

# NW Bicester

An application for the exemplar phase of the  
NW Bicester Eco Development proposals submitted by  
P3Eco (Bicester) Limited and the A2Dominion Group

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## Environmental Statement Volume 1: Main Text

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P3Eco Ltd

a2dominion







# P3 Eco (Bicester) Ltd and A2Dominion Group

## Bicester Eco Development

### Exemplar Environmental Statement

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#### Volume 1: Main Text

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# 1 Introduction

## 1.1 The Development

P3 Eco (Bicester) Ltd (P3Eco) and A2Dominion Group are proposing to develop an eco development on land to the north-west of Bicester in Cherwell District, as shown on Drawing 1-1 in Volume 2 of this Environmental Statement (ES). The North-West Bicester Eco development (NW Bicester) is intended to provide a new form of sustainable community within Cherwell District, and to extend the benefits of this community to the existing town of Bicester. The first part of the Eco development to be progressed is the proposed Exemplar Site development, which will be undertaken on agricultural land and is expected to be constructed in phases between 2011 and 2026.

This ES reports the findings of the Environmental Impact Assessment (EIA) for the proposed Exemplar Site development. This ES describes the development, the baseline environment and the significant and non-significant environmental effects after mitigation. The purpose of the ES is to ensure that the likely effects of the development on the environment are fully understood and taken into account before any decision by the Local Planning Authority (LPA) is taken to approve the proposals.

## 1.2 Exemplar Site Background and Context

In July 2009, the Department for Communities and Local Government published 'Planning Policy Statement (PPS): eco-towns'<sup>1</sup> as a supplement to PPS1 Delivering Sustainable Development<sup>2</sup>. The PPS1 supplement includes requirements on sustainability, affordable housing, low and zero carbon technologies and public transport.

Within the PPS1 supplement, eco-towns are defined as sustainable developments of at least 5,000 homes. In July 2009, four 'first wave' locations were identified with the potential to have an Eco-town; one of which was NW Bicester<sup>3</sup>.

The Eco-towns PPS outlines the Government's objectives for planning that are set out in PPS1:

1. "To promote sustainable development by:

*ensuring that eco-towns achieve sustainability standards significantly above equivalent levels of development in existing towns and cities by setting out a range of challenging and stretching minimum standards for their development, in particular by:*

- providing a good quantity of green space of the highest quality in close proximity to the natural environment*
- offering opportunities for space within and around the dwellings*
- promoting healthy and sustainable environments through 'Active Design' principles and healthy living choices*
- enabling opportunities for infrastructure that make best use of technologies in energy generation and conservation in ways that are not always practical or economic in other developments*
- delivering a locally appropriate mix of housing type and tenure to meet the needs of all income groups and household size, and*
- taking advantage of significant economies of scale and increases in land value to deliver new technology and infrastructure such as for transport, energy and community facilities.*

2. *To reduce the carbon footprint of development by:*

*ensuring that households and individuals in eco-towns are able to reduce their carbon footprint to a low level and achieve a more sustainable way of living."*

The NW Bicester Eco development lies within the jurisdiction of Cherwell District Council (CDC), and the masterplan for the site is being progressed by P3Eco. Part of the eco development comprises the Exemplar Site development. This is being brought forward by P3Eco in partnership with A2Dominion Group as the first phase of the project and is proposed for the north-eastern edge of the Eco development area. This ES has been prepared in relation to this Exemplar Site development and therefore does not relate to the full extent of the Eco development site.

## 1.3 Legal Basis of Environmental Statement

The Exemplar Site requires planning consent under the Town and Country Planning Act 1990 (as amended). In accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (Circular 02/99), which implement EC Directive 85/337/EEC and its amendment 97/11/EC, the Exemplar Site constitutes a Schedule 2 development, based upon the scale of development exceeding 0.5ha. Due to the nature and scale of the proposals and its associated infrastructure, the development is likely to have significant effects on the environment, and therefore triggers the need for an EIA.

Several guideline documents have been used in defining the scope of the EIA and the assessment methodology to be used. The LPA issued a formal Scoping Opinion in September 2010, which has been taken into account when preparing the ES. The EIA Scoping Report and LPA's Scoping Opinion are included in Appendix 1A of this ES. In addition to observing the formal requirements of the EIA Directives and the EIA Regulations, further formal guidance has informed the assessment. Examples include Environmental Impact Assessment: A Guide to Procedures (DCLG, 2000 and amendment 2001)<sup>4</sup>; Planning Policy Guidance (PPG) Notes and Planning Policy Statements (PPS); and Guidelines for Environmental Impact Assessment (IEMA, 2004)<sup>5</sup>.

The main aims of the ES are:

- To provide a description of the proposals.
- To provide detailed information regarding the likely main environmental effects of the proposals having taken into account the measures proposed to avoid, reduce and if possible remedy any predicted significant adverse effects on the environment or to enhance the beneficial effects of the proposals.
- To provide a forum for the public and consultees to express an opinion before the LPA makes a decision on whether or not to proceed with the Proposals.
- To provide an outline of the main alternatives studied by the developer and an indication of the main reasons for the choice, taking into account the environmental effects.

## 1.4 Structure of the Environmental Statement

The ES is structured as follows:

- Volume 1 (this volume) explains the purpose of the Proposals (Chapter 2), describes the proposals (Chapter 3), summarises alternatives considered (Chapter 4) and the overall approach to the environmental impact assessment (Chapter 5). It presents the mitigation measures and draws together the significant environmental effects after mitigation for each environmental topic in Chapter 6 to 17. Cumulative effects are presented in Chapter 18 and the conclusions are given in Chapter 19.

- Volume 2 contains the ES drawings referred to in Volume 1 ES main text
- Volume 3 contains the ES appendices referred to in Volume 1 ES main text
- The Non-Technical Summary (NTS) summarises the principle sections of the ES in non-technical language to make it readily understandable by members of the public. The NTS is available as a separate leaflet and is also included as text in Volume 0.

## 1.5 Availability and Observations of the Environmental Statement

A full copy of the ES is available to view at the following deposit locations via the Cherwell District Council online 'Public Access' system from the 26 November 2010 to the 22 December 2010, although Cherwell District Council may extend the deadline at their discretion.

- Cherwell District Council, Bodicote House, Bodicote, Banbury, Oxfordshire, OX15 4AA
- Banbury (Castlequay) Linkpoint, 43 Castle Quay, Banbury, Oxfordshire, OX16 5UW
- Bicester Linkpoint, 38 Market Street, Bicester, OX26 6AL
- Kidlington Linkpoint, Exeter Hall, Oxford Road, Kidlington, OX5 1AB

A full set of drawings will be available at Bicester Town Council, The Garth, Launton Road, Bicester, Oxon, OX26 6PS.

The ES will also be available to view in the Planning section on CDC's website; [www.cherwell.gov.uk](http://www.cherwell.gov.uk). The Planning Application will also be available to view on the NW Bicester website; [www.nwbicester.co.uk](http://www.nwbicester.co.uk).

Copies of the ES can be purchased from Barton Willmore at the address below:

FAO: Mr A Cattermole  
Barton Willmore  
7 Soho Square  
London  
W1D 3QB

The ES is priced as follows:

- Volume 1 - £50.00
- Volume 2 - £75.00
- Volume 3 - £100.00
- A CD of the full Environmental Statement may be ordered at a cost of £35.00

All interested parties are invited to comment in writing on the ES by 22 December 2010, although CDC may extend this at their discretion. Comments should be sent to CDC at the following address:

FAO Jenny Barker  
Planning Department  
Cherwell District Council  
Bodicote House  
Bodicote  
Banbury  
Oxfordshire  
OX15 4AA

## 2 The Need for the Proposed Development

### 2.1 Policy Requirements

P3Eco Ltd, who has options to acquire 21.1 hectares of land to the north-west of Bicester, has selected A2Dominion Group as its development partner for the promotion and implementation of the Exemplar Site scheme, and also as affordable housing partner in respect of the NW Bicester Eco development proposals. The land at North West Bicester is identified in the Supplement to PPS1 entitled 'Eco-towns' (July 2009)<sup>1</sup> as a location for a potential Eco development.

P3Eco are promoting the overall site for residential development comprising an Eco development through the preparation of the Cherwell Draft Core Strategy DPD<sup>2</sup>. Within the Draft Core Strategy, CDC has identified that an eco development of 5,000 homes and jobs will be developed on land at north-west Bicester, with 3,200 to be delivered in the period to December 2026.

This need is reflected in the emerging Core Strategy (at policy NWB1 of the Preferred Options Draft), which identifies land at north-west of Bicester as a strategic site for the provision of an Eco development. The emerging policy also identifies that land at north-west of Bicester is to:

- Provide a development of 5,000 homes.
- Create a development that will be a zero carbon development as defined in the PPS.
- Deliver a high quality local environment taking into account climate change adaptation.
- Create homes that achieve Level 5 of the Code for Sustainable Homes.
- Provide access to one employment opportunity for each new dwelling within easy reach by walking, cycling and / or public transport.
- At least 50% of trips originating from the development should be made by means other than the car.
- Provide 40% of the total gross site area as green space of which half will be public open space.

It is the Council's intention to identify the land at NW Bicester as a strategic location in the Core Strategy and thus obviate the need for a further allocation in the site allocations DPD or similar. The boundary of land that comprises the NW Bicester Eco development allocation is defined at Appendix 6 of the emerging Core Strategy.

