lighting effects. These may influence the character of the surrounding landscapes.
- 12.74** The Magnitude of Impact Landscape Criteria (see Assessment Methodology in Appendix 12.2) has been assessed using the scale set out in Appendix 12.2, Table 7, (ranging from Major to No Change) then assessed against the sensitivity of the site (Low, Table 4) to define the Significance Threshold for Landscape and Visual Effects (Appendix 12.2, Table 8) to provide a range of effects from Major to Neutral.

### *Landscape Character / Planning Policy Designation*

- 12.75** The extent of the impacts would be site wide but of a temporary nature. The impact would be a significant alteration to the baseline with the presence of site construction teams including vehicles, site cabins and associated noise. The site is on the edge of the existing built form of Bicester and therefore the impacts during the construction phase are considered minor/moderate adverse.
- 12.76** Direct and indirect construction phase landscape character impacts on the site and its context would be temporary and of minor/moderate magnitude resulting in adverse effect of minor-moderate significance.

### *Topography and Drainage*

- 12.77** The Proposed Development parameters already reflect the existing site levels, using the slope, so that the building elevation as set by the parameters plan ensures that the built form isn't intrusive. Any potential adverse effects on topography and drainage (e.g. from excavations for services) would be small scale and local.
- 12.78** Direct and indirect construction phase changes to the topography would be site wide, given the field wide change to the landform. Such activities are not uncharacteristic of a built area, the magnitude of impact would be minor resulting in a minor/moderate adverse effect.

### *Vegetation*

- 12.79** The visually important existing vegetation is located on the boundaries of the site, specifically along parts of the west, east and southern boundary. These hedges form a strong visible containment from view in the wider area. The vegetation along the northern boundary allows open views from the recently built Tesco foodstore and its carpark.
- 12.80** The Proposed Development landscape design strategy should seek to retain all of the existing site boundary vegetation as previously noted and develop a management plan to enhance the boundaries by reinforcing the existing trees and improving their current management regimes.

- 12.81** The loss of the arable field vegetation would be a minor change to the overall site vegetation, resulting in minor/moderate adverse effect.

### *Visual Effects*

- 12.82** Direct visual effects of the construction would result from the temporary appearance of the site as construction works progress and from the increased level of activity in the landscape. The effects of the removal of existing landscape features, such as the earthworks site strip and permanent small scale changes to the site, would also lead to 'existence' effects. These have been assessed as operational effects.
- 12.83** Visual changes resulting from the construction would be most pronounced in close proximity to the site and would diminish very quickly with distance, to the point that individual construction activities would no longer be visible due to the restricted zone of visibility at the site.
- 12.84** The Visual Sensitivity (as set out as in Assessment Methodology in Volume 2, Appendix 12.3) is set as Low, on account of the relatively degraded and low valued landscape character of the site and its surroundings. This sensitivity is used in the following assessment of individual receptors to identify the impacts upon them.

### *Short Distance Views from in and around the Site (Views 1-3)*

- 12.85** These views are directly adjacent to the site's boundary. The content of the views would change with the construction works and increased activity resulting in a noticeable difference to the baseline. This would be mitigated with reduced visibility of the site construction activity with the installation of non-permeable security hoarding along the A41 and Lakeview Drive boundaries. Therefore, the Visual Magnitude of Impact would be Moderate and of a short-term and temporary nature during the Construction phase.
- Workers as Low sensitivity receptors, would experience minor/moderate adverse visual effects.
  - Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience minor/moderate Adverse.
  - Residents: Medium to low visual receptors would experience moderate adverse from the limited number of adjacent properties.

## *Medium Distance Views around the Site (Views 4, 5, 7-8, 11)*

- 12.86** These are views looking across open ground from the south-west around to the north of the site towards the Proposed Development. There are limited views from the medium distance, these are predominately from the edge of recent or future development areas, such as the Kingsmere Estate to the site with construction activity on the site being potentially visible. Views from the south east on the edge of the Graven Hill development area will be available from the emerging residential area but will be limited by vegetation and seen in the context of the existing sewage works, railway line and Tesco's store.
- 12.87** Receptors in this location would be construction/farm/land workers and the few residents that have a view from the completed Kingsmere Estate. The construction phase changes would be minor scale additions, glimpsed over the tops of the intervening vegetation and in the context of the existing built development or construction areas resulting in Minor magnitude impacts realising minor /moderate adverse visual effect.

## *Long Distance Views around the Site (Views 6, 9-10)*

- 12.88** These are views looking across countryside from the south-west around to the south-east of the site towards the Proposed Development, they are from limited locations, for views from the wider countryside are predominately screened by existing intervening vegetation.
- 12.89** Receptors in this location would be farm/land workers and recreational walkers. The changing nature of the construction phase would be minor or negligible scale changes, that are glimpsed through intervening vegetation and in the context of the existing built development or local construction areas such as the continuing development on the Kingsmere Estate, resulting in Minor magnitude impacts that give a negligible to minor adverse effect.

## **Operational Phase**

### ***Landscape Effects***

- 12.90** Operational phase landscape effects are both direct and indirect. Potential direct landscape effects will result from:
- Land take resulting in changes to landscape character, sensitivity and quality of surrounding landscape; and
  - Additional building massing.
- 12.91** Potential indirect operational phase effects on landscape character of the site may result from:
- Visual intrusion from the proposed built form;
  - Activity of people working on the site;
  - Vehicle movement on the site;
  - Landform change; and
  - Lighting effects.

### ***Landscape Character / Planning Policy Designation***

- 12.92** The national and local character areas characteristics are noted in paragraph 12.28-12.34 of this chapter.
- 12.93** At day one there would be a noticeable change in the landscape character of the site from an area of arable use to an area of office park development.
- 12.94** The operational activity of people working in the buildings would also bring about noticeable change in the character of the site but this would be seen in the context of the adjacent existing Tesco foodstore. The

- 12.95** Proposed Development would overall be seen as more active than the baseline condition particularly with the effects from associated building lighting.
- 12.96** Operational activity effects and existence effects, resulting from the presence of the Proposed Development, would impact on the site itself and its immediate context with the introduction of the built form.
- 12.97** Sensitive design of the buildings massing and orientation to assimilate the buildings with its surroundings. The magnitude is assessed as moderate adverse, given these elements will partially alter the key baseline characteristics of the surrounding area but the introduction of the new built element is so well contained within the existing strong hedgerows on the boundaries and the landform and vegetation in the surrounding countryside so that only local views are available.
- 12.98** At year 15 the landscape of the site would be maturing, in particular the trees and new native hedges within the Proposed Development which will filter and breakup the building mass will reduce visual intrusion from the surrounding landscape, reducing the indirect impact from a moderate to neutral adverse effect.

### ***Vegetation***

- 12.99** The Proposed Development will include a landscape design strategy which addresses boundary planting of native trees and shrubs, reinforcing the retained planting and creating new planting to divide the office areas.
- 12.100** Day one operational impacts would be permanent, minor adverse on a very small proportion of the sites landscape resulting in a minor adverse effect which is not considered significant. At year 15, effects would be reduced to neutral or minor beneficial as the existing and proposed planting matures. Landscaping will be managed through an agreed management plan, which should aim to both visually screen and create a high quality office park in keeping with the adjacent landscaping of the access road and open space. The design and management plan will need to be agreed with the local planning authority through a reserved matter planning condition.

### ***Topography and Drainage***

- 12.101** The Proposed Development will retain the general existing site topography with areas raised slightly to create mounding to screen and filter views within the development.
- 12.102** Day one operational impacts would be a permanent minor magnitude and would result in minor/ neutral adverse effects that would continue through to year 15 and beyond.

### ***Visual Effects***

- 12.103** Operational visual effects are changes to views that would be apparent on opening day and at Year 15. These include both intermittent and long term visual changes that would occur through the presence of the Proposed Development.
- 12.104** The visual changes would follow a similar pattern to that described for the construction phase, as the operation activities and visual changes would occur in the same locations and relative to the same visual receptors.

### ***Short Distance Views from in and around the Site (Views 1-3)***

- 12.105** At day one, the change in view with the Proposed Development will be the addition of new office buildings seen from the PROW and the adjacent residential properties on the Kingsmere Residential Estate.
- 12.106** The magnitude of the change in close views around the site has been assessed as Moderate, as the change will be from limited locations and well screened by retained existing vegetation.

**12.107** At year 15 the mature landscape setting around the Proposed Development and additional native screen planting will have matured so that views of the buildings and structures will be limited if not obscured so that the magnitude will be minor.

**12.108** Impacts at day one would be:

- Workers as Low sensitivity receptors, would experience minor adverse visual effects;
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience a minor adverse effect; and
- Residents: Medium to low visual receptors would experience a moderate/ minor adverse effect from the limited number of adjacent properties.

**12.109** At year 15 the adverse impacts would be balanced by the mitigating effects of the new landscape:

- Workers as Low sensitivity receptors, would experience neutral or a positive enhancement of visual effects;
- Pedestrians, motorist and cyclists: as Low sensitivity receptors would experience neutral visual effects; and
- Residents: Medium to low visual receptors would experience a minor adverse effect from the limited number of adjacent properties.

### **Medium Distance Views around the Site (Views 4, 5, 7-8, 11)**

**12.110** At day one, the change in view with the Proposed Development will be the addition of new office buildings seen from various locations in the surrounding countryside.

**12.111** The magnitude of the change in medium distance views around the site has been assessed as Minor/ Neutral as the change will be from limited locations and well screened by intervening existing vegetation and seen in the context of existing built development.

**12.112** At year 15 the mature landscape setting around the Proposed Development and additional native screen planting will have matured so that views of the buildings and structures will be limited if not obscured so that the magnitude will be Neutral.

**12.113** Impacts at day one would be:

- Workers as Low sensitivity receptors, would experience neutral visual effects;
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience neutral; and
- Residents: Medium to low visual receptors would experience neutral from the limited number of adjacent properties.

**12.114** At year 15 the adverse changes would be balanced by the mitigating effects of the new landscape:

- Workers as Low sensitivity receptors, would experience neutral or a positive enhancement of visual effects.

### **Long Distance Views around the Site (Views 6, 9-10)**

**12.115** At day one, the tops of the office buildings and lighting glow from the buildings at night will be visible.

**12.116** The magnitude of the change in the long distance views around the site has been assessed as minor/ neutral as the change will be from limited locations and well screened by intervening existing vegetation and landform.

**12.117** At year 15 the mature landscape setting around the Proposed Development and additional native screen planting will have matured so that views of the buildings and structures will be obscured so that the magnitude will be neutral.

**12.118** Impacts at day one would be:

- Workers as Low sensitivity receptors, would experience neutral visual effects;
- Pedestrians, motorists and cyclists: as Low sensitivity receptors would experience neutral effects; and
- Residents: Medium to low visual receptors would experience Neutral effects from the limited number of adjacent properties.

### **Mitigation and Enhancement Measures**

**12.119** Landscape and visual measures will be incorporated at detailed design stage to prevent or reduce construction and operational effects as an integral part of the design development process. These measures have been taken into account in the preceding assessment of potential landscape and visual effects.

**12.120** These features include the following elements:

- Retaining all of the existing trees and hedges along the western, eastern and southern boundary of the site;
- New native trees and shrub screen planting to reinforce existing boundaries which needs to be developed as part of an overall landscape design strategy for the site. The landscape strategy plan will need to be agreed with the local planning authority through a reserved matter planning condition;
- Trees and hedges within the site to define the plots and boundaries and filter the mass of the buildings which will need to be developed as part of an overall landscape design strategy for the site. The landscape strategy plan will need to be agreed with the local planning authority through a reserved matter planning condition;
- Material, form and details of the dwellings that complement the character of the existing surrounding built form will need to be agreed with the local planning authority; and
- The elevation and massing of the buildings that complement the adjacent built development.

**12.121** The Illustrative Masterplan (See Figure 12.3 below) provides an example of how the site could be developed using the parameters that have been set for the building height, massing, landscape strategy and with the retention of the existing boundary features.

**12.122** New tree planting as agreed through a reserved matter planning condition would typically consist of native and indigenous species suitable for the location and having considered the future size and spread of the particular species.

**12.123** These typically would include the following species: hazel (*Corylus avellana*), oak (*Quercus robur*), field maple (*Acer campestre*), rowan (*Sorbus aucuparia*), beech (*Fagus sylvatica*), holly (*Ilex aquifolium*) elm (*Ulmus minor* Atinia) and hornbeam (*Carpinus betulus*).

**12.124** New hedge planting would also consist of native and indigenous species suitable for the location and be chosen to achieve dense screen hedge even in the winter months.

**12.125** These typically would include the following species: hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*) and hornbeam (*Carpinus betulus*).

**12.126** The planting will be important in conserving and enhancing the character of the surrounding landscape.

### **Residual Significant Impacts**

**12.127** The Proposed Development includes design parameters as identified above that prevent or reduce the landscape and visual impacts and form an integral part of the project. Visual impacts will be mitigated through a landscaping strategy developed at detailed design stage and secured through a planning condition. Therefore, no further measures are considered necessary.

# LANDSCAPE AND VISUAL IMPACT

**12.128** The level of impacts would remain unchanged from those identified in the preceding assessment and would not increase further over time.

**12.129** Table 12.2 below details the residual visual and landscape effects as a result of the Proposed Development.

Table 12.2: Residual Landscape and Visual Effects				
Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
<b>Residual Effects during the Demolition and Construction Phase</b>				
Landscape Effects				
Landscape Character	Local	Minor to Moderate - adverse	<b>Significant</b>	Temporary
Topography and Drainage	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Vegetation	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Visual Effects				
Short Distance Views from in and around the Site (Views 1-3) – Workers	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Short Distance Views from in and around the Site (Views 1-3) – Residents	Local	Moderate -adverse	<b>Significant</b>	Temporary
Medium Distance Views around the Site (Views 4,5,7-8, 11) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate and from the emerging Graven Hill development area)	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)	Local	Negligible to minor - adverse	Not Significant	Temporary
<b>Residual Effects once the Proposed Development is Complete and Occupied</b>				
Landscape Effects				
Landscape Character (0-15 years)	Local	Moderate adverse	<b>Significant</b>	Temporary (up to 15 years)

Table 12.2: Residual Landscape and Visual Effects				
Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
Landscape Character (after 15 years)	Local	Neutral adverse	Not Significant	Long-term
Topography and Drainage (0-15 years)	Local	Minor / neutral adverse	Not Significant	Temporary (up to 15 years)
Topography and Drainage (after 15 years)	Local	Minor / neutral adverse	Not Significant	Long-term
Vegetation (0-15 years)	Local	Minor adverse	Not Significant	Temporary (up to 15 years)
Vegetation (after 15 years)	Local	Neutral to minor - beneficial	Not Significant	Long-term
Visual Effects				
Short Distance Views from in and around the Site (Views 1-3) – Workers (0-15 years)	Local	Minor adverse	Not Significant	Temporary (up to 15 years)
Short Distance Views from in and around the Site (Views 1-3) – Workers (after 15 years)	Local	Neutral beneficial	Not Significant	Long-term
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (0-15 years)	Local	Minor adverse	Not Significant	Temporary (up to 15 years)
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (after 15 years)	Local	Minor adverse	Not Significant	Long-term
Short Distance Views from in and around the Site (Views 1-3) – Residents (0-15 years)	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary (up to 15 years)
Short Distance Views from in and around the Site (Views 1-3) – Residents (after 15 years)	Local	Minor adverse	Not Significant	Long-term
Medium Distance Views around the Site (Views 4,5,7-8, 11) Workers (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Medium Distance Views around the Site (Views 4,5,7-8, 11) Workers (after 15 years)	Local	Neutral - beneficial	Not Significant	Long-term

# LANDSCAPE AND VISUAL IMPACT

Table 12.2: Residual Landscape and Visual Effects				
Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
Medium Distance Views around the Site (Views 4,5,7-8, 11) Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Medium Distance Views around the Site (Views 4,5,7-8, 11) Residents (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Long Distance Views around the Site (Views 6,9-10) - Workers (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Long Distance Views around the Site (Views 6,9-10) – Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)
Long Distance Views around the Site (Views 6,9-10) - Residents (0-15 years)	Local	Neutral	Not Significant	Temporary (up to 15 years)

## Cumulative Impacts

- 12.130** Cumulative impacts are those that result from additional changes to the landscape or visual amenity caused by the Proposed Development in conjunction with other developments. There needs to be a consideration of the likely significant effects rather than a comprehensive cataloguing of every conceivable effect that might occur.
- 12.131** The schemes and range of developments that are to be considered are provided in Chapter 2: EIA Methodology, however those specific to landscape and visual chapter include:
- Bicester 3 (Kingsmere Residential Estate) a residential, community facilities and open space development;
  - Bicester Gateway Retail (part of the Bicester 3 policy area); and
  - Bicester Gateway Office Park (part of the Bicester 10 policy area).