The PPS1 supplement advises that it is for the LPA to decide whether it wishes to meet its strategic housing requirements by way of an eco-town or alternative means (para. ET3.1). Proposals for eco-towns are to be brought forward through the preparation of the Core Strategy and related DPDs (para. ET4.1). However, where proposals are submitted in advance of the Core Strategy the policies set out in the Supplement are material (para. ET5.1).

Further, PPS3 requires councils to identify land that is available, suitable and achievable. The purpose of this document is to respond to the emerging policy and demonstrate the deliverability of the site, having regard to paragraphs 54 and 69 of PPS3.

### The Emerging Policy Requirement

The emerging Core Strategy sets out the Council's proposed development strategy for meeting the development needs of the Borough for the period to 2026. Bicester and Banbury are identified as the main centres for growth and development. The Core Strategy identifies the need to make provision for 13,400 new homes by March 2026 (policy H1).



The Vision for Bicester (chapter B.1) seeks to develop the town to become an important economic centre in its own right within the Central Oxfordshire sub-region and on the Oxford to Cambridge arc. Furthermore, the vision indicates that North West Bicester will contribute greatly to improving Bicester's profile by being a pioneering development, an economic driver and by delivering environmental gains (paragraphs B.13, B.14 and B.15). Furthermore, the emerging Core Strategy at paragraphs B.3 and B.4 indicates that by 2026 Bicester's town centre will have been redeveloped and environmental and highway improvements will have been made to Market Square. The detailed proposals for Bicester are to be addressed through an Area Action Plan ('AAP').

The proposals for North West Bicester are consistent with this vision and policy objective.

Land to the north-west of Bicester is identified at policy NWB1 to provide some 5,000 dwellings in total with 3,200 by December 2026 in an Eco development, together with schools, local centres and facilities, a care home, B1 office accommodation, retail units and health care facilities along with other ancillary developments.

P3Eco and A2Dominion Group support the identification of land to the north-west of Bicester for development and will continue to engage with the Council through the preparation of the Core Strategy and related policy framework.

## 2.2 Development Objectives

The Vision for NW Bicester eco development is "to create a thriving diverse community in Bicester which offers a sustainable way of life for all". This vision will be underpinned through five values which reflect those set out within the document produced by CDC entitled 'Eco Bicester – One Shared Vision'<sup>3</sup>:

- Leading the way for a town wide transition to a low carbon community.
- Attracting inward investment to provide sustainable jobs and commerce, especially in green technologies.
- Offering transport, health and leisure choices which emphasise zero carbon and energy efficiency.
- Ensuring green infrastructure and historic landscapes, biodiversity, water, flood and waste issues are managed in an environmentally sustainable way.
- Making it easy, attractive and affordable for people to live within environmental limits.

## 3 Development Description

### 3.1 Development Context

The town of Bicester lies approximately 24km to the north-east of Oxford, and 28km to the southeast of Banbury. The M40 runs approximately 2km to the southwest, with Junction 9 providing access to the town via the A41.

Bicester is served by two railway stations; namely Bicester North and Bicester Town. Chiltern Railways operate services from Bicester North between Birmingham Snow Hill and London Marylebone. Branch line services to Oxford (via Islip) operate from Bicester Town. This lies to the south of the town and uses the old Varsity Line track between Oxford and Cambridge.

The eco development site lies to the north-west of Bicester, approximately 1.5km from the town centre, and comprises an area of approximately 416ha. The site, shown on Drawing 1-1, currently comprises Grade 3a and Grade 3b agricultural land and contains a number of farmhouses and other buildings, as well as a small area of employment land along Howes Lane. The railway line runs in a north-west to south east direction through the middle of the site. The villages of Bucknell and Caversfield are located to the north and east of the site respectively.

Drawing 3-1 illustrates the site boundary for the Exemplar development. This site lies wholly within the area identified for the NW Bicester Eco development, at its north-eastern edge, and lies due north of Bicester town. The Exemplar Site boundary runs alongside the B4100, and lies within the parish of Caversfield.

### 3.2 Description of the Development

The first element of the eco development will be the Exemplar Site, which lies in the north-eastern area of the area identified for the Eco development. The Exemplar Site development proposals include provision for the following:

- 394 residential units.
- An energy centre.
- A primary school.
- A nursery school.
- An Eco pub.
- B1(a) Eco Business Centre and office accommodation.
- Retail units (class A1 – A5).
- Social and community facilities within class D with associated means of access.
- Means of access.
- Car parking.
- Landscape.
- Amenity space.
- Service infrastructure.

The Exemplar Site planning application is being submitted as a hybrid application comprising:

- Full planning permission will be sought for the residential development, energy centre, means of access thereto, and associated car parking, landscape, amenity space and service infrastructure.
- Outline application for all non-residential uses, with consent being sought for access to those blocks.

All such development shall accord with the Application Plans and Development Parameters Schedule submitted with the Planning Application for the Development.

### 3.2.1 Full Application and Outline Application Details

#### Ground Levels and Contours

The existing topography of the Exemplar site falls by approximately 4m from the north-western boundary to the south-eastern boundary (92m AOD to 87m AOD), with two watercourses crossing the site which sit in central depressions reaching a depth of approx 82.5m AOD. The proposed ground levels would generally follow the existing topography except for the north eastern corner of the site where an existing localised depression would be filled in to a depth of approximately 0.6m. This is necessary to regularise the ground levels and assist drainage. Other localised minor earthworks that would be undertaken include the creation of water features or ponds and mounding as part of the landscaping scheme and at bridge abutments.

#### Development Area

The total (gross) site area is 21.1 ha. The net residential developable area in the Exemplar comprises 18.9 ha. The net non-residential developable area (to be developed for commercial, social and community uses) in the Exemplar comprises 2.16 ha. The Exemplar layout is shown on Drawing 3-1, Sheets 1 and 2.

#### Green Infrastructure

Green Infrastructure is the living network of integrated and multifunctional green spaces, water and environmental systems in and beyond urban areas. The strategic landscape shall be laid out in accordance with the principles set out on Drawing 3-2 (Landscape Framework Plan), as described in the Design and Access Statement. The creation of well connected, good quality open spaces and public amenity space, including recreation, is a key ingredient to the success of the Exemplar layout. It is an integral part of the green infrastructure. The Exemplar development includes the provision of attractive and safe walking and cycling routes which will help reduce the need to travel by vehicle and support the pursuit of healthy lifestyles. Access to open space and play areas is also achieved through the green infrastructure strategy for the development.

#### Overall Floorspace and Quantum of Development

The total amount of residential development within Class C3 (residential) shall amount to 394 units.

The total floorspace for uses other than those falling within Class C3, but excluding Class D1 space shall not exceed 4,960 square metres of which:

- Not more than 770 square metres shall fall within class A1, within which only one unit shall be greater than 500 square metres but shall be no bigger than 600 square metres and not more than 190 square metres within class A4.
- Not more than 2,900 square metres shall fall within Class B1.

- Not more than 350 square metres shall fall within Class D1 (excluding education uses) and 350 square metres within sui generis community uses.
- Class D1 education uses shall comprise land for the provision of up to a two form entry primary school, of a gross site area not more than 1.34 ha.

Accordingly, the total accommodation for non-residential uses, excluding education uses, shall not exceed 4,960 square metres.

## General Layout and Framework

The development of the site shall accord with the general principles and layout set out on Drawing 3-1, Sheets 1 and 2, and Drawing 3-2.

## Disposition Between Uses

The non residential land uses shall be broadly located as indicated on Drawing 3-1, Sheet 2, with such uses (excluding education) focused around the village green / the community hub.

The site for the primary school shall be in the western corner of the southern Exemplar development area, as shown on Drawing 3-1, Sheet 2.

## Open Space / Play Space Strategy

Strategic open / play space shall be provided in the broad locations identified on the Landscape Framework Plan, Drawing 3-2. In addition, within each development zone Local Areas of Play (LAPs) or such similar provision as is agreed will be provided as appropriate. Further, other areas of open space will be provided to complement the LAPs and the strategic open space.

## Site Access

Vehicular access to the site, as shown on Drawing 17-2 will be provided from A4095 Lord's Lane. The access will be provided for vehicles, footways and cycleways and the road will be aligned to suitable geometric standards. Additional cycle and/or pedestrian access will be provided on the highway verge along B4100 Banbury Road to Lord's Lane. An at-grade crossing will provide direct access to the existing pedestrian and cycle links to Bure Park and Bicester town centre. An access strategy plan is contained on Drawing 17-1.

The internal site layout will be designed to facilitate the safe and convenient movement of vehicular, cycle and pedestrian traffic with priority given to non-car routes. In relation to vehicular traffic, the road system will be designed to control vehicle speeds for the benefit of road safety while the pedestrian and cycle routes will aim to provide a safe and permeable network for these travel modes.

Street lighting will be provided within public areas and will incorporate, where appropriate, full cut-off luminaires together with use of timed and low energy systems.

## Parking

Car parking will be provided up to the maximum provision set out in CDC's Local Plan. Based on these standards an average of 1 space is permitted for a 1 bedroomed dwelling while the maximum standard for 2 and 3 bedroomed dwellings is 2 spaces (although most will be 1 parking space). For 4 and 5 bed dwellings the maximum is 2 spaces.

## Surface Water Drainage

Surface water attenuation shall be provided broadly in accordance with the proposals identified in the Drainage Strategy and as identified on Drawing 3-3, sheets 1 and 2.

Surface water drainage will be managed using a Sustainable Drainage System (SuDS). This will involve a combination of gravel-filled channels, underground storage facilities, above ground attenuation basins (some of which will support water for most of the year) and other wetland features. Those attenuation basins that will not hold water permanently will be specifically designed to do this to create habitats of value to wildlife.