## Landscape Effects

- 12.132** Cumulative landscape effects result from in-combination impacts on the physical landscape elements and on landscape character. The latter may be direct effects on the site’s landscape character or indirect intrusion based effects on the wider landscape.
- 12.133** In terms of the direct landscape effects these changes would result in urbanisation of the site landscapes however in all cases effects are contained within a strong structure of mature vegetation which reduces the adverse effects.
- 12.134** Cumulative effects would be limited to the change of character of the location from rural edge to urban form, there would be limited physical change in the landform with the developments generally being retained at the same or similar levels and form.

**12.135** Landscape effects would be particularly noticeable along the A41 Oxford Road and Boundary Way as this quadrant of land including the site is altered in character



**Figure 12.4: Illustrative Masterplan**

## Visual Effects

- 12.136** Cumulative visual effects result from simultaneous or successive or sequential visual effects from the individual projects acting on receptors in, and moving through, the landscape.
- Kingsmere Estate**
- 12.137** The residential estate is located directly to the west of the Proposed Development site on the opposite side of the A41 Oxford Road. There would be direct and simultaneous views of both sites for a short length of the main road that is an important gateway to Bicester Town. The development of the Kingsmere Estate will have greater prominence than the proposed Bicester Office Park, the significance of effects of the Proposed Development will therefore not alter.

## *Bicester Gateway Retail*

**12.138** The retail development is located to the north east of the hotel on the Kingsmere Residential Estate, adjacent to the A41 Oxford Road. This development is visually separated from the site and would result in no close views containing both developments and no cumulative effects.

## *Bicester Gateway Office Park*

**12.139** The office development is located to the south west of the Bicester Avenue Garden Centre, adjacent to the A41 Oxford Road. This development is visually separated from the site and would result in no close views containing both developments and no cumulative effects.

## **Summary of Landscape and Visual Effects**

**12.140** The various developments in close proximity to the Proposed Development site are sufficiently distinct entities to ensure that cumulative landscape and visual effects are not significantly greater than those identified for the individual projects.

**12.141** The three cumulative projects form a larger more prominent urban form and would have a wider influence on the study area landscape. Only in one instance would there be simultaneous views of both projects and this would only be for a short distance and local area.

**12.142** In combination effects would perhaps be most important for landscape character (and tranquillity) but even here effects would be subtle with an intensification of land use and an introduction of urbanising elements but no step change in impact that would elevate the significance of the previously identified effects.

## **Conclusion**

**12.143** Any development will change the character of a location to some degree. However, with the correct siting, design, architectural and landscape treatment, the development can provide a positive enhancement to the existing site, with positive impacts on the physical and visual character and quality of the surrounding landscape.

**12.144** The site is located to the south of Bicester adjacent to the A41 and occupies an area of approximately 13.1 hectares (ha) and consists of an area of arable field with hedgerows and mature tree bordering the western, and southern boundary and a new access road to the northern boundary.

**12.145** The visual appraisal concludes that the site is not visually prominent within the wider landscape nor is it widely perceptible from the built up areas of Bicester Town. The topography of the site and that of the wider landscape is flat with areas of gently undulating countryside and, as a result views towards the site from near or middle distance views are mainly screened by intervening vegetation. Views from the southern edge of Bicester are screened by vegetation or buildings particularly Bicester Village and the elevated section of the A41.

**12.146** Views towards the site from further to the east are screened either by intervening vegetation or landform. Graven Hill is an effective barrier in curtailing views from the southeast. There will be some limited views from the emerging residential development on Graven Hill (Bicester 2) but these are seen in the context of existing built development and screen by vegetation. Views towards the site from further to the south from the villages of Chesterton and Wendlebury are effectively screening by either landform or intervening vegetation. There are some local views from the east and south east direction towards the development these are from the recently constructed Kingsmere residential estate and are generally from frontage buildings only.

**12.147** The Proposed Development would create a new business park for Bicester, which would also have open space and associated parking. The new business park parameters are shown on the architect's plans and would be located within a sensitively planned and extensive landscape proposal.

**12.148** Access to the business park will be afforded from the A41 via the recently constructed Lakeview Drive which also serves the new Tesco's foodstore.

**12.149** The results of the visual assessment and preparation of the ZVI plans of the Proposed Development Zones demonstrate that only limited filtered and partial views of the upperparts of the development zones are visible from the surrounding area, in particular from the south and east of the site which are being developed for housing at present.

**12.150** The overall landscape objective is one of integration and the creation of a high quality office buildings set in a landscaped park. This will need to be achieved through a landscape design and management plan agreed with the local planning authority and submitted as a reserved matter planning condition.

**12.151** The Proposed Development has been informed by the desirability to protect the intrinsic features of the site and to ensure that the Proposed Development is sensitively integrated into the existing landscape setting.

**12.152** The landscape strategy adopted for Proposed Development will provide a high quality landscape at the entrance to the town of Bicester. The Proposed Development will provide a strong sense of place with a high quality landscape that will comprise of connected open spaces, pedestrian and public transport linkages and ecological enhancements.

**12.153** The key benefits provided by the landscape and masterplan strategy can be summarised as follows:

- The integration of the Proposed Development by providing a carefully considered and comprehensive landscape setting, thereby minimising the effects of new buildings and car parking on the existing character of the site;
- The retention and enhancement of existing boundary vegetation along the western, eastern and southern boundaries of the site, including the provision of landscape buffer planting along the northern boundary of the site;
- The introduction of trees and hedgerow planting to provide green connections between existing habitats at the perimeter of the site and beyond; and
- The Proposed Development will be built to current sustainable requirement and reflect the best in architecture and urban design.

It is considered that the Proposed Development would be acceptable in landscape and visual terms and would not conflict with the aims and objectives of the landscape and environment policies within the Local Plan. The Proposed Development would offer opportunities to significantly enhance the setting and appearance of the site, including the diversification and protection of existing habitats benefiting both local ecology and landscape amenity.

## Introduction

- 13.1** This chapter of the ES reports the findings of an assessment of the likely significant effects on water resources and flood risk as a result of the Proposed Development.
- 13.2** This chapter sets out the relevant water resources planning policy context; the methods used to assess potential effects; the baseline conditions and potential effects on water resources as a result of the Proposed Development. Where appropriate, mitigation measures required to prevent, reduce or offset any potentially significant adverse effects are identified, alongside a summary of the expected residual effects.
- 13.3** The potential for cumulative effects associated with the Proposed Development and with other relevant development schemes are discussed later in this chapter. The potential for effect interactions with other identified likely significant effects arising as a result of the Proposed Development are discussed in Chapter 14: Effect Interactions of this ES (Volume I).
- 13.4** This chapter is supported by a Flood Risk Assessment (FRA) for the site which has been prepared in accordance with the National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012) and the accompanying National Planning Practice Guidance and consultation with the Environment Agency (EA). A drainage strategy has also been prepared and provides information on how surface water from the Proposed Development will be managed to ensure existing surface water management and flood risk are not compromised. The drainage strategy additionally outlines the proposed plans for the management of foul water from the development. The FRA and drainage strategy are provided as ES Volume II: Appendix 13.1.

## Legislative and Planning Policy Context

- 13.5** The legislation, policy and guidance that has influenced the assessment is listed below. Further details are provided in Appendix 13.2.

### National Policy and Guidance

- National Planning Policy Framework (NPPF) (DCLG, 2012);
- National Planning Practice Guidance – Water Supply, Wastewater and Water Quality (DCLG, 2013);
- Water Resources Act (1991);
- Future Water (2008);
- Making Space for Water; and
- Water for life (white paper) (2011).

### Regional Policy and Guidance

- Environment Agency River Basin Management Plan: Thames River Basin District 2016-21 (EA, 2016) - Prepared by the Environment Agency (EA) in conjunction with wider stakeholders, the Environment Agency River Basin Management Plan aims to protect and improve the water environment and will inform planning decisions and policy making. The intention is for all water bodies to achieve good status as defined by the European Water Framework Directive (WFD). The plan is updated every six years.

### Local Policy and Guidance

- Cherwell Local Plan 2011-2031 – The Cherwell Local Plan 2011 – 2031 has been produced by Cherwell District Council (CDC) and sets out how the guiding policies and vision for how CDC will

grow and develop in the period up to 2031. A number of policies are relevant to water resources and have been considered in this chapter. These include:

- Policy ESD 1: Mitigating and Adapting to Climate Change;
- Policy ESD 6: Sustainable Flood Risk Management;
- Policy ESD 7: Sustainable Drainage Systems (SuDS);
- Policy ESD 8: Water Resources; and
- Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment.

### Other Relevant Policy and Guidance

- Pollution Prevention Guidance Notes (now withdrawn);
- Construction Industry Research and Information Association Guidance; and
- Guidance C753 – The SuDS Manual.

## Assessment Methodology

### Assessment Approach

- 13.6** The methodology adopted in this assessment involves the following:
- Review of international, national and local legislation, policies and guidelines in relation to water resources, water quality and flood risk;
  - Establishment of baseline conditions on and around the site through literature review and analysis of existing data obtained from the Environment Agency and Thames Water;
  - Identification of sensitive receptors through desk study and consultations with the Environment Agency as reported within the FRA for the development, and with Thames Water as reported in the Drainage Strategy for this development;
  - Identification of risks to water quality, water resources and flooding from development and hence the likely effects, magnitude of change and significance of environmental effects during both the demolition/construction and operational phases;
  - Development of mitigation strategies through consultation with the design team;
  - Identification of opportunities for enhancement of surface water quality and surface water management through design and mitigation; and
  - Identification of residual effects and identification if cumulative effects.
- 13.7** An EIA Scoping Report was submitted to Cherwell District Council in May 2017. CDC issued their EIA Scoping Opinion on 8 August 2017 which is provided in Technical Appendix 2.2, ES Volume 2 which broadly confirmed acceptability of the scope and method proposed for the Water Resources Assessment and highlighted the need for a surface water drainage scheme for the site will need to be submitted with a planning application (see Appendix 13.1).

### Assessment of effects

#### Receptor Sensitivity

- 13.8** A qualitative assessment of receptor sensitivity is described in Table 13.1:



## Water Resources and Flood Risk

**Table 13.1 Criteria for Determining Receptor Sensitivity**

Sensitivity	Criteria
High	Water body of high amenity value, including areas of bathing and water sports are regularly practiced. Water body of good or high chemical or ecological status. Includes designated bathing waters, shellfish and salmonid fisheries. A source used for public water supply or designated as a source protection zone. Site of Special Scientific Interest (SSSI), Special Protection Area (SPA)/Special Area of Conservation (SAC), Ramsar site or highly sensitive aquatic ecosystem. Water bodies currently failing water quality objectives. Areas which are highly vulnerable. With reference to flood risk, these can include essential infrastructure, emergency services and basement dwellings.
Moderate	Water body of moderate amenity value including public parks, boating, non-contact sports, popular footpaths adjacent to water courses, or water courses running through housing developments/town centres. Water body of moderate ecological status and/ or non - public water supply or cyprinid fishery. Water body of nature conservation importance at the regional level or a moderately sensitive aquatic ecosystem e.g. Site of Nature Conservation Interest (SNCI). Areas which are more vulnerable. With reference to flood risk, these can include hospitals, residential units, educational facilities and waste management sites.
Low	Water body of poor ecological status. A source in close proximity to a source protection zone or abstraction point. Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area. Areas which are less vulnerable. With reference to flood risk, these can include retail, commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants.
Negligible	Low sensitivity aquatic ecosystem. Water of poor ecological status. Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area. Areas which are considered to be water-compatible. With reference to flood risk, these can include flood control infrastructure, docks/marinas, pumping stations and recreational/landscape areas.

### Magnitude of Change / Impact

- 13.9** The qualitative criteria used to assess how far an effect deviates from the baseline condition, i.e. the magnitude of change, are described in Table 13.2.

**Table 13.2 Criteria for Determining Effect Magnitude**

Magnitude	Criteria
Large	Wholesale changes to the watercourse channel, route or hydrology. Significant changes to soil erosion or sedimentation patterns. Major changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in an increase in discharge/run-off with flood/sewage exceedance potential. A large increase to flood risk of water bodies and areas downstream. A large risk of flooding to site infrastructure and users, as determined by an on-site FRA in accordance with NPPF.
Medium	Some fundamental changes to the watercourse and hydrology. Moderate changes to soil erosion or sedimentation patterns. Moderate changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in an increase in discharge/run-off within system capacity. A medium increase to flood risk of water bodies and areas downstream. A medium risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF.

Small	Minor changes to the watercourse. Minor changes to soil erosion or sedimentation patterns. Minor changes to the water chemistry of surface run-off and groundwater. Changes to site resulting in slight increase in discharge/run-off well within drainage system capacity. A small increase to flood risk of water bodies and areas downstream. A small risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF.
Negligible	No change to the watercourse, run-off and soil erosion and sedimentation patterns and water chemistry. Very minor to no change in discharge run-off and increased pressure on sewer capacity. No increased flood risk to water bodies and areas downstream. No risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF

### Significance Evaluation

- 13.10** The significance of a potential effect is derived by considering both the sensitivity of the feature and the magnitude of change, as demonstrated in 13.3.

**Table 13.3 Matrix for Determining Effect Significance**

		Magnitude of change / impact			
		Large	Medium	Small	Negligible
Receptor value	High	Major	Major	Moderate/Minor	Negligible
	Moderate	Major	Moderate	Minor	Negligible
	Low	Moderate/Minor	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

- 13.11** Note that moderate and major effects are considered to be 'significant'.

### Baseline Conditions

#### Current Baseline

#### Existing Land Use

- 13.12** The current baseline is 2017. The baseline assessment covers the site and areas surrounding which may impact the Proposed Development or be susceptible to impact as a result of the Proposed Development; this includes major water bodies within a material distance of the site, as deemed by the technical specialist.

- 13.13** The plot is approximately 13.12 hectares and is bound to the north and west by a dual carriageway (A41), and to the east by the London – Birmingham Snow Hill railway line. Bicester Avenue Garden Centre lies directly to the south.

- 13.14** The land is primarily agriculture (Grade 4) although it has been upgraded in recent years to provide access and infrastructure off Oxford Road to serve the new Tesco foodstore to the north.

#### Existing Site Levels

- 13.15** land levels along Lakeview Road in the north of the site are typically between 66.5m AOD, increasing in the west to 67.5m AOD. Along the south of Lakeview Road, there is a 0.8m to 1.5m high bund and an area of material storage north of the drainage ditch. Land slopes downwards from the road to the south boundary where land levels vary from 66.0m AOD to 65.0m AOD and to south east where levels are typically between 64.6m AOD and 64.9m AOD.

# Water Resources and Flood Risk

## Surface Water Features

**13.16** The nearest surface water feature to the site is Langford Brook which flows past the site to the south-east. The location of the Langford Brook in relation to the site boundary can be seen in Figure 13.1. There is also a small pond along the south east boundary of the site which forms part of the surface water drainage strategy for the Bicester Avenue Garden Centre. There is the potential for some water in the south of the site to drain into this pond.

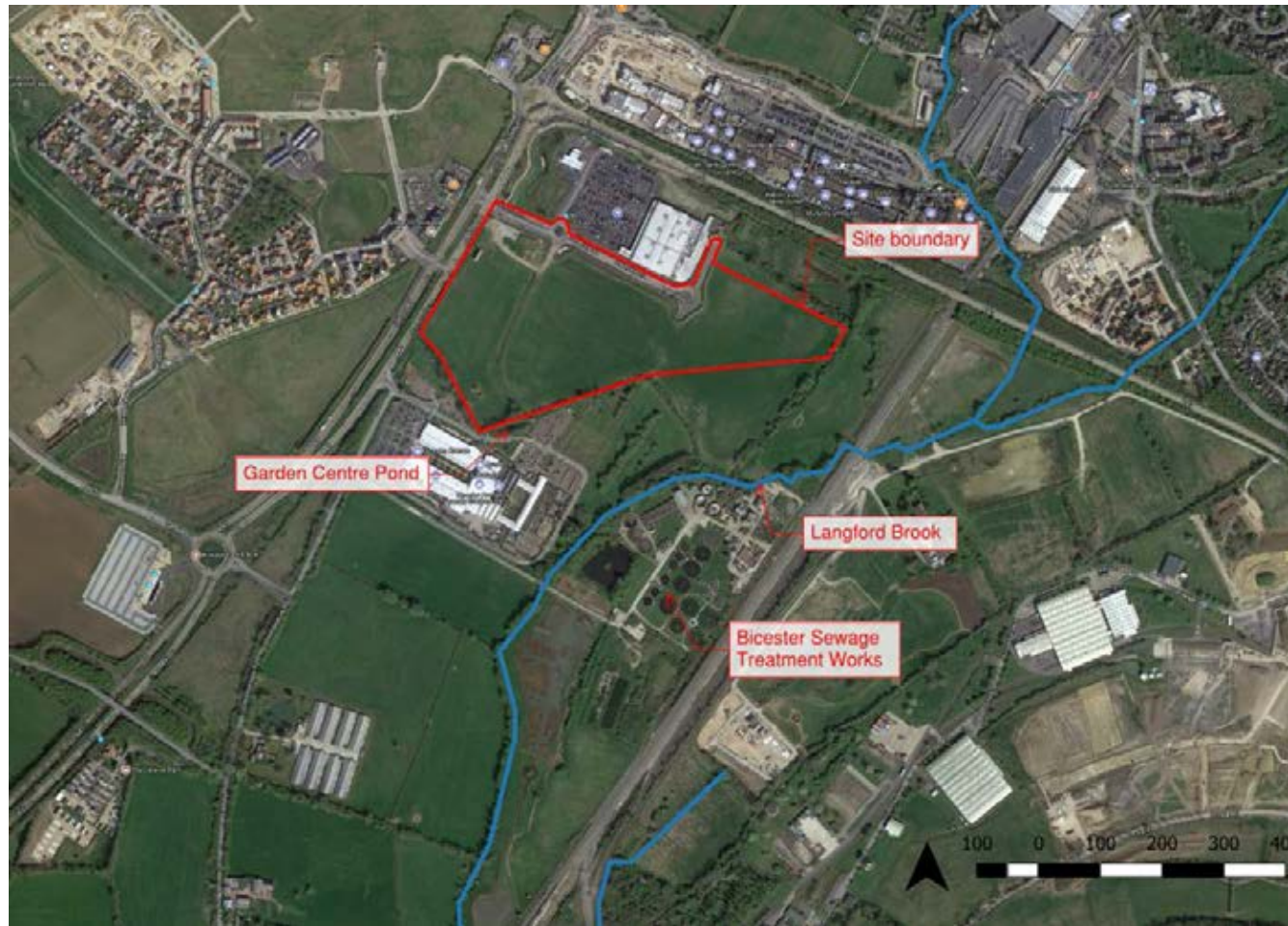


Figure 13.1 Surrounding water features in relation to indicative red line boundary

## Langford Brook Water Quality

**13.17** On-site drainage currently connects to the surface drainage sewer which connects to Langford Brook. Some surface water may also drain into the Garden Centre pond to the south. There is potential for on-site activities to influence the water quality of this water body through this connection both during construction and operational phases of the Proposed Development.

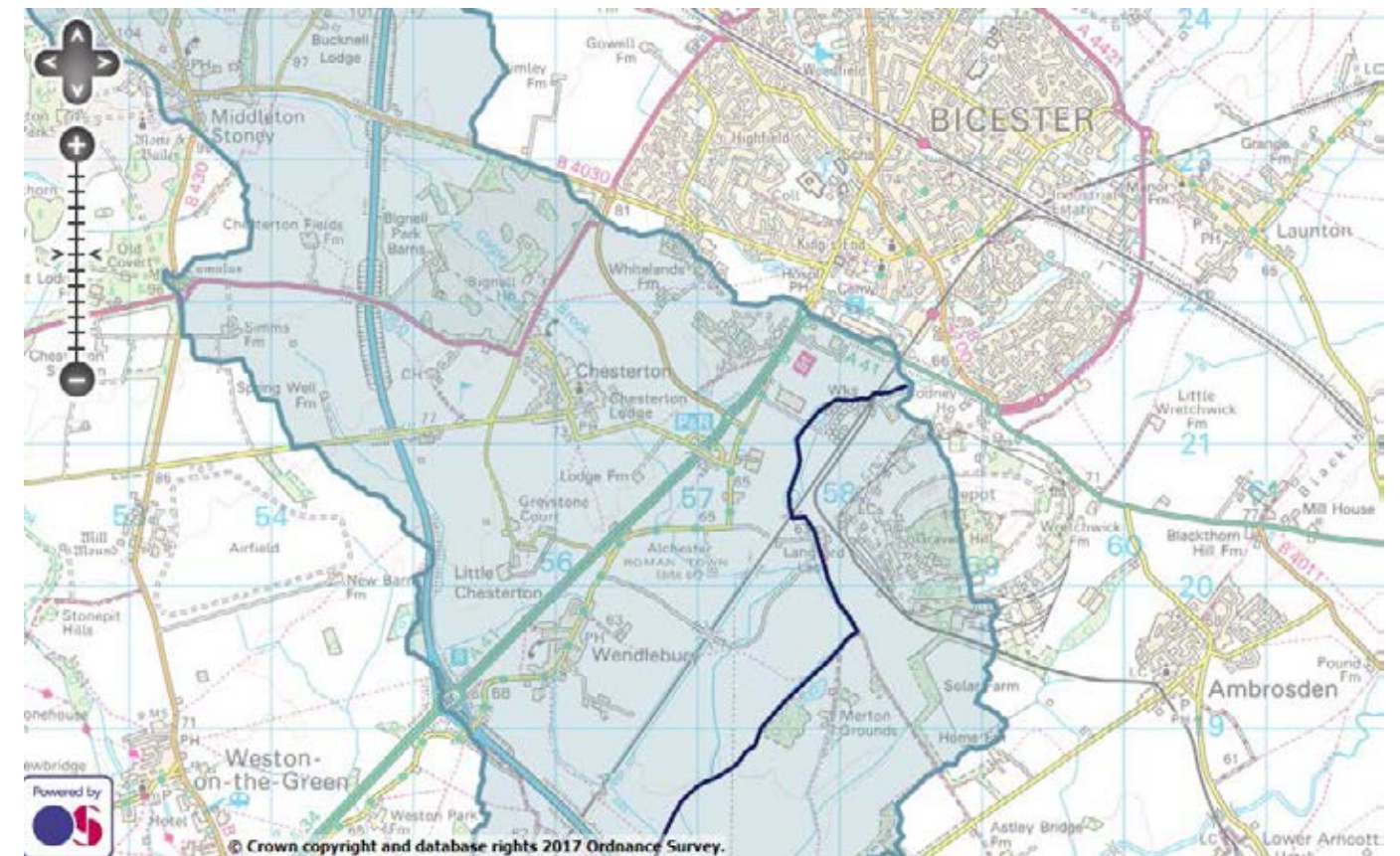
**13.18** The European Water Framework Directive (WFD) was transposed into national law through the Water Environment WFD (England and Wales) Regulations 2003 (Statutory Instrument 2003 No. 3242). The aim of

this Directive is to provide an integrated, Europe-wide approach to the management of water resources, particularly water quality. As part of the Directive, River Basin Management Plans have been established.

**13.19** Langford Brook falls within the Thames River Basin District. The associated River Basin Management Plan establishes a number of requirements that must be met to comply with the WFD.

**13.20** The ecological status of the Langford Brook at this location is classified as 'Poor' (Figure 13.2). The stream is expected to maintain this status at the end of the previous WFD planning cycle.

**13.21** The chemical status of the Langford Brook at this location is classified as 'Good'. The stream is expected to maintain this status during the current WFD planning cycle.



	2009 Cycle 1	2016 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	Poor by 2015
Ecological	Moderate	Poor	Poor by 2015
Chemical	Does not require assessment	Good	Good by 2015

Figure 13.2 WFD classification of the Langford Brook adjacent to the site (EA Catchment Data Explorer, accessed 07.08.17)

# Water Resources and Flood Risk

## Existing Surface Water and Foul Water Drainage

- 13.22 A full description and drawings of the existing drainage infrastructure is provided in the drainage strategy, which forms Appendix 13.1. For the purpose of this ES chapter a brief summary is provided below.
- 13.23 There is an existing surface water sewer running along Lakeview Drive This was constructed as part of the primary infrastructure that was installed to serve the Tesco store and the proposed development within the red line boundary. The sewer then traverses the application site before connecting to a ditch (ordinary watercourse) which connects a stream known as the Langford Brook. A foul water sewer also follows the same route as the surface water sewer, however connects up to sewage treatment works.
- 13.24 It is believed that all surface water from the site currently either infiltrates into the ground, or discharges into the surface water sewer which connects to the ditch leading to the Langford Brook.

## Water Supply

- 13.25 The Proposed Development will create an additional demand for water supply in the area. Thames Water supplies water in this location. The majority of Thames Water's water supply is derived from surface water abstraction from the River Thames and the remainder is derived from groundwater abstraction.
- 13.26 The EA has identified the Bicester area to be an area of water stress through the 'Identifying Areas of Water Stress for the UK' consultation.

## On-site Flood Risk

- 13.27 A detailed assessment of existing flood risk to the site and a full summary of consultations with the EA is provided in the FRA (ES Volume II: Appendix 13.1). A summary is provided below:

### Risk of Fluvial Flooding

- 13.28 Fluvial flooding occurs when sustained or intense rainfall events increase the flow in rivers causing water level to rise above the level of the banks and into surrounding areas.
- 13.29 The Flood Zone map produced by the EA shows that the majority of the site lies within Flood Zone 1 which is considered at low risk of flooding. However, land along the south east boundary lies within Flood Zones 2 (0.1% - 1% probability of flooding), 3a (>1% probability of flooding) and 3b (floodplain - >5% probability of flooding) due to the Langford Brook approximately 180m from the site.
- 13.30 The fluvial flood hazard map for the 1 in 100 year + 35% climate change event has been provided in Figure 13.3. The map shows the hazard rating across the site (defined in Table 13.1). This is based on the following calculation which takes into consideration velocity (v) and depth of the floodwater (d) and debris factor (DF):

$$HR = d * (v+0.5) + DF$$

Table 13.4 Flood Hazard Calculations

Flood Hazard	Hazard to People Classification	
Less than 0.75	Very Low Hazard	Caution
0.75 to 1.25	Danger for some	Includes children, the elderly and the infirm
1.25 to 2.0	Danger for most	Includes the general public
More than 2.0	Danger for all	Includes the emergency services

- 13.31 Figure 13.3 shows that along the south eastern boundary, there are areas of that are defined at 'Very low hazard', 'Danger for some' and some small localised spots where it is classified as 'Danger for most'.

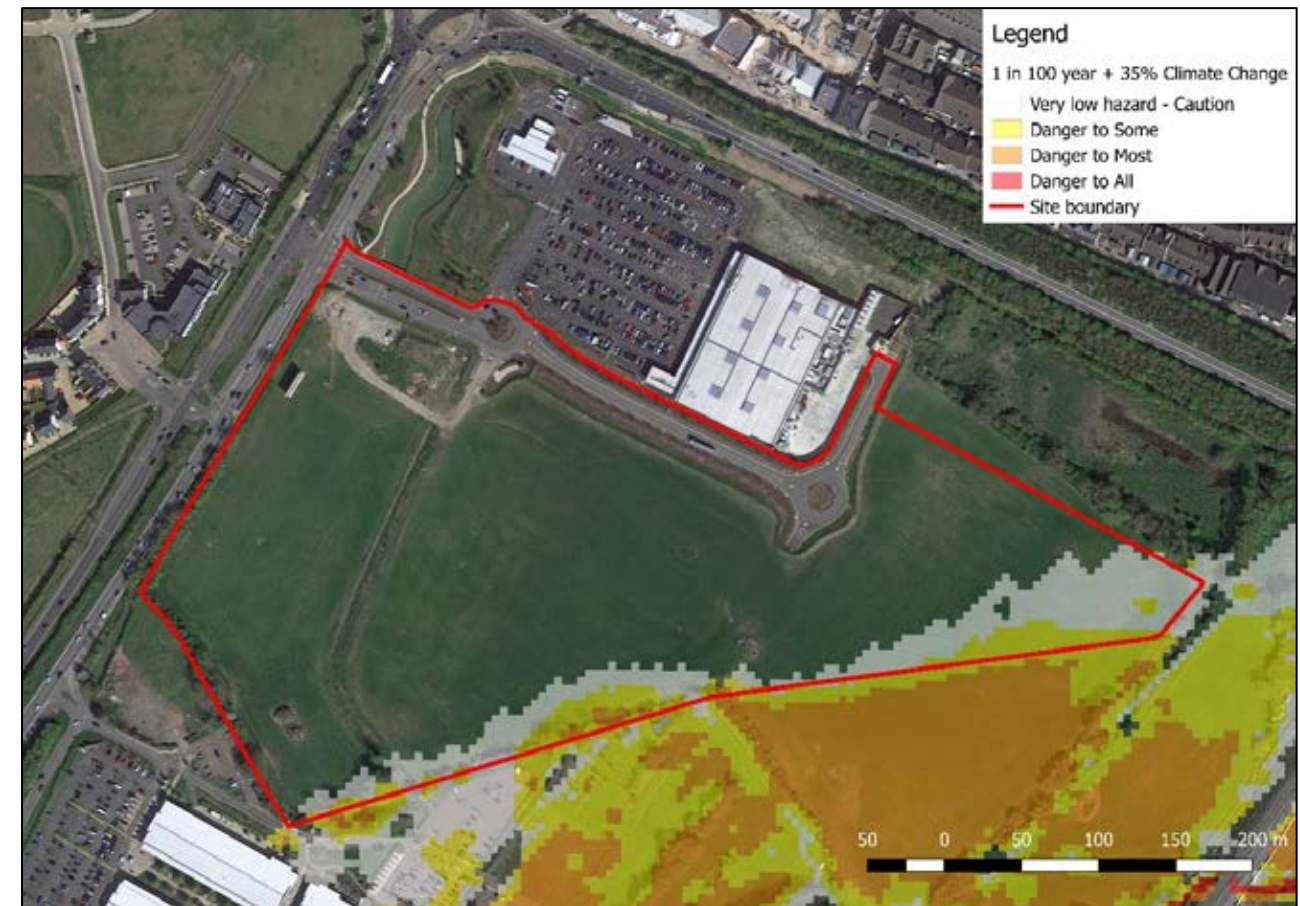


Figure 13.3 Fluvial flooding hazard map for 1 in 100 year storm event + 35% climate change (Contains Environment Agency Information © Environment Agency and/or database right) Imagery © Google 2017, Map data © Google 2017)

### Risk of Flooding from Surface Water

- 13.32 Surface water flooding occurs when intense rainfall is unable to naturally soak into the ground due to impermeable ground covering such as concrete or tarmac, or low permeability ground conditions preventing infiltration. This excess surface water can flow through built-up areas and open space and pond in lower-lying areas causing localised flooding.
- 13.33 The Environment Agency surface water map shows that the majority of the site is at very low risk of surface water flooding (i.e. less than 1 in 1,000 annual probability of surface water flooding in any year). Figure 13.4 has been reproduced using the EA flood extent data. The map shows that there is an area at high risk of flooding (less than a 1 in 30 annual probability of surface water flooding) from the north to the south of the site. This corresponds to the location of the drainage ditch. The EA's model results typically show between 300 to 600mm of flooding with localised spots between 600 to 900mm for the 1 in 100 annual exceedance probability event as shown in Figure 13.4.