## Services

There are no existing public utilities crossing the site however there are telecoms (BT), 11kv and LV Electricity supplies (SSE) and water mains (Thames Water) on the periphery of the site adjacent to Lords Lane (A4095) and Banbury Road (B4100) with existing gas mains and foul sewers to the west and south.

The proposed utilities serving the proposed housing and other uses would be located in the spine footways and road ways. Reinforcement and interconnection with the existing utility infrastructure would be required, however due to the size and reduced demand of the development this would be relatively small scale. The electricity system would incorporate supply connections from an on-site Energy Centre that would also supply the proposed district heating system.

Although the Exemplar is phased ahead of the main NW Bicester Eco development, the utility provision in this initial phase would be set out to allow connectivity with the future renewable energy strategy for the NW Bicester development.

## Phasing of Development

The site shall be developed in phases, starting at the southern edge of the Exemplar, building from Banbury Road into the development. The construction will be phased from 2011, as outlined in Section 3.3 below. Table 3-1 summarises the proposed land use across the Exemplar Development.

**Table 3-1 Proposed Land Use of Exemplar Development**

Use	Quantum
Class C3 Residential	394 dwellings
Primary School (Land)	1.34 ha
B1(a) Office Accommodation	2,900 sq m
Eco-Pub	190 sq m
Retail Units (Class A1)	770 sq m
Community Centre	350 sq m
Energy Centre	400 sq m
Nursery	350 sq m

## 3.3 Construction Strategy

The construction of the Exemplar Site will be undertaken by two contractors. The contracts will be let as three packages of work comprising:

- The northern section of the Exemplar.
- The southern section of the Exemplar.
- Infrastructure across the whole Exemplar.

The construction approach has not yet been determined, as the individual contracts have not yet been commissioned. The infrastructure works will commence in Summer 2011, with a duration of 6 months. The remaining construction work will commence in 2012, starting with 50 units during year one, and 100 units per year thereafter.

Routes for construction traffic will be in accordance with HGV limits in place throughout Bicester. As a result, Exemplar Site construction traffic would be likely to use the following routes:

- The B4100 Banbury Road for travel to/from Junction 10 of the M40
- The A4095, A4221 and A41 for travel to/from Junction 9 of the M40

A Construction Environmental Management Plan (CEMP) will be prepared and would incorporate the mitigation measures outlined in the ES. This will be implemented throughout the construction phase.

The Development has been designed for long-life, adopting future-proofing principles. It is unlikely that the Development would be decommissioned within a period that can be forecast, therefore decommissioning is not included as part of this ES.

## 4 Alternatives Considered

### 4.1 Introduction

This chapter summarises the main alternatives considered during the development of the proposals. This considers the evolution of the proposal from the time when an eco development was first shortlisted within Cherwell District, to the specific layout within the Exemplar Site boundary.

In accordance with Article 5 (3) of Directive 97/11/EC, the environmental impacts of alternatives reviewed are described in the ES, as well as the reasons for choosing the proposed development, taking account of the environmental effects. This demonstrates the consideration of environmental impacts has been considered as an integral part of the design process.

### 4.2 Weston Otmoor Eco development Site

Following publication of PPS1 – eco-towns, councils across the UK submitted applications for eco-towns to be considered within their local areas. Twelve locations were shortlisted, one of which was located within Cherwell District. The original location was near the village of Weston-on-the-Green; this proposal was known as Weston Otmoor. It comprised 15,000 dwellings, 15,000 jobs and a range of retail space, leisure facilities, primary and secondary schools, healthcare provision and community facilities. CDC objected to the Government's proposal at Weston Otmoor, raising the suggestion of an alternative eco development at NW Bicester. This concept was based upon Local Development Framework (LDF) work undertaken by CDC.

The Eco-towns Location Decision Statement<sup>1</sup> stated '*the [Weston Otmoor] site was considered not to demonstrate the potential to meet the sustainability and deliverability requirements for successful development as an eco-town at this time*'. Some of the key sustainability issues of the site included being partially on the Oxford Green Belt, being located on high grade and versatile agricultural land (Grade 2), on a site incorporating Ancient Woodland, Sites of Special Scientific Interest (SSSI) and a Nature Reserve, being in an area of 'serious' water stress, and being close to a congested road junction on the M40 and A34 which could encourage commuting and exacerbate congestion.

### 4.3 Determining the Exemplar Site Boundary

During the development of the Exemplar Site proposals, P3Eco and A2Dominion Group considered a number of alternative boundaries for the site. The environmental consultant's advising the design team were consulted at all stages to comment on proposed land parcel selection, however the selected site boundary largely reflected the result of negotiations with landowners and the shape of the land parcels available.. Key aspects to the siting of the Exemplar included frontage to the ring road in order to establish the optimum link with Bicester town, connectivity through the site and critical mass.

### 4.4 Development of Site Layout

#### Layout One

At this point at the process the concept of locating the village facilities to the south and in central location was in place but the settings for the non residential functions had not yet been established and a number of studies for the centre were undertaken. Key features were discussed, including the location of the village store, the response to the watercourse and the

potential settings. Initial ecological information was emerging and the design team were beginning to form views as to how to respond to the watercourse. In parallel with these studies research on post medieval poly focal villages was being undertaken for national settlements and local villages. This analysis led to an arrangement with a market square to the east and a village green to the west, providing different settings for the retail based uses and a quieter environment for the school and Care Home. The road link to the south was placed next to the hedgerow as it was believed that the main badger set sat in the middle of the watercourse and was to be avoided.

In this early phase it was assumed that the land available would support a single road connection without other uses in the middle zone. The fields to the north were informed by the orthogonal pattern of the hedgerow but are yet to provide suitable buffer zones for habitat retention or creation and the local open space provision was yet to be addressed.

## Layout Two

Further analysis was undertaken of local precedent to understand the size and the facilities of the village centre settings in relation to their population so that the village square and the village green designs could be progressed.

There was a refinement of the village settings and seeks to create greater containment by placing accommodation to the south and opening the spaces to the watercourse.

The field pattern grain started to appear in the fields to the north and the south. In fields to the north, two elements were used to work 'across' the grid; a green link supporting a wildlife corridor connecting with the ancient woodlands to the north and the vehicular route that is located by road engineering analysis of the Banbury Road. Similarly to the south the junction (due to its location relative to the roundabout) resulted in a road that adds variety to the grid.

The initial responses to the landscape assessment and the ecology studies were included with emerging buffer areas and a greater appreciation of the watercourses. Flood risk data was still unavailable and housing locations were not yet modified.

The key development in this stage was the opportunity provided by the evolution of the red-line boundary. Following consultation with the local farmer, the middle zone was accommodated by the Care Home and housing, fronting the vehicular link and designating a crossing point for the farmer's livestock.

## Layout Three

Further refinement of the village settings were developed in three dimensions to respond to the gradient and the bridge crossing. The school site was increased to 0.6ha and the village square proportions were modified.

Housing continued to be shown as solely terraced to understand the street pattern but in parallel attitudes to key frontages were being discussed by the design team. Pressure to maximise housing numbers resulted in the green link shrinking and losing connectivity and its ability to provide meaningful playspace. Car parking was on drives in front of the properties meaning that street edges were less well defined.

## Layout Four

There were a number of significant design changes at this point that result in the layout appearing more like the final proposal for the Exemplar.



To the north the green link and road link were unified towards the centre of the plan making a more meaningful space with play facilities and a buffer habitat to the central hedgerow. The edge buffer zones have softened the plan. A level of complexity has been achieved within the streetscape but this idea continues to develop. Homezones have been established and the network of pedestrian and cycle routes have been developed.

Unit types were allocated with reduced massing to edges and significantly the housing is moved to the street edge by removing cars from driveways in front of the houses and placing them to the side and behind in car parking courts.

The Care Home provider decided to wait for a latter phase for inclusion and housing has been grouped in the middle zone. The school site was expanded to 0.8 ha, placing school fields next to the badger sett and the east/west watercourse. Meanwhile next to the village square the energy centre (with Biomass) and village store have been collocated to share the service yard and minimise the impact of the servicing requirements.

## The Proposal

The key changes from the fourth layout to reach the final proposals were:

- Road link minimised to become less intrusive, with improved frontage by houses
- Car courts were reduced in size and familiarised
- Greater complexity and layering in the landscape settings throughout the scheme.
- SuDS proposal developed
- Flood risk information made available and layout modified
- Ecological Assessments and interpretation made available to allow for development of habitats
- Non-residential uses grouped into a High Street concept that allows unified education facilities and reduces walking distances and car parking duplication.
- School site expanded to 1.34 hectares and placed to southern boundary to facilitate expansion into future phase.
- Entrance features developed to mark arrival and departure from the site.

## 5 Environmental Impact Assessment Methods

### 5.1 Introduction

This ES presents the assessment of the environmental effects likely to result from the construction and operation of the Development. As outlined in Section 3.3, decommissioning of the Development is not considered in this ES. This chapter sets out the various stages of the EIA and the methods used to assess the various environmental topics.

### 5.2 Scoping of Environmental Topics

In accordance with Regulation 5 of the Town and Country Planning (Environmental Impact Assessment) Regulations 1990 (as amended), a request for screening and scoping opinion was submitted in July 2010 by Hyder Consulting. This identified that the Development could have significant environmental effects on the following topic areas:

- Landscape and Visual Impact
- Ecology
- Flood Risk and Hydrology
- Air Quality
- Noise
- Built Heritage and Archaeology
- Contaminated Land
- Agriculture and Land Use
- Human Health
- Socio-Economics and Community
- Waste
- Traffic and Transport

The following areas have been scoped out of the ES:

- A separate Sustainability chapter has not been included as this is being covered in a separate Sustainability Statement. This will be submitted as part of the Exemplar Site planning submission.
- Microclimate studies have not been included within the ES, as it is not considered that there will be significant effects on environmental receptors. A separate daylight/sunlight study has been prepared to inform the design and ensure compliance with accepted building design practice in terms of user comfort and functionality of the proposals.