# Water Resources and Flood Risk

13.34 There are areas of low to medium risk of surface water flooding (between a 1 in 30 and 1 in 100 and between a 1 in 100 and 1 in 1000 annual probability respectively) adjacent to drainage ditch, along the eastern boundary and south eastern corner of the site. The predicted depths from the EA's modelling are less than 300mm for the 1 in 100 annual probability event.

13.35 The area along the northern boundary of the site shows areas of low, medium and high surface flood risk. This area has been re-configured as part of the 2015 superstore works which may not be reflected in the modelling. Depths for the 1 in 100 annual probability event are predicted as below 300mm.



Figure 13.4 Environment Agency's surface water flood extents map (© Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH). Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013. Imagery © Google 2017, Map data © Google 2017)



Figure 13.5 Environment Agency's surface water flood depth map for 1 in 100 annual probability event (© Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH) and © Lead Local Flood Authorities. Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013. Imagery © Google 2017, Map data © Google 2017)

Figure 13.6 shows that for the 1 in 100 annual probability event, the flooding in the locality of the drainage ditch has areas which pose a 'Danger for most', 'Danger for some' and areas 'Very Low Hazard – Caution'. There is also a 'Very Low Hazard – Caution' areas along the eastern and northern boundary with localised spots of 'Danger for some' on Lakeview Drive.

# Water Resources and Flood Risk

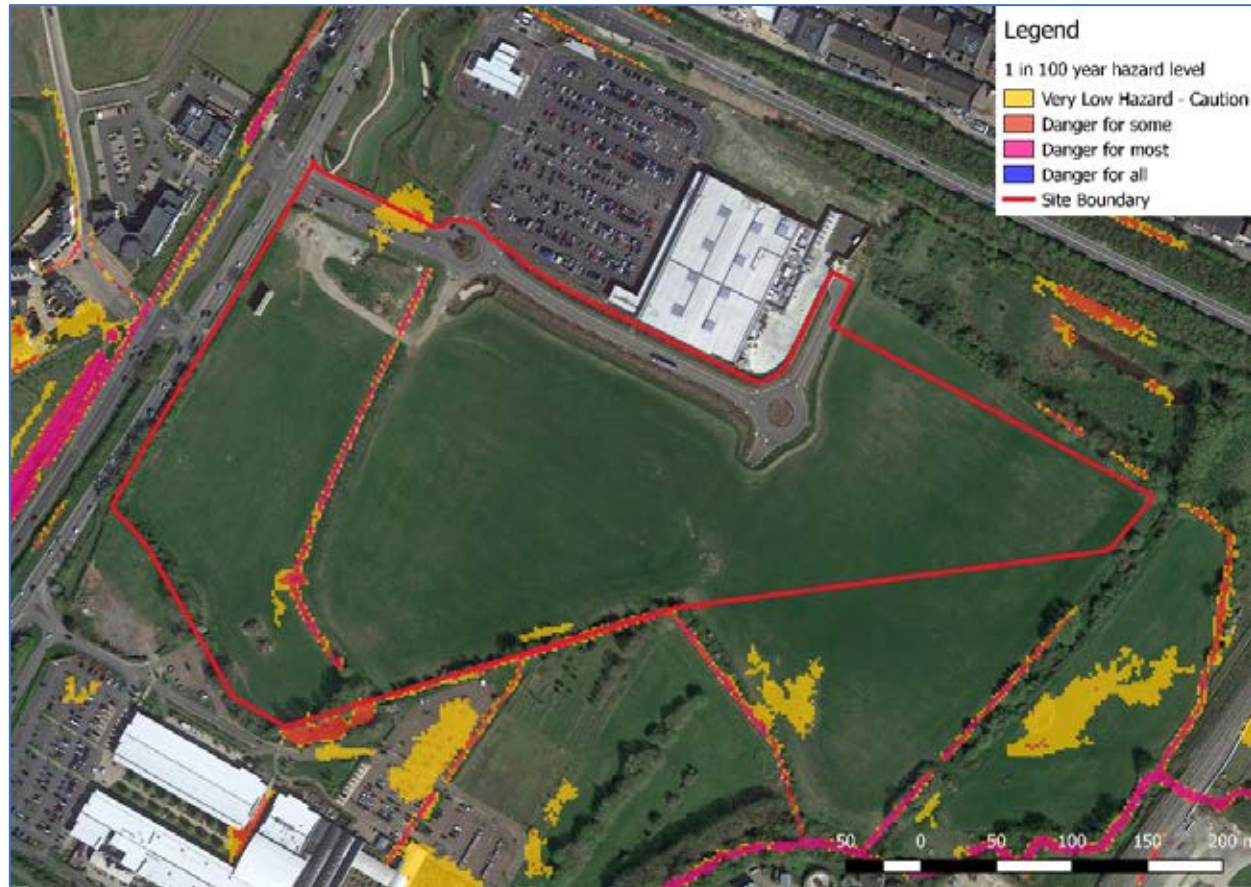


Figure 13.6 Environment Agency's surface water flood hazard map for the 1 in 100 annual probability event © Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH). Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013. Imagery © Google 2017, Map data © Google 2017

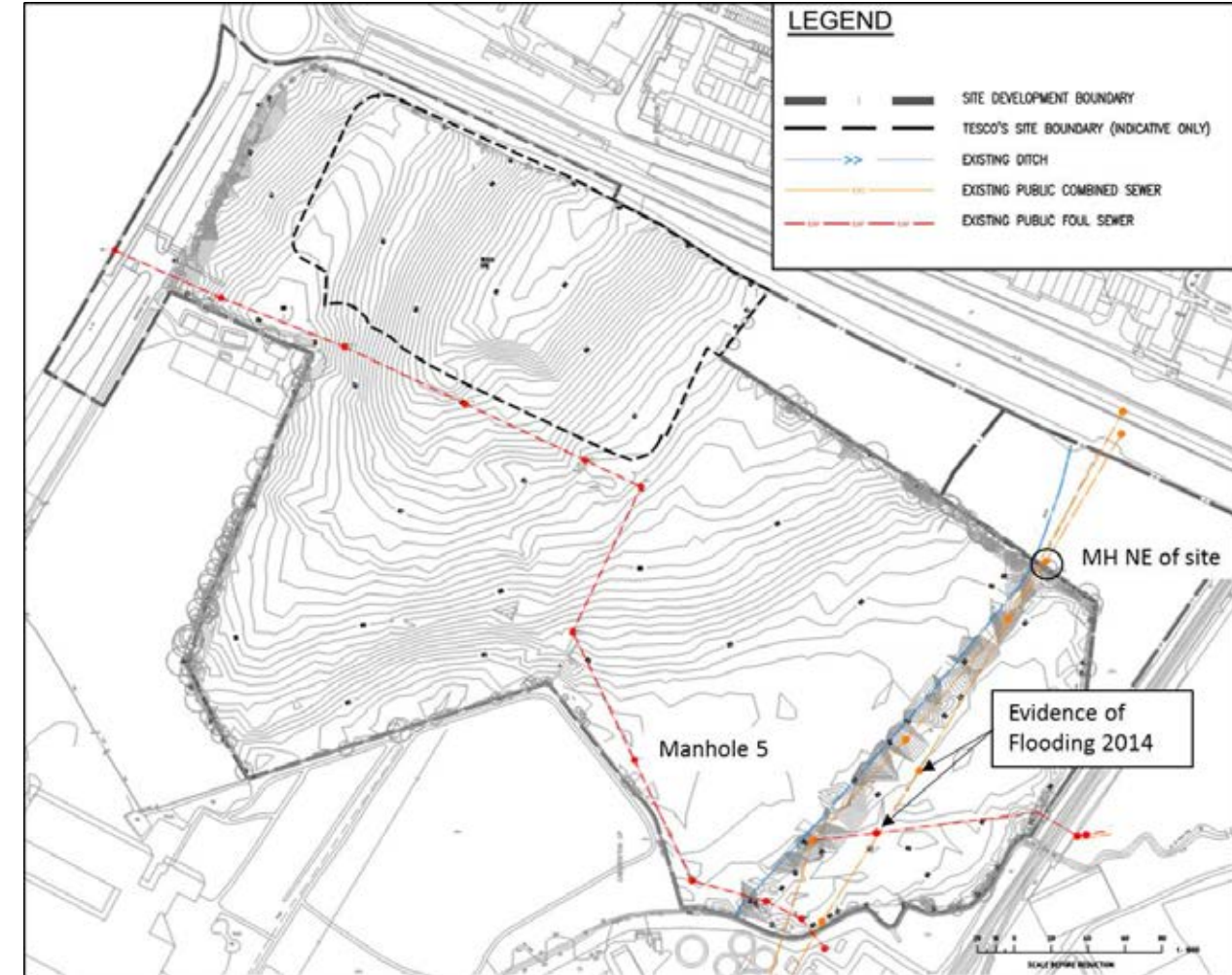


Figure 13.7 Existing Services Information from 2011 Tesco Drainage Strategy

### Risk of Flooding from Sewers

13.36 Flooding from sewers is typically associated with blockage, failure or overloading of the sewer network.

13.37 The Level 2 SFRA Thames Water DG5 database map showed no recorded sewer flooding incidents within or in the vicinity of the site for the period during 2000-2010 from public foul, combined or surface water sewers. The SFRA also reported that Cherwell District were not aware of any historical incidents on the site but 'are aware of the limited sewer capacity in Bicester'.

13.38 There are two existing combined public sewers which are to the south east of the proposed development site, parallel to the existing ditch (tributary of the Langford Brook) from Bicester village to the sewage treatment plant as shown in Figure 13.7 taken from the 2011 BuroHappold Drainage Strategy for the Tesco Development. The BHE site report from 2014 showed evidence of localised sewer flooding however, these were related to manholes outside of the site boundary as shown in Figure 13.7.

13.39 There is also an existing 600mm diameter foul sewer which crosses the site from the A41 Oxford Road east along Lakeview Drive before turning south and then south east towards the sewage treatment works. This was installed as part of the primary infrastructure works to support the Tesco foodstore and masterplan works.

13.40 In December 2014 / January 2015, it was reported that there was localised foul flooding at a manhole 80m to the south-east of the site and at two combined sewers approximately 240m to the east of the site. It is understood that this was associated with an issue downstream at the sewage treatment works rather than a capacity issue.

13.41 There are no known sewer flood incidents on site however, there have been incidents of sewer flooding in the vicinity of the site due to downstream issues. During a site visit in November 2017, there was evidence of sewer flooding from the two combined sewer manholes and the manhole north-east of the site (circled on Figure 13.7) by the presence of detritus. From a review of the topographic survey and LiDAR data in combination with a review on site, flood water from the north east manhole would likely flow along the drainage ditch to the east away from the site. We are led to believe that the offsite foul sewer flooding at MH5 was as a result of a combination of unusual events which led to surcharging rather than a pipe capacity issue. The risk

# Water Resources and Flood Risk

of sewer flooding to the site is therefore considered low. However, further consultation will be needed with Thames Water during detailed design.

## Risk of Flooding from Groundwater

- 13.42 Flooding from groundwater occurs when the water table in permeable rocks such as chalk and limestone rises to enter underground spaces such as basements and cellars or reaches a sufficient level to emanate from the ground surface itself. Groundwater flooding is not necessarily directly linked to a specific rainfall event and is generally of longer duration than other causes of flooding (possibly lasting for weeks or months).
- 13.43 The Cherwell District Council Level 2 SFRA provides the Environment Agency's Area Susceptibility to Groundwater Flooding map. The map shows that the eastern half of the site lies within a 1km square which has up to 25% of its area susceptible to groundwater flooding and the western site between or equal to 25% and less than 50%.
- 13.44 Ground investigation was undertaken on site in 2008 and 2014. Boreholes and a Trial Pit show that groundwater was either not encountered or was an artesian groundwater level at depth between 8.9, and 11.7m within the Forest Marble Formation. This formation is considered a confined aquifer with low permeability.
- 13.45 The Eastern part of the site is underlain immediately by the Kellaways Formation which is classified as an Unproductive Aquifer with the Forest Marble Formation at depth. Boreholes and Trial Pits showed groundwater levels were within the superficial deposits between 0.6m and 1.4m. Given the low permeability of the Kellaways Formation geology, it is considered that there is a low risk of groundwater flooding for the Eastern part of the site.

## Risk of Flooding from Artificial Sources

- 13.46 The Environment Agency map shows that there are no reservoirs located within the vicinity of the site and that the site does not lie within a breach flood flow path of a reservoir. Neither are there canals within the vicinity of the site and therefore the site is not at risk of canal flooding.
- 13.47 There is a pond to the north of the site as part of the Tesco foodstore. This is an ornamental pond which forms part of the landscaping works and has an overflow into the drainage network. The pond is lower than the surrounding ground levels so the risk of breach of the pond is considered to be low.
- 13.48 There is also a small pond along the south east boundary of the site which forms part of the surface water drainage strategy for the Garden Centre. This is also at a lower elevation than the site and therefore is not considered to pose a risk of flooding from breach.
- 13.49 In summary, the site is at a low risk of flooding from artificial sources.

## Identified Receptors and their Sensitivity

- 13.50 Potential receptors have been identified through the assessment of baseline conditions. Sensitivities have been applied as indicated in Table 13.5.

Table 13.5 Identified receptors and their sensitivity

Receptor	Sensitivity	Justification
Langford Brook	Water Quality	Moderate Poor dilution of pollutants due to low water volume. Amenity value associated with this water body.
Garden Centre Pond	Water Quality	Moderate Amenity value associated with this water body.
Water services infrastructure	Capacity	Low Drainage infrastructure has been sized appropriately to manage development on the proposed site.

Receptor	Sensitivity	Justification
Water services infrastructure (supply)	High	Bicester is a water stressed area. The WRMP has identified a growing water supply deficit.
Water services infrastructure (foul treatment)	Low	Sewerage system has been sized appropriately to manage development on the proposed site.
Site users	High	Demolition and construction site workers and site users during operation.

## Pre mitigation Construction Effects

### Relevant Aspects of The Proposed Development

- 13.51 The risks to the water environment during construction includes:

- Increase in sediment loads caused by site run-off containing elevated suspended sediment levels. This can result from land clearance, excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site;
- The release of hydrocarbons and oils into the on-site drainage system due to a large number of vehicles accessing the site, leakage from oil / fuel storage tanks and accidental spillages;
- Accidental leaks and use of hazardous materials, particularly concrete and cement products, which can be contained in uncontrolled wash-down water and surface water run-off;
- Dust and debris caused by poor management of site; and
- Leaks or breakage of temporary sewerage system infiltrating groundwater and/or migrating to surface waters.

- 13.52 These effects can be identified as temporary (construction activities) or permanent (loss of habitat) and risks relating to the water environment as a result of the Proposed Development are discussed in detail below, and summarised in Table 13.6.

### Increased Sediment Loads

- 13.53 Site run-off containing elevated suspended sediment levels can result from land clearance, excavation, stockpiling, bunding, wheel washing and movement of materials to and from the site. Run-off with high sediment loads can have adverse effects on water bodies through increasing turbidity (thus reducing light penetration and reducing plant growth), and by smothering vegetation and bed substrates (thus effecting on animal communities through the destruction of feeding areas, refuges and breeding / spawning areas). Indirect adverse effects can also be associated with suspended sediments that have inorganic or organic contaminants (e.g. heavy metals and pesticides respectively). Sediment can additionally cause issues within runoff channels through clogging and blockages resulting in reduced flow capacity.
- 13.54 As the primary existing receptor, the sewer network is most likely to be affected by elevated sediment loads through clogging / blocking, premature operation of combined sewer overflows or localised flooding. The magnitude of change to the sewer network capacity is considered to be medium without effective management of sediment loads during construction. The effect significance is therefore minor adverse.
- 13.55 Langford Brook is also likely to be affected by construction activities through construction site drainage draining into the stream. When considering receptor sensitivity, the overall significant effect is considered to be moderate adverse for water quality in Langford Brook.
- 13.56 Water drainage from runoff and foul sewerage will link into the existing sewerage system running through the site and will not be routed near the Garden Centre Pond therefore any effects related to sewerage systems will not be relevant for this receptor. Additionally, surface runoff from the site into the Garden Centre Pond is

# Water Resources and Flood Risk

deemed to be indiscernible as the pond is protected by surrounding vegetation and there is no hard standing leading from the site to the pond, meaning water will largely infiltrate into the ground. Therefore, the only risk for the Garden Centre Pond relates to dust as discussed below.

## Hydrocarbons and Oils

- 13.57** The release of hydrocarbons and oils into the on-site drainage system is a common form of pollution within urban areas. There is a risk such pollution will increase during construction with greater numbers of vehicles accessing the site.. This increase will likely include a significant number of heavy vehicles. Increased vehicle movements results in a greater likelihood of leakage from oil / fuel storage tanks and accidental spillages. Oils and fuels that are washed from surfaces into the on-site drainage system are likely to discharge to the drains.
- 13.58** Hydrocarbons form a film on the surface of the water body, deplete oxygen levels and can be toxic to freshwater fish. Even at very low concentrations the film can negatively affect the visual appearance of the water body. The effect would be temporary, and water quality within the affected water body would improve over time as pollutants disperse and are treated by natural processes.
- 13.59** Hydrocarbons may affect Langford Brook through discharge into the sewer. When considering receptor sensitivity, the overall significant effect is considered to be moderate adverse for water quality in Langford Brook.

## Accidental Leaks of and Use of Hazardous Materials

- 13.60** The use of concrete and cement products on-site can present a pollution risk because of the potential for uncontrolled release of wash-down and surface water run-off. If these activities are not carried out in designated areas, wastewater may enter a water body and adversely affect the combined sewer and aquatic environment. Concrete products are highly alkaline and corrosive; fish can be physically damaged and their gills blocked, and both vegetation and the bed of the water body can be smothered.
- 13.61** During demolition and construction there is an elevated risk of potential leaks or accidental spillage of hazardous chemicals infiltrating to groundwater or migrating to surface water bodies. However it is only when large quantities of hazardous substances are spilled, or the spillage is directly into the water body, that a significant risk of acute toxicity will arise in the receiving water body. The magnitude of any change will depend on the scale and nature of any potential incident and thus is difficult to predict.
- 13.62** For the most part, effects are likely to be temporary, water quality within the affected water body will improve over time as pollutants are dispersed and diluted.
- 13.63** Hazardous materials may affect Langford Brook through drainage into this water body. Considering any spillage would not be direct and the likely nature of chemicals used on this site, the overall significant effect is considered to be moderate adverse for water quality for both receptors.

## Dust and Debris

- 13.64** Construction activities located on site have the potential to release dust and debris that may be blown into adjacent water bodies. Increased dust levels in water bodies may reduce the levels of light reaching aquatic plant and animal species. Debris blown into water bodies can decrease the recreational and aesthetic quality of the water body. Effects will however be temporary; water quality within the affected water body will improve over time as dust and debris settle or are trapped by vegetation. Sediment/debris can additionally cause issues within combined sewer networks through clogging / blocking, a reduction in flow capacity and premature operation.
- 13.65** The effect of dust blowing directly into water bodies will depend on the distance and site practices employed. Considering the sensitivity of the Langford Brook and the Garden Centre Pond, and the magnitude of change likely, the effect significance has been placed at minor adverse. Dust may indirectly affect water bodies through

settling on site, and draining into the draining network, the effect of this is acknowledged in the assessment of increased sediment loads within surface water run-off.

## Leak or Breakage of the Temporary Sewerage System

- 13.66** Leaks and breakages of sewers from the temporary toilet facilities on-site during construction works may result in crude sewage infiltrating groundwater or being washed into the site drainage system. Sewage contains high levels of nutrients, organic matter, coliforms and suspended solids. These can result in nutrient enrichment and eutrophication, smothering of bottom-dwelling organisms and plants, and significantly reduced oxygen levels. The effect would be temporary as water quality within the affected water body would improve over time as organic matter is dispersed and treated by natural processes.
- 13.67** Any temporary sewerage system will be connected to the foul sewerage system that runs under the site. Langford Brook will be affected if breakage results in sewage draining into the surface water drainage sewer which drains into the Langford Brook. With this considered, and the sensitivity of the receptors, the overall significant effect is considered to be moderate adverse for water quality for the Langford Brook.

## Flood Risk to Construction Workers and Construction Plant

- 13.68** Without appropriate mitigation to protect construction workers from excavations/basement flooding and surface water flooding, the magnitude of change on the construction workers and plant is likely to be medium and the significance of effect is considered to be major in significance.

Table 13.6 Summary of Potentially Significant Effects During Construction

Receptor	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance
Garden Centre Pond (water quality)	Moderate	Dust and debris	Small adverse	Minor adverse
Langford Brook (water quality)	Moderate	Increased sediment loads	Medium adverse	Moderate adverse
		Accidental release of hydrocarbons	Medium adverse	Moderate adverse
		Accidental release of hazardous materials	Medium adverse	Moderate adverse
		Dust and debris	Small adverse	Minor adverse
		Leak or breakage of the temporary sewerage system	Medium adverse	Moderate adverse
Water services infrastructure – drainage sewer (surface water capacity)	Low	Increased sediment loads	Medium adverse	Minor adverse
Site users (construction workers and plant)	High	Flood risks to site workers	Medium adverse	Major adverse

## Completed Development Effects

### Relevant Aspects of The Proposed Development and Designed-In Mitigation

**13.69** The following commitments, made through the FRA and Drainage Strategy (Appendix 13.1) for the planning application, are considered to form designed in mitigation. The subsequent assessment assumes that the design measures specified in these documents are implemented.

#### **Foul Water Drainage**

**13.70** The Drainage Strategy (Appendix 13.1) includes more detail regarding proposals for foul water drainage and associated demands from the Proposed Development. A summary of the proposals is provided here.

**13.71** A 600mm public foul sewer constructed as part of the primary infrastructure works with blank connection points to serve the Proposed Development. The flow rates from the Proposed Development has been estimated based on the benchmarks for B1 (office) use. The total flow rate is from the Proposed Development in operation will be very low in comparison with the capacity of public sewer. It is not anticipated that there will be any flow restrictions placed on the connections by Thames Water.

**13.72** The foul sewer network to serve the development will be designed in accordance with Sewers for Adoption 6th Edition or subsequent revisions.

#### **Surface Water Drainage**

**13.73** The Drainage Strategy (Appendix 13.1) includes more detail regarding proposals for surface water drainage and associated demands from the development. A summary of the proposals is provided here.

**13.74** The surface water sewer was designed with a capacity to serve the masterplan proposals. In accordance with the previously agreed drainage strategy that surface water runoff from the developed site will be limited to current 'greenfield' runoff rates and onsite storage will be required. The sewer capacity of the constructed surface water drainage has been designed on this basis. The storage has been assumed to be provided in accordance with Sustainable Drainage System (SuDS) design requirements

**13.75** In order to limit the runoff of the current 'Greenfield' rates the drainage system to serve the Proposed Development will incorporate the recommendations within the current good practice guidance for SuDS contained in CIRIA Report C753, issued in 2015. This will be used to design the onsite drainage network unless superseded in the future.

**13.76** In term of the SuDS hierarchy, the following considerations have been made:

- *"Store rainwater for later use* Rainwater harvesting could be incorporated within the Proposed Development.
- *"Use infiltration techniques, such as porous surfaces in non-clay areas"*. French drains and infiltration trenches are proposed. Permeable pavement is recommended for all car parking areas. It is not suitable for servicing/waste storage areas. This is unlikely to be suitable due to the ground conditions.
- *"Attenuate runoff by storing rainwater in swales or other 'dry' areas of landscaping"*. Swales were constructed adjacent to the access road to convey highway drainage. The system helps to reduce the rate of runoff provide infiltrations to the ground, and a degree of cleansing. These may be suitable for inclusion in the proposed landscaping.
- *"Attenuate runoff by storing rainwater in ponds or open water features for gradual release"*. Ponds or water features could be incorporated into the landscape proposals. The system would provide temporary storage required during storm events and promote pollutant removal.

**13.77** *"Attenuate rainwater by storing in tanks or sealed water features for gradual release"*. If insufficient storage can be provided above ground, below ground storage tanks can be used. Note these can be used in combination with rainwater harvesting tanks Surface water attenuation will be required to store the runoff from 1 in 100 year storm event + 20% climate change balanced against current Greenfield runoff rate for a 1 in 100 year storm. When the drainage strategy for the Tesco store was approved a Greenfield runoff rate for the site of 9.47 l/s/ha was agreed by the Local Drainage Authority (Oxfordshire County Council).

**13.78** As part of the primary infrastructure works a 150mm water main was laid under the access road and Thames Water have confirmed that this has sufficient capacity to meet the water demand requirements of the Proposed Development covered by the new outline planning application. However, it is anticipated that rainwater harvesting will be suitable for the Proposed Development and this would allow the water demand to be reduced as well providing attenuation in accordance with BS 8515:2009+A1 2013.

#### **On-site Flood Risk**

**13.79** The FRA and Drainage Strategy (Appendix 13.1) includes the detailed proposals for managing flood risks to the development. A summary of the proposals is provided here.

#### **Fluvial Flooding**

**13.80** For the Proposed Development, ground levels within the Functional Floodplain (i.e. within the 1 in 20 year flood extent) are not to be raised in accordance with NPPF guidance and the EA's pre-application advice. At grade car parking within this zone is considered acceptable by the Environment Agency provided there is no raising of ground levels.

**13.81** A sequential approach should be taken to locating development on site to areas of lower risk of flooding. The office buildings are to be located outside of the 1 in 100 + 35% climate change and set with a minimum floor level. Car parking should be located, where possible, towards areas of lower risk of flooding (i.e. away from the south-eastern boundary).

**13.82** Finished floor levels for the office buildings are to be set at the 1 in 100 year + 35% climate change flood level with an additional 300mm freeboard.

**13.83** During detailed design of the site, if ground raising is required between the 1 in 20 year flood extent and the 1 in 100 year + 25% climate change flood extent, then flood compensation will be required to be provided. This will need to be provided on a level for level and volume for volume basis on site in accordance with the Level 2 SFRA Table 5-3 guidance for the site.

#### **Surface Water Flooding**

**13.84** The primary surface water drainage infrastructure to serve the Proposed Development has already been constructed as part of the primary infrastructure contract for the site. The drainage was designed to provide capacity to serve the development proposals covered by the 2010 outline planning application (refer to chapter 1: Introduction for more information regarding the 2007 outline planning application).

**13.85** Attenuation measures for the developed site will be designed to accommodate the increased rainfall intensities in accordance with the climate change recommendations issued by the Environment Agency in February 2016.

**13.86** In accordance with Policy Bicester 4, the site is not permitted to flood from surface water up to and including the 1 in 30 year event. Surface water flooding above this event up to a 1 in 100 year event with allowance for climate change is permitted provided it is safely contained within the site. During detailed design, exceedance routes will need to be agreed to route flood water away from the threshold of buildings.



# Water Resources and Flood Risk

## Flooding from Sewers

**13.87** The primary foul water drainage infrastructure to serve the Proposed Development has already been constructed as part of the primary infrastructure contract for the site in 2011. The drainage was installed with connection points to facilitate the future connection of the masterplan site. The flow rates from the Proposed Development have been estimated based on the benchmarks for B1 (office) use. The total flow rate from the completed development will be very low in comparison with the capacity of public sewer. It is not anticipated that there will be any flow restrictions placed on the connections by Thames Water.

## Groundwater Flooding

**13.88** The Proposed Development does not include development below ground level that could be affected by high ground water levels such as basement car parking. Although the risk of groundwater flooding to the Proposed Development is considered low, further ground investigation during detailed design should be undertaken and consideration through the design of foundations to minimise the impact of groundwater.

**13.89** To minimise any risk from groundwater flooding during excavation of the Proposed Development, cut levels should be limited to at least 0.5m above groundwater level. Where this is not possible, dewatering and other groundwater control measures will be required. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.

## Potential Operational Effects of the Proposed Development and their Significance

**13.90** This section considers the potential effects that the Proposed Development will have on the water environment once operational.

**13.91** Impacts of the Proposed Development on the water environment during operation include:

- Pollutants contained within surface water run-off contaminating water bodies through overflows / leaks to the sewer system;
- An decrease of vegetation, trees and other green areas in the Proposed Development compared with the current baseline could increase flood risk;
- Water services infrastructure may not be able to maintain the increased water demand; and
- The effect on sewerage infrastructure on increased foul discharges and waste water to the network.

## Pollutants Contained in Surface Water

**13.92** Pollutants, such as silts and hydrocarbons resulting from activities on-site such as vehicle storage, vehicle washing and oil / fuels leaks would be discharged to the public surface sewerage network through surface water run-off. This can increase water turbidity, deplete oxygen levels and be toxic to the aquatic environment.

**13.93** The magnitude of change will depend on the activities present and their occurrence. The effect is considered permanent, although certain activities such as accidental spillages would be temporary. It is envisaged that operational effects on the Langford Brook will be negligible due to the semi-urban setting and the fact that the flow of the water course is from the direction of the town.

## Changes to Flood Risk

### On-site

**13.94** Southern and eastern boundaries of the site are located within flood zones 3a&b which is considered at high risk of flooding, and flood zone 2 which is considered medium risk. The FRA includes designed in mitigation such as appropriate development levels for different uses to manage this residual risk. The magnitude of change and residual significant effect to site users has therefore been assessed as minor.