The Scoping Report provided an outline approach for the identification of potentially adverse and beneficial effects. It was sent to the following statutory consultees and stakeholders for comment:

- Environment Agency: (Thames Region)
- Natural England: (South East Region)
- English Heritage: (South East Region)
- Cherwell District Council

- Oxfordshire County Council
- Thames Water
- Highways Agency
- Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust

The scoping has evolved with the design and reflects the iterative nature of the consultation process. Thus, since the scoping was undertaken, the methodology has developed as the design progressed, through further discussion with the statutory bodies. The Scoping Report and responses are included in Appendix 1A.

## 5.3 Consultation

From the outset, P3Eco has had an open approach to information about the development and has made a substantial number of public and private presentations and ensured information is made available via [www.nwbicester.co.uk](http://www.nwbicester.co.uk).

As well as through numerous ad hoc meetings and conversations, there has been structured contact through both the project workstream structure and formal periods of consultation.

The detailed work to produce the wider Masterplan (ongoing) and specific proposals for the Exemplar scheme began with an Open Planning Week which established local ambitions, context and concerns. Subsequently, there have been two further periods of consultation which have provided opportunities to scrutinise both outline and detailed plans for the Exemplar scheme prior to submission.

There is a significant level of active support for the proposed Exemplar from key groups, including elected representatives on Town, District and County councils and in consultation responses from the local parish – Caversfield. There has also been consistent support from Bicester Vision (the public-private partnership) and the Bicester Chamber of Commerce. Various other groups, including the Bicester Local History Society, the residents' associations and individual business and community associations have shown consistent interest.

A good level of awareness of the proposals for NW Bicester has been established and a significant amount of interest shown in information presented publicly. Primary concerns have centred on whether the development will reach the high expectations of sustainability and the impact of the additional population on traffic and other infrastructure.

During the EIA process, statutory and key non-statutory consultees have been engaged both as a part of the scoping process and during ES preparation. These key consultees include English Heritage, Natural England, the Environment Agency (EA), Cherwell District Council (CDC) and Oxfordshire County Council (OCC). Topic specific consultation is described in the relevant topic chapter.

## 5.4 Environmental Impact Assessment General Methodology

In accordance with relevant guidelines, the EIA has incorporated the following elements:

**The Baseline:** Baseline environmental conditions, including those that are predicted to exist immediately prior to construction and operation of the development as well as those currently existing, will be identified through a number of means. They can be determined through the use of existing data or through undertaking additional surveys, studies and modelling. Each

environmental discipline has identified key resources and receptors that have been taken into account during the assessment process.

**Assessment Scenarios:** For all topics, assessments have been made of the impacts with (Do-Something) and without (Do-Minimum) the proposed development. The Do-Minimum scenario represents a baseline against which the environmental effects of the development can be measured. This takes account of the likely future baseline conditions, allowing for environmental trends and planned future development that has not yet been implemented.

**Spatial Scope:** The area over which impacts could occur could be wider than the area of land directly taken by the proposals. It is inappropriate to define a single study area for the assessment, since the spatial scope varies depending on the topic under consideration. The study areas allow for the assessment of indirect as well as direct effects, including off-site works such as spoil disposal and routes for construction traffic.

**Temporal Scope:** In considering the environmental effects of the development, it is necessary to identify impacts that may occur during construction or operation. Construction extends from the commencement of site works to the date immediately prior to opening of the development. Operation extends from immediately after opening of the development for the remainder of its life. In addition, it is recognised that some environmental design measures would take time to become established and effective. The assessment therefore considers impacts in Year 1 (Opening Year) and in Year 15 (Design Year), where appropriate. It is also recognised that some effects would be of a permanent nature whereas others would be temporary.

**Assessing Impacts:** Impacts associated with the construction and operational stages of the proposed development will be identified during the course of the EIA process. These will be considered in terms of their nature, the physical extent of their influence and the magnitude of their effects. In considering the nature and significance of the impacts, the effects will be assessed on the basis of whether they will be:

- Direct or indirect
- Temporary, short, medium or long term
- Reversible or irreversible
- Beneficial or adverse
- Cumulative

Qualitative and quantitative techniques have been used to assess these impacts, as appropriate.

The EIA will identify those elements of the development that have been introduced to mitigate potential adverse effects and assesses the significance of the impacts that remain after mitigation measures have been put in place (the “residual impacts”).

**Determining Significance:** Determining whether or not an effect is significant, is an important step in the formal EIA process, and is necessary in order to satisfy statutory reporting requirements. In general, the significance of an impact reflects the importance or value of the affected resource or receptor, its sensitivity to change, and the magnitude of the predicted impact. The criteria for determining significance will vary from topic to topic but the general principle will be that higher magnitude impacts on important resources will be regarded as significant. Lower magnitude impacts on less important resources will not generally be regarded as significant.

## 5.5 Cumulative Effects

Cumulative impacts result from the incremental impacts of the development when added to other past, present and reasonably foreseeable future actions. The impacts from a single development may not be significant on their own but when combined with other impacts and other developments, these effects could become significant.

Cumulative effects will be considered by describing and assessing the following:

- Interaction of impacts from the development with those from other plans or activities, including the various phases of the redevelopment of this site.
- Interaction of different impacts of the development, which affect the same resource or receptor.

Cumulative impacts are considered in each topic chapter as necessary, and summarised in Chapter 18, Cumulative Effects.

## 6 Landscape and Visual Impact

### 6.1 Introduction

This chapter considers the landscape and visual implications of the proposed development. Landscape is defined in the European Landscape Convention<sup>1</sup>, as ‘...an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors’. Visual considerations relate specifically to the views of a landscape afforded to people. These separate but related issues form the basis for landscape and visual impact assessment (LVIA).

### 6.2 Regulatory and Policy Framework

This impact assessment has been undertaken in accordance with current international and national legislation, and national, regional and local plans and policies relating to landscape and visual amenity in the context of the proposed Exemplar development. A summary of the relevant legislation and policies, the requirements of these policies and the Eco Development response has been provided in Table 6-2 below:

**Table 6-2 Policy/Legislation**

<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Bicester Eco Development Exemplar Response</b>
PPS7 - Sustainable Development in Rural Areas <sup>2</sup>	All development in rural areas should be well designed, in keeping with its location, and sensitive to the character of the countryside and local distinctiveness.	Development will respect and enhance local landscape character, securing appropriate mitigation where damage to local landscape character cannot be avoided. This will be achieved, in large part, through green infrastructure proposals and through design in response to the local vernacular
Cherwell District Council LDF: Core Strategy Policy SD11 - Local Landscape Protection and Enhancement <sup>3</sup>	Opportunities will be sought to secure the enhancement of the character and appearance of the landscape, particularly in urban fringe locations, through the restoration, management or enhancement of existing landscapes, features or habitats and where appropriate the creation of new ones, including the planting of woodlands, trees and hedgerows. Development will be expected to respect and enhance local landscape character, securing appropriate mitigation where damage to local landscape character cannot be avoided. Proposals will not be permitted if they would:	Development will respect and enhance local landscape character, securing appropriate mitigation where damage to local landscape character cannot be avoided. This will be achieved, in large part, through green infrastructure proposals and through design in response to the local vernacular

Policy/Legislation	Requirements	Bicester Eco Development Exemplar Response
	<ul style="list-style-type: none"> <li>▪ Cause undue visual intrusion into the open countryside;</li> <li>▪ Cause undue harm to important natural landscape features and topography;</li> <li>▪ Be inconsistent with local character;</li> <li>▪ Harm the setting of settlements, buildings, structures or other landmark features; or</li> <li>▪ Harm the historic value of the landscape.</li> </ul> <p>Development proposals should have regard to the information and advice contained in the Council's Countryside Design Summary Supplementary Planning Guidance, and the Oxfordshire Wildlife and Landscape Study (OWLS).</p>	

## 6.3 Methodology

### 6.3.1 Introduction

The assessment process has been carried out based on guidance entitled 'Guidelines for Landscape and Visual Impact Assessment: Second Edition', produced by the Landscape Institute and Institute of Environmental Management and Assessment, in 2002<sup>4</sup>.

### 6.3.2 Study Area

The Study Area is broadly defined by the Zone of Visual Influence (ZVI) of the proposed development, or the theoretical area from which any part of the proposed development would be visible.

Given the local topography, vegetation cover and built form, the ZVI is relatively contained, extending northwards to Bainton Road, eastwards to Caversfield/nearby settlement, southwards to the northern edge of Bicester, and westwards to the railway line embankment. The ZVI is illustrated on Drawing 6-1.

A local landscape character assessment has been undertaken for land to the north-west of Bicester, within which the proposed development site sits. Landscape character areas extend beyond the ZVI where there is continuity of respective landscape characteristics outside of the ZVI limits.