### Off-site

**13.95** Without any mitigation, the change from vegetation to building and hard standing may increase the amount of surface water being discharged into the drainage network when compared to existing conditions. However, with inbuilt attenuation and infiltration systems within the site as described in the Drainage Strategy, the effect significance is considered to be negligible.

## Water Demand

**13.96** As discussed within the baseline assessment, water supply within the Bicester region is considered to be stressed.

**13.97** As the population on the site will increase as a result of the Proposed Development, without appropriate potable water demand management the magnitude of change on strategic water supply could be medium and the magnitude of effect major adverse.

## Foul Water Drainage

**13.98** Whilst there will be a significant increase in foul water drainage volumes from the site, with an increased population on site, the capacity of the foul sewerage network has been designed to manage future development on the site. In light of this, the effect significance to the foul sewer network is considered minor adverse.

**13.99** A summary of potential effects and their significance prior to further mitigation is provided in Table 13.7.

**Table 13.7 Summary of Potentially Significant Effects once Operational (Completed Development)**

Feature	Sensitivity	Description of effect	Magnitude of change / impact	Effect significance	
Langford Brook	Water Quality	Moderate	Pollutants contained in surface water	Negligible	Negligible
Water services infrastructure (surface water)	Capacity	Low	Flood risk	Negligible	Negligible
Water services infrastructure (supply)		High	Increased water demand	Medium	Major adverse
Water services infrastructure (foul)		Low	Increased foul water discharge	Medium	Minor adverse
Site users		High	Increased flood risk	Small	Minor adverse

## Mitigation and Monitoring

### Construction

**13.100** The contractor will develop a Construction Environmental Management Plan (CEMP) to cover the construction site works. It will include mitigation measures to protect the water environment. This will set out how construction activities will be undertaken in accordance with good practice guidance, including the Pollution Prevention Guidelines (PPG) formerly published by the EA, particularly 'PPG1 General guide to the prevention of water pollution', 'PPG2 Above ground oil storage tanks', 'PPG 5 Works in, near or liable to affect watercourses', and 'PPG 6 Working at construction and demolition sites', and other good construction guidance such as CIRIA 'Guidance C532 control of water pollution from construction sites'.

# Water Resources and Flood Risk

Table 13.8 Summary of Supplementary Demolition and Construction Mitigation measures

Adverse effect	Mitigation measure	Means of implementation	Timing	Essential / desirable
Elevated sediment loads in surface water	<p>Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures:</p> <p>Minimise exposed surface areas by only removing vegetation and hard-standing when necessary and keep gradients of soil as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be reseeded or surfaced as soon as practicable.</p> <p>Enforce tight control of site boundaries including minimal land clearance and restrictions on the use of machinery adjacent to water bodies. Where possible, do not locate stockpiles within 10m of water bodies or drainage lines.</p> <p>Wheel wash facilities should be provided at all entry and exits points. Water from wheel wash facilities must not be discharged into water bodies or the on-site surface water sewerage network.</p> <p>Capture run off from site in perimeter cut off ditches, settlement lagoons and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network.</p> <p>Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent.</p> <p>If there is a requirement for discharge to the combined sewer, this should be throttled to a flow rate that is agreed with Thames Water prior to commencement of work.</p>	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction.	Essential
Dust and debris blowing into water bodies	CEMP to include dust suppression measures such as dampening, and wheel washing.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Accidental release of hydrocarbons and oils into the on-site drainage system or directly to water body	<p>Development and implementation of a CEMP that considers the following measures:</p> <p>Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge.</p> <p>Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network.</p>	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site	<p>Development and implementation of a CEMP that considers the following measures:</p> <p>Provision of storage facilities and tanks and conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines.</p> <p>Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin.</p>	CEMP to be secured through planning condition and implemented by contractor.	Prior construction	Essential

Adverse effect	Mitigation measure	Means of implementation	Timing	Essential / desirable
drainage system or directly to water body	As a remedial measure, spill containment equipment such as absorbent materials should be stored on site. Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.			
Leak or breakage of temporary sewerage system causing crude sewage to migrate to water	In order to improve groundwater and any subsequent impacts on health, the CEMP should consider the following: Provision and maintenance of temporary septic tank, cesspit and/or sewerage connection for disposal of sewage from the toilet facilities to reduce the likelihood of crude sewage infiltrating groundwater or migrating towards water bodies. Any temporary toilet facilities will be positioned at least 10m away from the banks of water bodies / the on-site culvert.	CEMP to be secured through planning condition and implemented by contractor.	Prior to construction	Essential
Flood risk to site workers and downstream areas during construction	<p>Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. Contractor will need to sign up to the EA's flood warning service which covers the site and produces a construction flood and evacuation plan for managing flood risk on site during the construction phase.</p> <p>During construction, stockpiles of material should not be stored within the Functional Floodplain as land raising is not permitted. It is recommended that stockpiles are located outside the 1 in 1000 year flood extent in accordance with EA guidance.</p> <p>Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to deep excavations and damage to plant.</p> <p>To minimise any risk from groundwater flooding during excavation of the site, cut levels should be limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures during the construction phase, the</p>	CEMP to be secured through planning condition and implemented by contractor.	Prior construction	Essential

## Water Resources and Flood Risk

### Completed Development

Table 13.9 Summary of supplementary operational mitigation measures

Receptor	Adverse effect	Mitigation measure	Means of implementation	Timing	Essential / desirable
Water services infrastructure (supply)	Water demand and foul water drainage	<p>Early engagement with TW on the potable water needs for the development and any current restrictions.</p> <p>Water efficiency measures that will reduce potable demand and subsequent foul flows including one or more of the following:</p> <p>Low flow fittings: low flush toilets, spray taps and low flow showers;</p> <p>Efficient water supply: Leak detection, smart meters and pressure reduction; and</p> <p>Water from alternative sources: greywater recycling, rainwater harvesting, inclusion of a water butt for any residential properties that has outdoor space.</p> <p>The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.</p>	Through the development of potable water between now and construction of the Proposed Development	Through future development of potable water utilities strategy	Essential

### Residual Effects

Table 13.10 Summary of Residual Effects

Intended End Use		Likely Effect, Geographic Scale and Duration (Pre Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
<b>Construction</b>				
Garden Centre Pond – water quality	Dust and debris	Localised minor, temporary	Negligible	<b>Negligible</b>
Langford Brook – water quality	Increased sediment loads	Localised moderate, temporary	Minor	<b>Minor adverse</b>
	Accidental release of hydrocarbons	Localised moderate, temporary	Negligible	<b>Negligible</b>
	Accidental release of hazardous materials	Localised moderate, temporary	Negligible	<b>Negligible</b>
	Dust and debris	Localised minor, temporary	Negligible	<b>Negligible</b>
	Leak or breakage of the temporary sewerage system	Localised moderate, temporary	Negligible	<b>Negligible</b>
Water services infrastructure – drainage sewer	Increased sediment loads	Localised minor, temporary	Negligible	<b>Negligible</b>

Intended End Use		Likely Effect, Geographic Scale and Duration (Pre Mitigation)	Residual Effect, Geographic Scale and Duration (Post Mitigation)	Residual Effect Significance
(surface water capacity)				
Site users (construction workers and plant)	Flood risks to site workers	Major – site wide, temporary.	Negligible	<b>Negligible</b>
<b>Completed Development</b>				
Langford Brook – water quality	Pollutants contained in surface water	Localised minor, permanent	Negligible	<b>Negligible</b>
Water services infrastructure (surface water) - capacity	Decreased flood risk	Localised minor, permanent	Minor	<b>Minor adverse</b>
Water services infrastructure (supply)	Increased water demand	Localised major, permanent	Minor	<b>Minor adverse</b>
Water services infrastructure (foul)	Increased foul water discharge	Localised minor, permanent	Minor	<b>Minor adverse</b>
Site users	Increased flood risk	Localised minor, permanent	Negligible	<b>Minor adverse</b>

### Cumulative Effects Assessment

- 13.101** Possible in-combination cumulative effects include demand on foul water, changes to the capacity of the sewer network / operation of combined sewer overflows and water supply and changes in water quality downstream. Any consented nearby development sharing water infrastructure will have the potential to contribute towards a cumulative effect with the Proposed Development.
- 13.102** There is potential for in-combination cumulative effects during demolition and construction with pollutant loading potentially affecting Langford Brook through runoff from the site into the surface drainage network. This is, however, not expected to be significant with compliance and implementation of the mitigation outlined within this assessment through a Construction Environmental Management Plan (CEMP).
- 13.103** The flood risk and drainage strategies implemented in line with the NPPF will in turn support the improvement of water quality and help Langford Brook improve ecological status.

### Conclusions

- 13.104** Construction activity could potentially cause temporary but significant effects on water quality. With the suggested mitigation, the effects to all nearby water bodies that could be affected are considered to be non-significant (negligible and minor adverse).
- 13.105** Although there will be an increase in water demand and capacity required for foul drainage, the Proposed Development will need to meet water efficiency standards through a number of measures. This will assist in reducing potable water and foul water demand, through design and construction. Furthermore, the foul water sewerage system passing through the site has been designed with consideration of development on the proposed site, so has sufficient capacity to manage the needs of the Proposed Development.

# Effect Interactions

## Introduction

- 14.1 This chapter of the ES summarises the likelihood for intra-project effects. Note that inter-project effects have been discussed within each technical ES chapter, as appropriate, and have not been re-iterated within this ES chapter to avoid repetition.
- 14.2 There is no established EIA methodology for assessing and quantifying the intra- and inter- cumulative effects on sensitive receptors. However, the European Commission<sup>1</sup> (EC) has produced guidelines to assist EIA practitioners in developing an approach which is appropriate to a project. These guidelines have been used and an approach has been developed which uses the defined residual effects of the Proposed Development to determine the potential for intra- and inter-cumulative effects (refer to Chapter 2: EIA Methodology for further information on inter- and intra-project effects, and how these have been assessed within this ES).
- 14.3 Residual effects of beneficial or adverse significance that are minor, moderate or major in scale have been considered within this intra-cumulative assessment of effects; residual effects of negligible and neutral significance have been omitted, as these effects are, by definition, unnoticeable in their nature.
- 14.4 Table 14.1 and 14.2 present the assessment of the intra-cumulative effects respectively arising from the construction phase and the complete and occupied phase of the Proposed Development.

## Effect Interactions of Individual Effects – Construction

- 14.5 Table 14.1 presents the inter-project cumulative effects assessment throughout the construction stage of the Proposed Development, and the potential for effect interactions. The results presented in the table are discussed in more detail below.

Table 14.1: Effect Interactions of Individual Effects – Construction

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
Occupants of Neighbouring and Local Residential Properties	<p><b>Landscape and Visual</b> (Short Distance Views from in and around the Site (Views 1-3) – Residents): <b>moderate adverse</b></p> <p><b>Landscape and Visual</b> (Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)): <b>minor to moderate adverse</b></p>	<p><b>No</b></p> <p>The effects relating to views from residents during the construction period do not interact with each other, and there is therefore no potential for effect interactions between landscape and visual on occupants of neighbouring and local residential properties</p>
Occupants of Neighbouring and Local Commercial Properties and Businesses	<p><b>Socio-Economics</b> (gross value added from construction workforce spending): <b>moderate beneficial</b></p> <p><b>Landscape and Visual</b> (Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)): <b>minor to moderate adverse</b></p>	<p><b>No</b></p> <p>Construction workforce spending and views experienced by workers/occupants of neighbouring and local commercial properties and business, do not interact with each other, and there is therefore no potential for effect interactions between landscape and visual and socio-economics on occupants on neighbouring and local commercial properties and businesses</p>

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
	<b>Landscape and Visual</b> (Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)): <b>negligible to minor adverse</b>	
Demolition and Construction Site Workers	<p><b>Socio-Economics</b> (construction employment): <b>moderate beneficial</b></p> <p><b>Socio-economics</b> (construction training): <b>minor to moderate beneficial</b></p> <p><b>Landscape and Visual</b> (Short Distance Views from in and around the site (views 1-3) – workers): <b>minor to moderate adverse</b></p>	<b>YES</b> in terms of Socio-Economics effects on demolition and construction site workers
Flora and Fauna	<p><b>Ecology</b> (field margins): <b>adverse</b></p> <p><b>Ecology</b> (ditches): <b>adverse</b></p> <p><b>Ecology</b> (log pile): <b>adverse</b></p> <p><b>Ecology</b> (reptiles): <b>adverse</b></p> <p><b>Ecology</b> (birds nesting in hedgerows): <b>adverse</b></p> <p><b>Ecology</b> (birds - skylark): <b>adverse</b></p> <p><b>Ecology</b> (birds – red kite): <b>adverse</b></p> <p><b>Ecology</b> (bats): <b>adverse</b></p>	<b>YES</b> in terms of Ecology effects on flora and fauna
Local Highway Network	No effects of minor, moderate or major significance identified	<b>N/A</b>
Public Transport Network and Pedestrians	<b>Landscape and Visual</b> (Short Distance Views from in and around the Site (Views 1-3) – Pedestrians): <b>minor to moderate adverse</b>	<b>No</b> No effects to interact with
Local Air Quality	No effects of minor, moderate or major significance identified	<b>N/A</b>
Water Resources	<b>Water Resources and Flood Risk</b> (Langford Brook – Water Quality (Increased Sediment Load)): <b>minor adverse</b>	<b>No</b> No effects to interact with.
Buried Heritage (Archaeology) and Built Heritage	No effects of minor, moderate or major significance identified	<b>N/A</b>

<sup>1</sup> European Community (1999); Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

# Effect Interactions

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
Landscape	<p><b>Landscape and Visual</b> (landscape character): <b>minor to moderate</b></p> <p><b>Landscape and Visual</b> (topography and drainage): <b>minor to moderate</b></p> <p><b>Landscape and Visual</b> (vegetation): <b>minor to moderate adverse</b></p>	<b>YES</b> in terms of landscape and visual effects on the landscape character/topography and drainage and vegetation
Local and Long Distance Views	<p><b>Landscape and Visual</b> (Short Distance Views from in and around the Site (Views 1-3) – Residents): <b>moderate adverse</b></p> <p><b>Landscape and Visual</b> (Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)): <b>minor to moderate adverse</b></p> <p><b>Landscape and Visual</b> (Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)): <b>negligible to minor adverse</b></p>	<b>YES</b> with respect to all Landscape and Visual effects on local and long distance views experienced by residents/construction/farm/land workers and recreational walkers).
Existing Utilities Infrastructure	No effects of minor, moderate or major significance identified	N/A

14.6 Table 14.1 identifies that there is potential for effect interactions to take place during the construction phase of the Proposed Development, for the following resources / receptors / receptor groups:

- Demolition and Construction Site Workers;
- Flora and Fauna
- Landscape; and
- Local and Long Distance Views

### Explanation of the Potential for and Significance of Combined Cumulative Effects

14.7 The moderate beneficial effect on construction employment and the minor to moderate beneficial effect on construction training (Socio-Economic effects) have the potential to interact to create a beneficial environment for demolition and construction workers. The increased skills gained by the workers from the construction training will in turn have a beneficial effect on employability.

14.8 There is the potential for adverse Ecology effects on flora and fauna to interact with each other during the demolition and construction period. The adverse effects on the field margins, ditches and log pile will in turn have an effect on the flora and fauna on site. Mitigation measures are proposed, which will help to minimise adverse effects. These include the clearing of any areas that may support reptiles in a staged manner (arable margins, log piles, any other ruderal, scrub or tall grassland habitats other than arable crop) prior to the commencement of any works in these areas. The vegetation will be cut to 200 mm, left over night, then cut to ground level. Movement of operators with brush cutters will be from west to east so that any animals disturbed will move away from the site into the flood plain area (which will not be developed). Such mitigation will help to minimise effects on flora and fauna.