### 6.3.3 Establishment of Baseline Conditions

Baseline conditions are defined by landscape character and respective sensitivity, together with visual amenity (as represented by views) and the sensitivity of visual receptors (or potential viewers), in accordance with the criteria set out below:

**Table 6-3 Assigning Landscape Sensitivity**

<b>Sensitivity</b>	<b>Description</b>
Very High	Landscape unlikely to tolerate any change (of the nature and type proposed), even with mitigation. Typically of very high importance and rarity, international scale, and very limited potential for substitution (e.g. World Heritage Site).
High	Landscape unlikely to tolerate change (of the nature and type proposed) and effective mitigation would be difficult to achieve. Typically of high importance and rarity, national scale, and limited potential for substitution (e.g. National Park or Area of Outstanding Natural Beauty).
Medium	Landscape likely to tolerate a small degree of change (of the nature and type proposed) and effective mitigation would be possible Typically of high or medium importance and rarity, regional scale, and limited potential for substitution (e.g. Registered Historic Park and Garden, Conservation Area).
Low	Landscape likely to tolerate a large degree of change (of the nature and type proposed) and effective mitigation would be readily achievable Typically of low or medium importance and rarity, local scale, such as undesignated landscape.
Negligible	Landscape likely to tolerate extensive change (of the nature and type proposed) and to benefit from mitigation. Typically of very low importance and rarity, local scale, such as degraded landscape identified for enhancement in policies.

**Table 6-4 Assigning Visual Sensitivity**

<b>Sensitivity</b>	<b>Description</b>
Very High	Recreational routes within nationally valued landscapes (such as National Parks or Areas of Outstanding Natural Beauty), where appreciation of affected views may be the principal activity.
High	Recreational routes outside of nationally valued landscapes, where attention may be focussed on affected views. Residential Properties.
Medium	Open areas/ recreation areas outside of nationally valued landscapes, where attention may be focussed on affected views.
Low	Places of work or commercial properties, where attention is unlikely to be focussed on affected views.
Negligible	Roads and railways, where views are transient due to travelling through the landscape.

Relevant information has been obtained from Natural England (previously the Countryside Agency), Oxfordshire County Council, Cherwell District Council and Ordnance Survey, with field survey work during Summer/early Autumn 2010. Key information sources are as follows:

- Cherwell District Council (2010); 'Draft Core Strategy'.<sup>3</sup>



- Countryside Agency (1999); 'Countryside Character'.<sup>5</sup>
- Cherwell District Council (1995); 'Cherwell District Landscape Assessment'.<sup>6</sup>
- Oxfordshire County Council (2004); 'Oxfordshire Wildlife and Landscape Study'.<sup>7</sup>

Viewpoints have been selected to represent the range of visual receptors and views affected, against which visual sensitivity was assessed. These were agreed with Cherwell District Council and corresponding photographs and photomontages have been produced in accordance with Landscape Institute Advice Note 01/04 entitled 'Use of Photography and Photomontage in Landscape and Visual Assessment as Amended (August 2008)'.<sup>8</sup> Photographs have been taken using the digital equivalent of a 50mm lens for 35mm format camera, with Digital SLR camera lens at 1.65m above ground level. Photographs have been reproduced in the form of stitched, multiple-frame panoramas with the vertical frame dimension fixed at that for a standard 6" (150mm) x 4" (100mm) photograph and a panorama composition broadly of one third sky and two thirds land.

## 6.3.4 Assessment of Effects

The criteria and threshold matrices used to assess the magnitude of impact and significance of landscape and visual effects are set out below:

**Table 6-5 Assigning Magnitude of Landscape Impact**

<b>Magnitude of Impact</b>	<b>Description</b>
Major Adverse	Loss of landscape character and/or quality and integrity of landscape designation; severe damage to key landscape characteristics, features and elements.
Major Beneficial	Large scale or major improvement of landscape quality; extensive restoration or enhancement; major improvement of landscape attribute quality.
Moderate Adverse	Loss of landscape character, but not adversely affecting the integrity of landscape designation; partial loss of/damage to key landscape characteristics, features or elements.
Moderate Beneficial	Benefit to, or addition of, key landscape characteristics, features or elements; improvement of landscape attribute quality.
Minor Adverse	Some measurable change in landscape attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key landscape characteristics, features or elements.
Minor Beneficial	Minor benefit to, or addition of, one (maybe more) key landscape characteristics, features or elements; some beneficial impact on landscape attribute or a reduced risk of negative impact occurring.
Negligible Adverse	Very minor loss or detrimental alteration to one or more landscape characteristics, features or elements.
Negligible Beneficial	Very minor benefit to or positive addition of one or more landscape characteristics, features or elements.
No Change	No loss or alteration of landscape characteristics, features or elements; no observable adverse or beneficial impact.

**Table 6-6 Assigning Magnitude of Visual Impact**

<b>Magnitude of Impact</b>	<b>Description</b>
Major Adverse	Where the Proposed Development would cause a substantial deterioration in existing views.
Major Beneficial	Where the Proposed Development would cause a substantial improvement in existing views.
Moderate Adverse	Where the Proposed Development would cause a noticeable deterioration in existing views.
Moderate Beneficial	Where the Proposed Development would cause a noticeable improvement in existing views.
Minor Adverse	Where the Proposed Development would cause a minor deterioration in existing views.
Minor Beneficial	Where the Proposed Development would cause a minor improvement in existing views.
Negligible Adverse	Where the Proposed Development would cause a very inconspicuous deterioration in existing views.
Negligible Beneficial	Where the Proposed Development would cause a very inconspicuous improvement in existing views.
No Change	No discernable deterioration or improvement in existing views.

:

**Table 6-7 Determining the Significance of Effect**

<b>Sensitivity</b>	<b>Magnitude of Impact</b>				
	<b>No Change</b>	<b>Negligible</b>	<b>Minor</b>	<b>Moderate</b>	<b>Major</b>
<b>Negligible</b>	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight
<b>Low</b>	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
<b>Medium</b>	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
<b>High</b>	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
<b>Very High</b>	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
<p>Note: Significance is derived as a product of Magnitude and Sensitivity, as set out above. Where more than one significance outcome is possible, professional judgement is used to determine that which is most appropriate, on a case by case basis.</p>					

**Table 6-8 Definitions for Significance of Effect**

<b>Significance of Effect</b>	<b>Description</b>
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer most damaging impact and loss of resource integrity. However, a major change in site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	Those beneficial or adverse effects may be important, but are not likely to be key decision making factors. The cumulative effects of such factors may influence the decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision making process, but are important in enhancing the subsequent design of the Project.
Neutral	No effects or those that are beneath levels of perception, within the normal bounds of variation or within the margin of forecasting error.

### 6.3.5 Consultation

Viewpoints have been agreed with Cherwell District Council, following attendance at workshops, telephone conversations and correspondence dated 3<sup>rd</sup> August, 3<sup>rd</sup> September, 9<sup>th</sup> September and 27<sup>th</sup> September 2010.

## 6.4 Description of Existing Baseline Conditions

### 6.4.1 Landscape

The site and immediate surroundings are not covered by any landscape designations.

Natural England (previously the Countryside Agency) has produced a landscape character assessment of England entitled 'Countryside Character', 1999<sup>5</sup>. Land to the north-west of Bicester is defined by the transition between National Character Areas 107 and 108, the 'Cotswolds' and 'Upper Thames Clay Vales', respectively. More locally, the area forms part of the 'Oxfordshire Estate Farmlands' Character Area identified in Cherwell District Landscape Assessment (1995)<sup>6</sup>. This is broadly described as having a rolling landform, with underlying limestone geology, characterised by a distinctive pattern of woodlands and mixed farmland - much of which is associated with 18<sup>th</sup> Century parkland. Most recently, the Oxfordshire Wildlife and Landscape Study (2004), places the site within 'Wooded Estatelands' Landscape Character Type, with the following key characteristics<sup>7</sup>:

- 'Rolling topography with localised steep slopes.
- Large blocks of ancient woodland and mixed plantations of variable sizes.
- Large parklands and mansion houses.
- A regularly shaped field pattern dominated by arable fields.

- Small villages with strong vernacular character.'

Within this Character Type, the land near Bicester is classified as 'Middleton Stoney' Landscape Character Area, described as follows:

*'The area is dominated by large arable fields and localised improved grassland. There are smaller grass fields around villages, particularly Bletchington and Kirtlington. Woodland is a strong landscape element, and large woodland blocks are associated with the parklands and estates. It is mainly ancient semi-natural woodland, with species such as ash, oak, hazel, and field maple, as well as mixed plantations. Throughout the landscape, there are belts of young mixed and coniferous plantations next to roadside hedges and they often function as field boundaries. Hedgerow trees such as ash, sycamore and occasionally oak are found in some roadside hedges, but they are sparser to the north where there is more intensive arable cropping. In parts there are dense corridors of willow and ash, belts of semi-natural woodland and poplar plantations bordering watercourses. Hedgerows vary from tall, thick species-rich hedges with shrubs such as wayfaring tree, dogwood, hazel, field maple, spindle and wild privet through to low, gappy internal field hedges. Parklands are a prominent feature throughout and they include Middleton, Bignell and Tusmore Parks in the north and Kirtlington and Bletchington Parks in the south.'*

The landscape strategy for the Wooded Estate lands, within which the Middleton Stoney area lies, is to safeguard and enhance the characteristic landscape of parklands, estates, woodlands, hedgerows and unspoilt villages.

## Local Landscape Character

As part of the landscape impact assessment process for the Bicester Eco Development project, a landscape character assessment has been prepared for land to the north-west of Bicester based on the principles set out in 'Landscape Character Assessment Guidance for England and Scotland', produced by the Countryside Agency and Scottish Natural Heritage, in 2002<sup>9</sup>. In line with this guidance, landscape character areas have been identified and key landscape characteristics defined for each. The sensitivity of each landscape character area to mixed use development has also been identified, based on the criteria set out in the methodology, above.

Drawing 6.2 illustrates the landscape character areas that have been identified, each with a distinctive sense of place, in the form of key characteristics, described below. This provides the local landscape character context for the site. The Exemplar Site falls within Caversfield Valleys and Ridges character area:

### Caversfield Valleys and Ridges

- Distinctive valley and ridge landform.
- Valleys defined by tree lined watercourses, woodland blocks and relatively steep fields predominantly laid to pasture.
- Mixed farmland on ridges, with fields bounded by established hedgerows and woodland blocks.
- Settlement comprising the historic, stone built village of Caversfield, including Home Farm and the Anglo-Saxon St Lawrence's Church (Listed Buildings), with the church tower forming a visible element in the local landscape.
- Generally strong sense of enclosure due to characteristic landform, vegetation and settlement edges.

The setting of St Lawrence's Church and Home Farm are key considerations for any future development within this character area. This setting is currently defined in large part by

undeveloped agricultural land with associated rural qualities, in turn allowing views from these areas to the church tower, such that built development without adequate open buffers would be incongruous. Development edges made up of soft landscape proposals and sensitively designed built form have the potential to conserve and enhance the current setting of historic features and would respond well to the existing tree and woodland cover, described above. The strong landscape structure and general sense of enclosure across the landscape are such that with careful consideration for retention and enhancement of local features (described above) development could be accommodated without resulting in disruption to the local landscape pattern. Overall, taking into account the existing landscape and scope for mitigation, this landscape is considered to have a **low sensitivity**.

#### Bucknell Ridge

- Ridgeline defined by subtly raised landform, with land falling away to local watercourses and Bicester urban edge.
- Large, rectilinear fields, predominantly in arable use.
- Established hedgerows with hedgerow trees.
- Settlement limited to scattered farmsteads of clustered farm buildings.
- Open, expansive views framed by established hedgerow vegetation.

Development in this raised area has the potential to form an obtrusive element within the landscape. However, if new built form responds to the local pattern of clustered settlement, buffered by tree planting and separated by open land, development could occur without undue urbanising effects in the wider landscape. Overall, taking into account the existing landscape and scope for mitigation, this landscape is considered to have a **low sensitivity**.

#### Bucknell Valley Corridor

- Shallow valley depression, falling between local ridgelines.
- Landscape pattern heavily influenced by linear communications and drainage features, with generally narrow, elongated fields separated by communications and drainage corridors.
- Farmland comprising mixture of fields in arable and pastoral use, bounded by established hedgerows and copses.
- Settlement defined by a mixture of scattered farmsteads and, nearer the urban edge, modern offices /depots.
- Strong sense of enclosure due to vegetation cover, railway embankment and settlement edges.

This enclosed landscape offers limited views across the area and, with careful consideration for existing vegetation, development could be accommodated without resulting in significant disruption to the local landscape characteristics. There is considerable scope to enhance communications/drainage corridors through landscape proposals that improve amenity value, particularly where there is currently/could be public access. Overall, taking into account the existing landscape and scope for mitigation, this landscape is considered to have a **low sensitivity**.

#### Himley Farmland Slopes

- Gently sloping farmland, predominantly in arable use, interspersed with woodland shelter belts.
- Medium to large-scale fields bounded by established hedgerows with hedgerow trees.

- Settlement limited to isolated farmsteads, including the historic Himley Farm buildings (the barns are Listed Buildings), connected by hedgerow lined tracks.
- A number of overhead power lines, which form urbanising elements, traverse the area.

This gently sloping, enclosed landscape, offers limited views across the area, and with careful consideration for local features (described above), development could be accommodated without resulting in disruption to the local landscape pattern. Whilst Listed Buildings present a constraint, the setting could be respected through careful layout of proposals, retention of landscape features and structural planting, where appropriate. Overall, taking into account the existing landscape and scope for mitigation, this landscape is considered to have a **low sensitivity**.

## 6.4.2 Visual Amenity

The Zone of Visual Influence is described in relation to the Study Area, above. Key visual receptors include a local Public Right of Way and approach to Bicester along the B4100, north of the site, residential properties at Caversfield (at Caversfield House and Home Farm, a Listed Building) and southeast of Caversfield (near Skimmingdish Lane), and the B4100 south/east of the site. In the case of the Church of St Lawrence, a Listed Building near the eastern edge of the site, intervening evergreen vegetation prevents views to the Site such that the church is not considered to be a visual receptor.

Viewpoints have been selected to represent the range of visual receptors and views affected, against which visual sensitivity is assessed. The locations of viewpoints are indicated on Drawing 6.1, with corresponding panoramic photographs illustrated on Drawings 6.3 to 6.7. Photographs were taken during the summer/early autumn months with deciduous vegetation in leaf. During winter months the obstructive effects of this vegetation would be reduced in some instances, as indicated in relation to individual representative viewpoints below:

Viewpoint 1: View north-eastwards from field gate off A4095 Lords Lane: This view represents users of Lords Lane road, at the northern edge of Bicester, and visual sensitivity is therefore considered to be **negligible**. This view illustrates the glimpsed views available through field gateways, in which the proposed development site is obscured by trees and hedgerows in the wider agricultural landscape. Due to the density of trees and shrubs the obstructive effects of this vegetation would be comparable during winter.

Viewpoint 2: View north-eastwards from junction of Germander Way and A4095 Lords Lane: This view represents users of Lords Lane road and cycleway together with adjacent properties, at the northern edge of Bicester. Given the presence of residential properties and a recreational route, visual sensitivity is considered to be **high**. Existing visual amenity is characterised by established tree and shrub planting along Howes Lane, which also serves to direct views along the road corridor and limit views of the wider landscape to those through intermittent field gateways. Due to the density of trees and shrubs the obstructive effects of this vegetation would be comparable during winter.

Viewpoint 3: View north-westwards from B4100 Banbury Road south of Home Farm/Caversfield: This view represents users of Banbury Road and as such visual sensitivity is considered to be **negligible**. Hedgerows and intermittent hedgerow trees limit views out to the wider landscape, such that the road, signage, grass verges and adjacent hedgerows form the dominant elements, with only glimpses to the proposed development site. During winter glimpses would be more frequent due to leaf loss within the hedgerows.

Viewpoint 4: View westwards from residential properties south of Caversfield: This view represents residential properties and adjacent minor roads south of Caversfield (near Skimmingdish Lane). Given the presence of residential properties, visual sensitivity is



considered to be **high**. At ground level, dense hedgerows dominate the foreground, allowing only glimpses of the agricultural fields beyond. From first floor windows views are more open, but with hedgerows in the wider landscape preventing unimpeded views to the proposed development site. Due to the density of hedgerows, the obstructive effects of this vegetation would be comparable during winter.

Viewpoint 5: Views north-westwards from B4100 Banbury Road at Caversfield: This viewpoint represents views from properties at Caversfield and adjacent Banbury Road. Given the presence of residential properties, visual sensitivity is considered to be **high**. In the case of the Church of St Lawrence views to the proposed development site are obstructed by evergreen vegetation in the church yard, with only first floor views available from buildings at Caversfield House (including the Lodge) due to intervening walls and hedges. At ground level, views of the proposed development site are impeded by dense hedgerows and intermittent hedgerow trees, with more open views of the pastoral fields that make up north-eastern part of the site from first floor windows. Due to the density of hedgerows, the obstructive effects of this vegetation would be comparable during winter; however the filtering effect of trees would be reduced.

Viewpoints 6 and 7: Views south-westwards and north-westwards at entrance to Home Farm Business Units: This viewpoint represent views of Home Farm business unit users, visual sensitivity is therefore considered to be **low**. From the properties and outbuildings, established trees at the periphery of the farm complex filter views out to the surrounding agricultural fields and proposed development site. Whether from the access or business premises, views of the proposed development site are largely impeded by dense hedgerows and intermittent hedgerow trees, with only the pasture that makes up the western part of the site visible in the background of Viewpoint 5. Due to the density of hedgerows, the obstructive effects of this vegetation would be comparable during winter; however the filtering effect of trees would be reduced.

Viewpoints 8 and 9: Views southwards from Public Footpath northwest of Caversfield: These views represent views from a recreational route and as such visual sensitivity is considered to be **high**. Current views towards the proposed development site are defined by the local agricultural landscape, with open arable fields forming the foreground and a backdrop of established hedgerows, copses and woodlands. Views of the proposed development site are impeded by hedgerows and due to their density the obstructive effects of this vegetation would be comparable during winter.

Viewpoint 10: View southwards from junction of B4100 Banbury Road near Bainton Road: This view represents users of Banbury Road and as such visual sensitivity is considered to be **negligible**. Due to the slightly elevated position of the road views out to the local agricultural landscape are available, in which the foreground is defined by hedgerows and arable fields and the backdrop is formed by established hedgerows, copses and woodlands. Views of the proposed development site are impeded by dense hedgerows. Due to the density of hedgerows, the obstructive effects of this vegetation would be comparable during winter.

Railway: It is not possible to obtain a geo-referenced viewpoint from the railway due to the movement of the trains; however, these views, of **negligible** visual sensitivity, are described as follows: Elevated views over the proposed development site are available when approaching or leaving Bicester, on embankment. In these views, the enclosed agricultural land that makes up the site is seen within the context of Bicester's current urban edge, defined by urban extensions dating to the 1990s. Views are partially obscured by vegetation on the railway and trees within the wider landscape, the filtering effects of which would be slightly reduced in winter due to deciduous leaf loss.