14.9 There is the potential for effects on short, medium and long distance views (Landscape and Visual effects) to interact to cause a nuisance to sensitive receptors (residents/construction/farm/land workers and recreational walkers). It is anticipated that there will be effects to short and medium distance views on residents, and effects to medium and long distance views experienced by construction/farm/land workers and recreational walkers. Where crossovers in effects experienced by sensitive receptors occur, it is likely that these receptors will be experience nuisance by the effects to the views. These effects are temporary in nature, and upon construction of the Proposed Development (aftertime), the landscape setting around the Proposed Development and additional native screen planting will mature overtime so that views of the buildings and structures will be limited if not obscured, therefore minimising adverse effects experienced by sensitive receptors

### Combined Effects of Individual Effects – Once the Proposed Development is Completed and Occupied

14.10 Table 14.2 presents a review of the potential for intra-cumulative effects arisings once the Proposed Development is completed and operational. The potential effect interactions are then discussed further, below Table 14.2.

Table 14.2: Effect Interactions of Individual Effects – Operation

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
Occupants of Neighbouring and Local Residential Properties	<p><b>Air Quality</b> (road traffic impacts on air quality at existing receptors): <b>negligible to minor adverse</b></p> <p><b>Landscape</b> ((Short Distance Views from in and around the Site (Views 1-3) – Residents (0-15 years)): <b>minor to moderate adverse</b></p> <p><b>Landscape</b> ((Short Distance Views from in and around the Site (Views 1-3) – Residents (after 15 years)): <b>minor adverse</b></p>	<b>YES</b> Air quality and landscape and visual effect have the potential to interact to have an effect on occupants of neighbouring and local residential properties.
Occupants of Neighbouring and Local Commercial Properties and Businesses	<p><b>Socio-Economics</b> (gross value added): <b>major beneficial</b></p> <p><b>Socio-Economics</b> (permanent jobs): <b>major beneficial</b></p> <p><b>Socio-Economics</b> (net additional permanent jobs): <b>major beneficial</b></p> <p><b>Socio-economics</b> (training and skills development opportunities): <b>moderate beneficial</b></p> <p><b>Landscape</b> ((Short Distance Views from in and around the Site (Views 1-3) – Workers (0-15 years)): <b>minor adverse</b></p>	<b>YES</b> There is the potential for Socio-Economic effects to interact with each other, and for Socio-Economic effects and Landscape and Visual effects to interact to have an effect on the occupants of neighbouring and local commercial properties and businesses
Flora and Fauna	<b>Ecology</b> (birds nesting in hedgerows): <b>adverse</b>	<b>No</b> No effects to interact with
Local Highway Network	<b>Air Quality</b> (road traffic impacts on air quality at existing receptors): <b>negligible to minor adverse</b>	<b>No</b> No effects to interact with
Public Transport Network	<b>Landscape</b> ((Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (0-15 years)): <b>minor adverse</b>	<b>No</b> Due to the differing time periods in which the landscape and visual effects occur, there is no potential for these effects to interact to have an effect on the public transport network.

## Effect Interactions

Sensitive Receptor Group	Residual Effects	Potential for Effect Interactions and so Combined Effects?
	<b>Landscape</b> ((Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (after 15 years)): <b>minor adverse</b>	
Local Air Quality	<b>Air Quality</b> (road traffic impacts on air quality at existing receptors): <b>negligible to minor adverse</b>	<b>No</b> No effects to interact with
Built Heritage	No effects of minor, moderate or major significance identified	<b>N/A</b>
Landscape	<b>Landscape</b> (landscape character 0 -15 years): <b>moderate adverse</b> <b>Landscape</b> (vegetation 0-15 years): <b>moderate adverse</b> <b>Landscape</b> (vegetation after 15 years): <b>moderate adverse</b>	<b>No</b> These landscape and visual effects have the potential to interact to have an effect on the landscape.
Existing Utilities and Infrastructure	<b>Water Resources and Flood Risk</b> (water services infrastructure (supply) – increased water demand): <b>minor adverse</b> <b>Water Resources and Flood Risk</b> (water services infrastructure (surface water) – capacity – (decreased flood risk)): <b>minor adverse</b> <b>Water Resources and Flood Risk</b> (water services infrastructure (foul) – increased foul water drainage): <b>minor adverse</b>	<b>YES</b> there is the potential for water resources effects (water services infrastructure, surface water and increased foul water drainage) to interact to have an effect on existing utilities

14.11 Table 14.2 shows that there is potential for a series of potential effect interactions to take place once the Proposed Development is complete and occupied, for the following resources / receptors / receptor groups:

- Occupants of Neighbouring and Local Residential Properties;
- Occupants of Neighbouring and Local Commercial Properties and Businesses; and
- Existing Utilities and Infrastructure

14.12 When the potential for combined effects is considered, the receptor groups identified above are potentially affected by intra-cumulative effects.

### Explanation of the Potential for and Significance of Combined Cumulative Effects

14.13 There is the potential for the negligible to minor adverse air quality effect and the landscape (short distance view from in and around the site on residents) effects on occupants of neighbouring and local residential properties to interact. There is the potential for these effects to interact to cause a nuisance to residents, who are anticipated to be adversely affected both visually and by adverse road traffic impacts on air quality. The negligible to minor adverse air quality effect is not considered to be significant, and therefore any effect interactions experienced by occupants of neighbouring and local residential properties will be minimal. Additionally, measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which

is written into UK law). These measures will help to minimise any adverse effects effect interactions experienced by these sensitive receptors.

14.14 The major beneficial effects on permanent jobs, net additional permanent jobs and gross value added, and the moderate beneficial effect on training and skills development (Socio-Economic effects), have the potential to interact. The increased skills gained by the workers from the training will have an effect on employability. Additionally, any negative effects experienced by workers with regards to short distance views from in and around the site (Landscape and Visual effect on workers views) will be improved by the beneficial socio-economic effects experienced by the workers.

14.15 There is the potential water resources effects on existing utilities and infrastructure to interact. These water resources effects include: a minor adverse effects on increased water demand; a minor adverse effect on surface water capacity and flood risk; and a minor adverse effect on foul water drainage.

14.16 Mitigation measures suggested to minimise these effects include: early engagement with the water provider on the potable water needs for the development and any current restrictions; water efficiency measures that will reduce potable demand and subsequent foul flows including low flow fittings: low flush toilets, spray taps and low flow showers.

14.17 These mitigation measures will help to minimise water resources effects on existing utilities and infrastructure.

### Cumulative Effects of the Proposed Development with Other Development Schemes

14.18 As highlighted within the introduction to this ES chapter, the review of the combined effect of the Proposed Development with other developments is presented within each of the technical chapters of this ES.

# Residual Effects and Conclusions

## Introduction

15.1 This chapter of the ES presents a summary of the residual effects and the conclusions of the EIA, which has been undertaken in order to ascertain the likely significant effects of the Proposed Development during the construction works, and once completed and operational. Residual Effects are those remaining following the adoption and inclusion of mitigation measures detailed within each technical chapter within this ES.

15.2 For a detailed description of residual and likely significant environmental effects, reference should be made to individual technical chapters (Chapters 6 – 13) of the ES.

## Summary of Residual Effects

15.3 For details of the methodology used to define the geographic scale, nature, duration and significance of effects, refer to Chapter 2: EIA Methodology. Table 15.1 and 15.2 of this ES chapter respectively outline the residual effects resulting from the constructions works associated with the Proposed Development, and the Proposed Development once it is complete and operational.

## Residual Effects during Construction

15.4 Table 15.1 below provides a summary of the residual effects likely to arise as a result of the construction of the Proposed Development. Those effects which are considered to be 'Significant' in the context of the EIA Regulations<sup>1</sup> (moderate and major effects) are in **bold** and shaded **yellow**.

Topic Area	Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
Socio-Economics	Construction Employment	Local	Moderate beneficial	<b>Significant</b>	Short term
	Gross Value Added	Local	Moderate beneficial	<b>Significant</b>	Short Term
	Construction training	Local	Minor to moderate - beneficial	<b>Significant</b>	Short term
Transportation and Access	Severance (Lakeview Drive)		Negligible	Not significant	N/A
Noise and Vibration	Construction Activity	Local	Negligible	Not significant	N/A
	Construction Traffic	Local	Negligible	Not significant	N/A
Air Quality	Dust Soiling	Local	Negligible	Not significant	N/A
	Dust Impacts on Human Health	Local	Negligible	Not significant	N/A
Buried Heritage (Archaeology) & Built Heritage	Site no. 180 (Mesolithic Flint scatter with Later Prehistoric and Roman features)	Local	Negligible	Not significant	N/A

Topic Area	Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
	Site no. 285 (Ridge and Furrow)	Local	Negligible	Not significant	N/A
	Site no. 286 (Circular cropmark from aerial photography)	Local	Negligible	Not significant	N/A
	Site no. 287 (Field boundaries (extant and buried))	Local	Negligible	Not significant	N/A
Ecology	<b>Field Margins</b>	Local	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	Hedgerows	Local	Negligible	Not significant	Temporary
	Trees	Local	Negligible	Not significant	Temporary
	<b>Ditches</b>	Local	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	<b>Log pile</b>	Local	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	<b>Reptiles</b>	Local	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	<b>Birds – nesting in hedgerows</b>	Site level	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	<b>Birds – skylark</b>	Local	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	<b>Birds – Red kite</b>	Site level	<b>Adverse</b>	<b>Significant</b>	<b>Temporary</b>
	Badgers	Site level	Negligible	Not significant	Temporary
	Bats	Site level	Adverse	Significant	Permanent
	Landscape and Visual Impact Assessment	<b>Landscape Effects</b>			
Landscape Character		Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Topography and Drainage		Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Vegetation		Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
<b>Visual Effects</b>					
Short Distance Views from in and around the Site (Views 1-3) – Workers		Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
Short Distance Views from in and around the Site (Views 1-3) – Pedestrians		Local	Minor to moderate - adverse	<b>Significant</b>	Temporary

<sup>1</sup> HM Government. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. London: HMSO, 2017

# Residual Effects and Conclusions

**Table 15.1: Residual Effects during the Construction Phase of the Proposed Development**

Topic Area	Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
	Short Distance Views from in and around the Site (Views 1-3) – Residents	Local	Moderate - adverse	<b>Significant</b>	Temporary
	Medium Distance Views around the Site (Views 4,5,7-8) (construction/farm/land workers, and residents with a view from the completed Kingsmere Estate)	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary
	Long Distance Views around the Site (Views 6,9-10) (farm/land workers and recreational walkers)	Local	Negligible to minor - adverse	Not significant	Temporary
Water Resources and Flood Risk	Garden Centre Pond – Water quality (Dust and Debris)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Increased Sediment Load)	Local	Minor Adverse	Not significant	Temporary
	Langford Brook – Water Quality (Accidental Release of Hydrocarbons)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Accidental Release of Hazardous Materials)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Dust and Debris)	Local	Negligible	Not significant	Temporary
	Langford Brook – Water Quality (Leak or Breakage of the Temporary Sewerage System)	Local	Negligible	Not significant	Temporary
	Water Services Infrastructure – Drainage Sewer (Surface Water Capacity)	Local	Negligible	Not significant	Temporary
	Site Users (Construction Workers and Plant) – Flood Risk to Site Workers	Local	Negligible	Not significant	Temporary

## Residual Effects Once the Proposed Development is Completed and Operational

15.5 Table 15.2 below summarises the residual effects which have been identified by the individual technical assessments as likely to arise as a result of the operation of the Proposed Development. Those effects which are considered to be ‘Significant’ in the context of the EIA Regulations<sup>1</sup> are in bold.

**Table 15.2: Residual Effects once the Proposed Development is Complete and Occupied**

Topic Area	Description of Residual Effect	Geographic Scale of the Effect	Scale and Nature of Effect	Significance of Residual Effect	Duration of Effect
Socio-Economics	Employment Effects				
	Permanent jobs	Regional	Major beneficial	<b>Significant</b>	Long-term
	Net additional permanent jobs	Regional	Major beneficial	<b>Significant</b>	Long-term
	Economic Effects				
	Gross value added	Regional	Major Beneficial	<b>Significant</b>	Long-term
	Training Opportunities				
	Training and skills development opportunities	Local	Moderate Beneficial	<b>Significant</b>	Long-term
Transportation and Access	Severance (Lakeview Drive)	Local	Negligible	Not significant	Permanent
	Delay	Local	Negligible	Not significant	Permanent
	Amenity	Local	Negligible	Not significant	Permanent
	Fear and Intimidation	Local	Negligible	Not significant	Permanent
	Accidents and Safety	Local	Negligible	Not significant	Permanent
Noise and Vibration	Site Activity	Local	Negligible	Not significant	Permanent
	Mechanical Services Plant	Local	Negligible	Not significant	Permanent
	Road Traffic	Local	Negligible	Not significant	Permanent
Air Quality	Road traffic impacts on air quality at existing receptors	Local	Negligible to Minor Adverse	Not significant	Permanent
Ecology	Field Margins	Local	Negligible	Not significant	Permanent
	Hedgerows	Local	Negligible	Not significant	Permanent
	Trees	Local	Negligible	Not significant	Permanent
	Ditches	Local	Negligible	Not significant	Permanent



# Residual Effects and Conclusions

	Log pile	Local	Negligible	Not significant	Permanent
	Reptiles	Local	Negligible	Not significant	Permanent
	Birds – nesting in hedgerows	Site level	Adverse	<b>Significant</b>	Permanent
	Birds – skylark	Local	Negligible	Not significant	Permanent
	Birds – Red kite	Site level	Negligible	Not significant	Permanent
	Badgers	Site level	Negligible	Not significant	Permanent
	Bats	Site level	Negligible	Not significant	Permanent
Landscape and Visual Impact Assessment	Landscape Effects				
	Landscape Character (0-15 years)	Local	Moderate adverse	<b>Significant</b>	Temporary (up to 15 years)
	Landscape Character (after 15 years)	Local	Neutral adverse	Not significant	Long-term
	Topography and Drainage (0-15 years)	Local	Minor / neutral adverse	Not significant	Temporary (up to 15 years)
	Topography and Drainage (after 15 years)	Local	Minor / neutral adverse	Not significant	Long-term
	Vegetation (0-15 years)	Local	Minor adverse	Not significant	Temporary (up to 15 years)
	Vegetation (after 15 years)	Local	Neutral to minor - beneficial	Not significant	Long-term
	Visual Effects				
	Short Distance Views from in and around the Site (Views 1-3) – Workers (0-15 years)	Local	Minor adverse	Not significant	Temporary (up to 15 years)
	Short Distance Views from in and around the Site (Views 1-3) – Workers (after 15 years)	Local	Neutral beneficial	Not significant	Long-term
	Short Distance Views from in and around the Site	Local	Minor adverse	Not significant	Temporary (up to 15 years)

	(Views 1-3) – Pedestrians, motorists and cyclists (0-15 years)				
	Short Distance Views from in and around the Site (Views 1-3) – Pedestrians, motorists and cyclists (after 15 years)	Local	Minor adverse	Not significant	Long-term
	Short Distance Views from in and around the Site (Views 1-3) – Residents (0-15 years)	Local	Minor to moderate - adverse	<b>Significant</b>	Temporary (up to 15 years)
	Short Distance Views from in and around the Site (Views 1-3) – Residents (after 15 years)	Local	Minor adverse	Not significant	Long-term
	Medium Distance Views around the Site (Views 4,5,7-8) Workers (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Medium Distance Views around the Site (Views 4,5,7-8) Workers (after 15 years)	Local	Neutral - beneficial	Not significant	Long-term
	Medium Distance Views around the Site (Views 4,5,7-8) Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Medium Distance Views around the Site (Views 4,5,7-8) Residents (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)

# Residual Effects and Conclusions

	Long Distance Views around the Site (Views 6,9-10) - Workers (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Long Distance Views around the Site (Views 6,9-10) – Pedestrians, motorists and cyclists (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
	Long Distance Views around the Site (Views 6,9-10) - Residents (0-15 years)	Local	Neutral	Not significant	Temporary (up to 15 years)
Water Resources and Flood Risk	Langford Brook – Water Quality (Pollutants Contained in Surface Water)	Local	Negligible	Not significant	Permanent
	Water Services Infrastructure (Surface Water) Capacity (Decreased Flood Risk)	Local	Minor Adverse	Not significant	Permanent
	Water Services Infrastructure (Supply) – Increased Water Demand	Local	Minor Adverse	Not significant	Permanent
	Water Services Infrastructure (Foul) – Increased Foul Water Drainage	Local	Minor Adverse	Not significant	Permanent
	Site Users – Increased Flood Risk	Local	Negligible	Not significant	Permanent

## Summary of Likely Significant Environmental Effects

### Construction

- 15.6** Likely significant adverse effects identified during the construction phase of the Proposed Development relate to the impact on townscape views, heritage assets and ecological features. These include landscape related effects on landscape character, topography and drainage and vegetation, visual effects pertaining to short and medium distance views and ecological effects relating to habitats and protected species.
- 15.7** Likely significant beneficial effects identified during the construction phase of the Proposed Development are socio-economic in nature. There are likely significant (moderate beneficial) effects on construction employment and cross value added, and likely significant (minor-moderate beneficial) effects on construction training, during the construction period. The remaining construction effects are considered to be not significant.
- 15.8** It should be noted that the construction phase effects are short-term in nature and temporary. For development to take place these effects are unavoidable. A series of management and control measures have been committed to ensure that impacts from the construction works are reduced as far as reasonably practicable.