## 6.5 Design and Mitigation

### 6.5.1 Construction

Construction best practice would be employed to minimise landscape and visual disruption, specifically with respect to the following:

- Translocation of hedgerows.
- Protection of retained trees and hedgerows in accordance with the scheme arboricultural method statement.
- Location of construction compounds and areas for material/plant storage away from sensitive views, wherever possible.
- Careful management of retained vegetation at the site periphery to provide visual screening and early buffer planting, wherever possible, to contribute to early screening and landscape enhancement.

### 6.5.2 Operation

As set out in the ES introductory chapters, the scheme has been developed in line with key project objectives, principally, in relation to landscape, to create a national exemplar of integrated, multi-functional green space/infrastructure of very high quality, which complements that of Bicester. The proposed development both responds to landscape character, as expressed through landscape character assessments (set out in Section 6.4, above) and creates a new, high quality landscape in its own right. Specifically, the following design measures have been employed in respect of landscape and visual amenity:

- Retention or translocation of the majority of existing tree and shrub vegetation.
- Response to local character in the scale, layout, massing and appearance of built form, through creating a nucleated pattern of settlement that reflects the local vernacular in form and use of materials.
- Open land/buffer around heritage features (St Lawrence's Church/Home Farm) and retention of vistas to the church tower of St Lawrence's Church, which forms a feature in the local landscape.
- Green infrastructure proposals that respond to the wooded character of the local landscape, through native tree and shrub belts, strengthening hedgerow cover, and enhancing the locally characteristic, tree-lined watercourses.
- Creation of development buffers through judicious planting of tree and shrub species characteristic of the area, helping to soften built form and integrate within the surrounding countryside.

Provision has also been made for long term management of the landscape, as set out in the heads of terms for a Landscape and Ecology Conservation Management Plan (Appendix A of the Biodiversity Strategy), summarised as follows:

- Bicester Eco Development Green Infrastructure is an example of ecologically-based green space design, incorporating many different landscapes, ranging from formal amenity plantings to a wide range of habitats for plant and animal species. The landscape will be managed with this in mind.
- Site wide objectives for green infrastructure management will be developed, particularly with regard to varying maintenance requirements of vegetation such as trees and shrubs, grassland, and wetland areas.



- Response to the seasons will be integral in the prescription of specific landscape maintenance activities, particularly with regard to local ecology and growing seasons.
- Management prescriptions will be developed for each of the vegetation types that make up the green infrastructure network.
- A programme of continuous monitoring and review will ensure that managers take account of any evolving interactions between the built environment and the surrounding landscape, and between people and wildlife.

## 6.6 Assessment of Effects

### 6.6.1 Construction

#### Landscape and Visual Amenity

There would be disruption to landscape character and visual amenity, principally due to construction compounds, use of construction plant, earthworks and materials storage during construction. However, whilst disruption would be caused, these effects would be minimised by construction best practice, as set out in Section 6.5 above, and, due to their temporary nature, impacts would be of negligible adverse magnitude with significance ranging from neutral to slight adverse.

Overall significance is considered to be **slight adverse**.

### 6.6.2 Operation

#### Landscape

The proposed development would not lie within a valued landscape, as expressed through designation. However, as described in Section 6.1, above, the site is subject to planning policy in respect of landscape character and local landscape characteristics must therefore be taken into account. The proposed development site falls at the transition between National Character Areas 107 and 108, the 'Cotswolds' and 'Upper Thames Clay Vales', and within the 'Wooded Estatelands' of the Oxfordshire Wildlife and Landscape Study. The landscape characteristics exhibited more locally relate to those of 'Caversfield Valleys and Ridges' landscape character area, defined as part of this landscape and visual impact assessment, which is identified as having low sensitivity. The implications of the proposed development for each of landscape characteristics of this character area are set out in Table 6-9 below, together with the corresponding magnitude of impacts and significance of effects:

**Table 6-9 Landscape Effects**

Key characteristic	Magnitude of impact and significance of effect
Distinctive valley and ridge landform.	<p>The layout of the proposals responds to local topography, creating new settlement with corresponding variety of character and avoiding large scale landform manipulation.</p> <p>Magnitude: No change. Significance: Neutral</p>
Valleys defined by tree lined watercourses, woodland blocks and relatively steep fields predominantly laid to pasture.	<p>Whilst pasture would be replaced with new settlement, tree-lined watercourses and woodland blocks would be retained with minor loss of trees at watercourse crossing points more than compensated for by landscape proposals</p>

Key characteristic	Magnitude of impact and significance of effect
	to enhance the valley corridors.  Magnitude: Minor beneficial. Significance: Slight beneficial.
Mixed farmland on ridges, with fields bounded by established hedgerows and woodland blocks.	Whilst farmland would be replaced with new settlement, established hedgerows and woodland blocks would be retained, with minor loss of trees and hedgerows at access points, more than compensated for by landscape proposals and translocation of hedgerows where possible.  Magnitude: Minor beneficial. Significance: Slight beneficial.
Settlement comprising the historic, stone built village of Caversfield, including Home Farm and the Anglo-Saxon St Lawrence's Church (Listed Buildings), with the church tower forming a visible element in the local landscape.	Open land/buffer between St Lawrence's Church/Home Farm and the proposed development site would be in place. The nucleated pattern of proposed built form, with materials that reflect the local vernacular and retention of vistas to the church tower of St Lawrence's Church, responds well to existing settlement with increases public access to such vistas.  Magnitude: Negligible beneficial. Significance: Neutral.
Generally strong sense of enclosure due to characteristic landform, vegetation and settlement edges.	Retained vegetation, together with the layout, scale and landscape proposals for the proposed development would maintain and reinforce the local sense of enclosure.  Magnitude: Negligible beneficial. Significance: Neutral

Table 6-9 illustrates that the proposals are consistent with the landscape strategy of the Oxfordshire Wildlife and Landscape Study<sup>7</sup>, which identifies the need to safeguard and enhance characteristic woodlands, hedgerows and unspoilt villages.

The overall significance of landscape effects, taking into account the range of landscape effects, is considered to be **neutral**.

## Visual Amenity

Viewpoint photomontages of the development 1 year and 15 years after construction are illustrated on Drawings 6.8 to 6.17, with visual impacts described below.

Viewpoint 1: View north-eastwards from field gate off A4095 Lords Lane: This view represents users of Lords Lane road, at the northern edge of Bicester, and visual sensitivity is therefore considered to be **negligible**. Initially the proposed development would be partially obscured by existing hedgerows/trees and proposed planting, with proposed rooflines visible amongst tree canopies. Over time proposed planting would very slightly reduce views of built form. Vegetation would have a greater obstructive effect during summer, providing heavy filtering in winter.

Taking into account these considerations, the magnitude of impact is considered to be **minor adverse** and the significance of effect **slight adverse**.

Viewpoint 2: View north-eastwards from junction of Germander Way and A4095 Lords Lane:

This view represents users of Lords Lane road and cycleway together with adjacent properties, at the northern edge of Bicester. Given the presence of residential properties and a recreational route, visual sensitivity is considered to be **high**. The view would remain as existing, therefore the magnitude of impact is considered to be **no change** and the significance of effect **neutral**.

Viewpoint 3: View north-westwards from B4100 Banbury Road south of Home

Farm/Caversfield: This view represents users of Banbury Road and as such visual sensitivity is considered to be **negligible**. The existing hedgerow and two trees to the west of Banbury Road would be replaced with a widened road. However the hedgerow would be transplanted immediately west of its current location, which, together with proposed tree planting, would filter views to the proposed built form. Timber building facades would be in keeping with the rural context, and over time proposed planting would further soften views during summer and heavily filter views in winter. Taking into account these considerations, the magnitude of impact is considered to be **moderate adverse** and the significance of effect **slight adverse**.

Viewpoint 4: View westwards from residential properties south of Caversfield: This view represents residential properties and adjacent minor roads south of Caversfield (near Skimmingdish Lane). Given the presence of residential properties, visual sensitivity is considered to be **high**. Initially the proposed development would be largely obscured by existing hedgerows/trees and proposed planting, with rooflines visible amongst tree canopies. Over time proposed planting would further obscure built form such that after 15 years, views of built form, at this distance, would be very restricted. Due to the density of intervening hedgerows, trees and shrubs the obstructive effects of this vegetation would be comparable during summer and winter. Taking into account these considerations, the magnitude of impact is considered to be **negligible adverse** and the significance of effect **slight adverse**.

Viewpoint 5: Views north-westwards from B4100 Banbury Road at Caversfield: This viewpoint represents views from properties at Caversfield and adjacent Banbury Road. Given the presence of residential properties, visual sensitivity is considered to be **high**. In the case of the Church of St Lawrence views to the proposed residential properties would be obstructed by evergreen vegetation in the church yard. From buildings at Caversfield House (including the Lodge) and from the road, the proposed stone facades of buildings in the foreground would be in keeping with the stone-built hamlet of Caversfield and would be filtered by existing hedgerows/intermittent hedgerow trees and proposed tree planting, such that the character of the view would remain largely intact. Over time, proposed planting would further obscure built form and after 15 years vegetation would have a greater softening effect during summer and heavy filtering effect in winter. Taking into account these considerations, the magnitude of impact is considered to be **minor adverse** and the significance of effect **slight adverse**.

Viewpoints 6 and 7: Views south-westwards and north-westwards at entrance to Home Farm

Business Units: This viewpoint represent views of Home Farm business unit users, visual sensitivity is therefore considered to be **low**. From the properties and outbuildings, established trees at the periphery of the farm complex, together with proposed tree and hedgerow planting, would filter views out to proposed buildings. From the access, the proposed stone facades of buildings would be in keeping with the stone-built hamlet of Caversfield and would be filtered by existing hedgerows/intermittent hedgerow trees and proposed tree planting, such that the character of views would remain largely intact. Over time, proposed planting would further obscure built form and after 15 years vegetation would have a greater softening effect during summer and heavy filtering effect in winter. Taking into account these considerations, the magnitude of impact is considered to be **minor adverse** and the significance of effect **slight adverse**.