### Completed Development

- 15.9** The most likely significant beneficial environmental effects identified for the Proposed Development once it is completed and operational are those relating to the socio-economic components. These effects include employment effects from permanent jobs and net additional permanent jobs, economics effects from gross value added, and training and skills development opportunities.
- 15.10** There are however a very small number of likely significant adverse environmental effects (three in total) likely to be experienced once the Proposed Development is completed and operational. These are effects pertaining to landscape and visual, with a likely significant (moderate adverse) effect on landscape character within the first 15 years of operation. A likely significant (minor to moderate adverse) effect on short distance views (views 1-3), experienced within the first 15 years of occupation, and a permanent significant adverse effect on birds nesting in hedgerows. Note that the first two of these effects are temporary in nature. The mature landscape setting around the Proposed Development and additional native screen planting will mature overtime so that views of the buildings and structures will be limited if not obscured, therefore minimising adverse effects experienced by sensitive receptors. In addition, the principle of this development has been established through the 2010 consent and is supported, in principle, by the Local Plan allocation, Bicester 4.

# Glossary of Terms and Abbreviations

ADMS Roads	Atmospheric Dispersion Modelling System Roads is a line-source Gaussian dispersion model with the capability to model 3 point sources.	Directive	European Union (EU) Directives impose legal obligations on European Member States. They are binding as to the results to be achieved, but allow individual states the right to decide the form and methods used to achieve the results. An example of this is the EU Air Quality Framework Directive (1996) that is brought into legal effect in the UK by the Air Quality (England) Regulations (2000).
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ( $LA_{F_{eq},T}$ ).	Displacement	An estimate of economic factors that may have reasonably been attained by other competitors in the absence of the development.
Amenity	A pleasant or advantageous aspect of the environment.	EIA Scoping	An initial stage in determining the nature and potential scale of the environmental impacts arising from a proposed development, and assessing what further studies are required to establish their significance.
Aquifer	A below ground, water-bearing layer of soil or rock.	EIA Scoping Opinion	A written statement of the opinion of the relevant planning authority as to the information to be provided in the Environmental Statement which specifically requires an local planning authority to respond or consult with consultees within a statutory period.
Alluvium	Sediment laid down by a river. Can range from sands and gravels deposited by fast flowing water and clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor are usually included in the term alluvium (e.g. peat).	EIA Screening	An initial stage in which the need for EIA is considered in respect of a development. Some developments are automatically subject to EIA by means of their inevitable size, nature and effects (Schedule 1 developments). Other projects are made subject to EIA because it is anticipated that they are likely to have significant environmental effects (Schedule 2 developments).
Arisings	Material (often spoil) derived from the ground through excavation	Emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.	Environmental Impact Assessment	A process by which information about the environmental effects of a development is collected and taken into account by the relevant decision-making body before a decision is given on whether the development should go ahead.
Baseline Studies	Studies of existing environmental conditions which are designed to establish the baseline conditions against which any future changes can be measured or predicted.	Environmental Statement	A statement that includes such information that is reasonably required to assess the environmental effects of a development.
Biodiversity	The diversity, or variety of plants and animals and other living things in a particular area of region. It encompasses landscape diversity, ecosystem diversity, species diversity and genetic diversity.	Fit-out	Installation of all non-substructure and non-superstructure items such as electrical water services, as well as final internal finishings.
Borehole	A deep hole bored into the ground as part of intrusive geological investigations.	Floodplain	Land adjacent to a watercourse over which water flows, or would flow but for defences in place, in times of flood.
Carbon Dioxide (CO <sub>2</sub> )	Carbon dioxide is a naturally occurring gas comprising 0.04% of the atmosphere. The burning of fossil fuels releases carbon dioxide fixed by plants many millions of years ago, and this has increased its concentration in the atmosphere by some 12% over the past century. It contributes about 60 per cent of the potential global warming effect of manmade emissions of greenhouse gases.	Geotechnical	Ground investigation, typically in the form of boreholes and/or trial/test pits, carried out for engineering purposes to determine the nature of the subsurface deposits.
Completed Development	A development scheme which has been build out.	Grade I Listed Building	A listed building that is of exceptional interest.
Conservation Area	An area designated by the Local Authority as being of special architectural or historic interest under the provisions of the Planning (Listed Buildings and Conservation Areas 1990) Act, the character or appearance of which it is desirable to preserve or enhance.	Grade II Listed Building	A listed building that is of special interest.
Construction Environmental Management Plan	A documented management system with environmental procedures to monitor residual impacts of the construction phase of a development.	Grade II* Listed Building	A listed building that is of particular importance and of more than special interest.
Construction Logistics Plan	A documented travel plan specific for a construction site.	Gross External Area	A measure of floor space calculated in accordance with the Royal Institution of Chartered Surveyors (RICS) Code of Measuring Practice.
Cumulative Schemes	Developments that have received planning permission and have a signed legal agreement in place. They are assumed to be in place by the time the Development being assessed is completed.	Gross Internal Area	A measure of the area of a building measured to the internal face of the perimeter walls at each floor level.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds $s_1$ and $s_2$ is given by $20 \log_{10} (s_1 / s_2)$ . The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$ .		
Desk-top Study	A non-intrusive study and review of all available information pertaining to a site, including historical records, collated and monitored data, and consultation with relevant stakeholders.		

# Glossary of Terms and Abbreviations

Heritage Asset	A building, area or scene which makes a positive contribution of special architectural, historic or environmental interest.	Pathways	The routes by which impacts are transmitted through air, water, soils or plants and organisms to their receptors.
Hoarding	A temporary board fence set up on the perimeter of a building site.	Pile	A timber, steel or concrete post which is driven, jacked or cast (bored) into the ground to carry vertical or horizontal loads.
Hydrogeology	The study of geological factors relating to the Earth's water.	Plant	A building's generator, heating, ventilation, and/or electricity-production system.
<i>In-situ</i>	In the natural, original or appropriate position.	Planning Practice Guidance	A web-based resource that came into force in 2014. It seeks to consolidate existing technical guidance into a consolidated online format and provides further detail on the policies contained within the NPPF.
Intrusive Investigation	An in-depth investigation involving further sampling and analysis, such as the gathering of samples from the ground, walls, ceilings for the detection of contamination, asbestos and or archaeological remains.	Receptor (Sensitive)	A component of the natural, created, or built environment such as human being, water, air, a building, or a plant that is affected by an impact.
L <sub>A</sub> F <sub>eq,T</sub>	The A-weighted noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.	Residual Effects	Those effects of a development following implementation of any relevant mitigation proposals.
L <sub>A</sub> F <sub>max,T</sub>	The A-weighted noise level index defined as the maximum noise level during the period T. L <sub>max</sub> is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.	Risk Assessment	An assessment of the likelihood and severity of an occurrence.
Listed Building	A building or structure of special architectural or historic interest which is included in a list made by the Secretary of State.	Setting	The context in which a building or area can be appreciated.
Local Plan	A series of documents which contains the vision, policies and proposals for planning in the CDC. The Local Plan comprises a series of documents that are separately prepared and together set out CDC's planning strategy.	Severance	The perceived divisions that can occur within a community when it becomes separated by a traffic route.
Made Ground	Soils or other material which has been deposited by man rather than natural processes, for example to make up ground levels.	Site of Importance for Nature Conservation	A non-statutory site identified as being areas of importance for wildlife and geology.
Mitigation	Any process, activity of thing designed to avoid, reduce or remedy adverse environmental impacts likely to be caused by a development project.	Statutory Consultees	Groups or bodies that, by law, must be consulted as part of the planning application process for EIA development.
Mitigation Measure	Measure aiming at reducing an adverse environmental effect.	Superstructure	Elements of a development above ground principally the mega frame, supporting northern core and outer shell cladding.
National Planning Policy Framework	Came into force on 27 March 2012. It sets out the Government's economic, environmental and social planning policies for England and summarises, in a single document, all previous national planning policy advice (Planning Policy Statements and Planning Policy Guidance notes).	Supplementary Planning Document	Documents which seek to give guidance and support on the Council's planning processes and are one of the material considerations in determining planning applications.
Nitrogen dioxide	Road transport and the burning of fossil fuels for power are the main sources of Nitrogen dioxide. In addition to being a greenhouse gas it also contributes to photochemical smog formation. It is an irritant to the respiratory system.	The Applicant	The persons or entities making the planning application.
Non-Technical Summary	A summary of the Environmental Statement in 'non-technical language'.	The site	The extent of the development site, as defined by the red-line boundary plan.
Ordnance Datum	Land levels are measured relative to the average sea level at Newlyn, Cornwall. This average level is referred to as 'Ordnance Datum'.	Topography	The natural and man-made features of an area collectively
Particulate Matter	Discrete particles in ambient air, sizes ranging between nanometres (nm, billionths of a metre) to tens of micrometres (µm, millionths of a metre).	Transport Assessment	Prepared and submitted alongside planning applications for developments likely to have significant transport implications. For major proposals, assessments should illustrate the following: accessibility to the site by all modes, the likely modal split of journeys to and from the site and proposed measures to improve access by public transport, walking and cycling. Statutory plans produced by each borough which integrate strategic and local planning responsibilities through policies and proposals for the development and use of land in their area.
		Travel Plan	A document which puts measures in place that will encourage sustainable travel and reduce reliance on single occupancy cars.
		Watching Brief (archaeological)	An archaeological watching brief is 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons.'

# Glossary of Terms and Abbreviations

## Abbreviations

$\mu\text{gm}^{-3}$	Micrograms per cubic metre	DAS	Design and Access Statement
$\mu\text{m}$	Micrometres	dB	Decibel
AADT	Annual Average Daytime Traffic Flows	DBA	Desk Based Assessment
AAWT	Annual Average Weekly Traffic Flows	DCLG	Department for Communities and Local Government
AD	Anno Domini	DEFRA	Department of Environment, Food and Rural Affairs
ADMS	Atmospheric Dispersion Modelling System	DMP	Dust Management Plan
AOD	Above Ordnance Datum	EA	Environment Agency
AQ	Air Quality	EC	European Commission
AQAL	Air Quality Assessment Level	EHO	Environmental Health Officer
AQAP	Air Quality Action Plan	EIA	Environmental Impact Assessment
AQMA	Air Quality Management Area	EPA	Environmental Protection Act
ATC	Automatic Traffic Counters	ES	Environmental Statement
BAP	Biodiversity Action Plan	FRA	Flood Risk Assessment
BC	Before Christ	FTE	Full Time Equivalent
bgl	Below Ground Level	FTP	Framework Travel Plan
BRE	Building Research Establishment	FWMA	Flood Water Management Act
BS	British Standard	GEA	Gross External Area
BSI	British Standard Institute	GIA	Gross Internal Area
CA	Conservation Area	GLVIA	Guidelines for Landscape and Visual Impact Assessment
CDC	Cherwell District Council	GP	General Practitioner
CEMP	Construction Environmental Management Plan	Ha	Hectare
CIL	Community Infrastructure Levy	HE	Historic England
CLP	Construction Logistics Plan	HGV	Heavy Goods Vehicle
CO	Carbon monoxide	IAQM	Institute of Air Quality Management
CO <sub>2</sub>	Carbon dioxide	IEMA	Institute of Environmental Management and Assessment
CoP	Code of Practise	Kg	Kilograms
CoPA	Control of Pollution Act	km	Kilometres
COSHH	Control of Substances Hazardous to Health	KPI	Key Performance Indicators
CRTN	Calculation of Road Traffic Noise	kWh	Kilowatt hour
		l/s	Litres per second
		LAQM	Local Air Quality Management
		LLFA	Lead Local Flood Authority
		m	Metre

# Glossary of Terms and Abbreviations

m <sup>2</sup>	Square metre	SSSi	Site of Special Scientific Interest
m <sup>3</sup>	Cubic metre	SuDS	Sustainable Urban Drainage Systems
mAOD	Metres Above Ordnance Datum	TA	Transport Assessment
mm/s	Millimetres per second	LVIA	Landscape and Visual Impact Assessment
m/s	Meters per Second	UDP	Unitary Development Plan
NAQO	National Air Quality Objectives	UK	United Kingdom
N/A	Not applicable	WHS	World Heritage Site
NHS	National Health Service	WSI	Written Scheme of Investigation
NIA	Net Internal Area		
NO <sub>2</sub>	Nitrogen Dioxide		
Nox	Nitrogen Oxides		
NTS	Non-Technical Summary		
NPPF	National Planning Policy Framework		
NRMM	Non-Road Mobile Machinery		
OCC	Oxford County Council		
OD	Ordnance Datum		
ONS	Office of National Statistics		
OS	Ordnance Survey		
PAN	Public Admission Numbers		
PFRA	Preliminary Flood Risk Assessment		
PM <sub>2.5</sub> /PM <sub>10</sub>	Particulate Material of a particular size fraction		
PPE	Personal Protective Equipment		
PPG	Planning Practice Guidance		
PPG	Pollution Prevention Guidelines		
ppm	Parts per million		
PRA	Preliminary Risk Assessment		
RFRA	Regional Flood Risk Assessment		
SFRA	Strategic Flood Risk Assessment		
SI	Site Investigation		
SINC	Site of Importance for Nature Conservation		
SoS	Secretary of State		
SO <sub>2</sub>	Sulphur Dioxide		
SPG	Supplementary Planning Guidance		
SPZ	(Groundwater) Source Protection Zone		

Trium Environmental Consulting LLP  
69-85 Tabernacle Street  
London  
EC2A 4BD  
+44 (0) 20 3887 7118  
[hello@triumenv.co.uk](mailto:hello@triumenv.co.uk)  
[www.triumenvironmental.co.uk](http://www.triumenvironmental.co.uk)

Project Reference: TEC0001