Viewpoints 8 and 9: Views southwards from Public Footpath northwest of Caversfield: These views represent views from a recreational route and as such visual sensitivity is considered to be **high**. Initially proposed built form would be set behind existing hedgerows/trees, with timber facades in keeping with rural context. Over time proposed planting would further obscure built form such that after 15 years, views would be largely obscured by vegetation. Proposed planting would have a very obstructive effect during summer and would have a heavy filtering effect in winter. Taking into account these considerations, the magnitude of impact is considered to be **minor adverse** and the significance of effect **slight adverse**.

Viewpoint 10: View southwards from junction of B4100 Banbury Road near Bainton Road: This view represents users of Banbury Road and as such visual sensitivity is considered to be **negligible**. Initially the proposed development would be seen at a distance, with glimpses of proposed rooflines/timber facades across intervening hedgerows. Over time proposed planting would further obscure built form such that after 15 years, views would be almost entirely obscured by vegetation. Proposed planting would have a very obstructive effect during summer and would have a heavy filtering effect in winter. Taking into account these considerations, the magnitude of impact is considered to be **negligible adverse** and the significance of effect **neutral**.

Railway: It is not possible to obtain a geo-referenced photograph from the railway due to movement of the trains therefore; these views are described in the text only. The associated visual receptors, train users, are of **negligible** visual sensitivity. Elevated views over the proposed development site would be available when approaching or leaving Bicester, on embankment. In these views, the proposed development would be enclosed by existing hedgerows and proposed trees, allowing only distant, glimpsed and transient views of proposed buildings during both summer and winter. Taking into account these considerations, the magnitude of impact is considered to be **negligible adverse** and the significance of effect **neutral**.

The overall significance of visual effects, taking into account the range of individual visual effects, is considered to be **slight adverse**.

### 6.6.3 Cumulative Effects

The proposed development would form the eastern extremity of a wider NW Bicester Eco Development. The design principles outlined in Section 6.5 would be applied cross the wider NW Bicester Eco Development area such that the character of distinctive areas, set out in Section 6.4, would be respected and collectively would result in negligible change to regional and national landscape character areas. In the limited available views of proposed development from the northern edge of Bicester (e.g. Viewpoint 1) and from the railway, NW Bicester Eco Development would dominate the foreground such that the proposed development would be insignificant and there would not be significant combined effects. In more distant views (e.g. Viewpoint 10), both the proposed development and wider NW Bicester Eco Development components would form very minor elements in wider panoramas. Planting of the proposed development is likely to be established prior to construction of NW Bicester Eco Development built form such that there would not be significant additive effects resulting from built massing. Other committed developments in the vicinity of Bicester, as identified in Table 18-2, are separated from the proposed development by the existing urban area such that there would not be cumulative impacts on the local landscape or visual amenity north-west of Bicester.

## 6.7 Summary

This chapter considers the landscape and visual implications of the proposed development, based on guidance set out in Guidelines for Landscape and Visual Impact Assessment

produced by the Landscape Institute and Institute of Environmental Management and Assessment. The proposed development site is not afforded protection through landscape designation and local landscape character is defined by a rolling topography, mixed farmland enclosed by woodlands and hedgerows, and villages exhibiting strong vernacular character. The visual influence of the proposed development is contained by topography, enclosure and settlement, such that visual receptors, or those with a view of the proposed development, would be limited. The proposed development is in keeping with landscape character through carefully considered design, with retention of open land and/or provision of planted landscape buffers around heritage features, safeguarding the majority of existing vegetation, extensive Green Infrastructure proposals, and proposed built form in response to local settlement. In views to the proposed development, existing vegetation and extensive planting proposals would generally dominate, serving to integrate built form with the rural landscape and resulting in minimal change to visual amenity. Overall, the significance of landscape effects is considered to be neutral and the significance of visual effects is considered to be slight adverse.

## 7 Ecology

### 7.1 Introduction

This chapter of the Environmental Statement (ES) assesses the likely significant effects of the proposed development of the Exemplar development for the NW Bicester eco-development in terms of Ecology and Nature Conservation. This chapter is supported by the reports presented in Appendix 7A to 7L, which presents the full baseline information relating to Ecology and Nature Conservation.

The baseline against which the likely significant effects are to be assessed is the current environmental conditions at and surrounding the study area, which includes the location of the proposed Exemplar development and adjacent areas proposed for the wider NW Bicester eco-development site. The study area has been widened further to include particular species or species groups of conservation concern. This ES addresses the construction phase and the completed development, or operational phase.

This impact assessment has been undertaken in accordance with the guidance set out in the Institute of Ecology and Environmental Management's (IEEM) Guidelines for Ecological Impact Assessment (2006) ('the IEEM Guidelines'), in order to provide Cherwell District Council with *"clear and concise information about the likely significant ecological effects associated with the project"* (IEEM, 2006).

This ES chapter has been prepared by Hyder Consulting Ltd. The surveys that underpin the ecological impact assessment were undertaken during 2010 by Arup.

### 7.2 Regulatory and Policy Framework

This impact assessment has been undertaken in accordance with current international and national legislation, and national, regional and local plans and policies relating to nature conservation in the context of the proposed Exemplar development. A summary of the relevant legislation and policies, the requirements of these policies and the proposed Exemplar development response has been provided in Table 7-10 below.

**Table 7-10 Ecology Regulatory and Policy Framework**

<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Proposed Exemplar Development Response</b>
Habitats Directive (92/43/EEC) as transposed into UK legislation by 'The Conservation of Habitats and Species Regulations 2010'  The Directive promotes the maintenance of biodiversity in Europe. The Regulations 2010 constitute the UK government's implementation of the Directive in England and	The Regulations provide for the designation of both Special Protection Areas (SPAs) (first established under the Birds Directive, 1979) and Special Areas for Conservation (SACs) as part of the Natura 2000 network of protected areas across Europe.  The Regulations also provide protection for European Protected Species (EPS) from the deliberate capture, killing or disturbance. It is also an absolute offence to destroy or	There are no Natura 2000 sites within 10km of the proposed Exemplar development, thus development on this site is unlikely to have any effects on sites of European importance.  The only EPS recorded within the proposed Exemplar development and included within this assessment are bat species. The proposed Exemplar development seeks to retain valuable habitats for bats and does not interfere with the single confirmed bat roosting site within the

Policy/Legislation	Requirements	Proposed Exemplar Development Response
Wales.	damage the resting site or breeding site of an EPS.	development, known roosts outside of the development or any potential roosting sites that have been identified.
<p>The Wildlife and Countryside Act (1981), as amended</p> <p>This Act is the principle mechanism for the legislative protection of wildlife in Great Britain.</p>	<p>The Act provides for the designation of Sites of Special Scientific Interest (SSSI), which are selected as the best national examples of habitat types, sites with notable species and sites of geological importance.</p> <p>Schedules 1-4 of the Act deal with the protection of wild birds. Schedule 5 of the Act details protection of other animal species. Full protection is given under Section 9 of the Act to certain animals listed on Schedule 5, including all species of bats. Partial protection under Section 9 is given to certain other species, including all common species of reptile. Badgers are listed on Schedule 6 of the Act which outlaws certain methods of taking or killing animals, where necessary. Schedule 8 of the Wildlife and Countryside Act details protection for plants and fungi.</p>	<p>There are twelve SSSIs within 10km of the proposed Exemplar development. It is not envisaged that the proposed Exemplar development will have any effect on the three sites of National importance within 5km of the proposed development, or an effect on Wendlebury Meads and Mansmoor Close SSSI, located approximately 7km to the south of the proposed development but linked hydrologically. It is also predicted that there will not be any adverse air quality impacts arising from the Energy Centre emissions on all SSSIs within 10km of the proposed development (see Chapter 9 of this ES).</p> <p>Species protected by the Act recorded within the proposed Exemplar development are common species of reptiles, bats and badgers. A barn owl roost was recorded on land adjacent to the proposed development. No protected plant species or protected invertebrate species have been recorded within the proposed development.</p> <p>The proposed Exemplar development seeks to retain valuable habitats for bats and does not interfere with the single confirmed roosting site or potential roosting sites identified. The 'main' badger sett, and known barn owl roost, would be retained and protected, and mitigation measures during construction would ensure no reptiles would be killed or injured.</p>
National Parks and Access to the Countryside Act 1949	LNRs are places with a wildlife or geological interest of local value that are capable of being	Bure Park LNR is approximately 630m south of the proposed development. The proposed



Policy/Legislation	Requirements	Proposed Exemplar Development Response
Local Nature Reserves (LNRs) are designated by Local Authorities under Section 21 of this act as amended by Schedule 11 of the Natural Environment and Rural Communities Act 2006.	managed with the conservation of nature and/or the maintenance of public access as priority concerns.	SuDS and the implementation of standard measures to protect water quality within the proposed Exemplar development will ensure that no adverse effects on the River Bure will arise as a result of the proposals.
Countryside Rights of Way Act (2000)	This Act (2000) gives greater protection to SSSIs and strengthens wildlife enforcement legislation by the introduction of the offence of 'reckless disturbance'. The Act also requires Government Departments to have regard to biodiversity and conservation; Section 74 of the Act required lists of habitats and species of principal importance to be produced, for which conservation steps should be taken or promoted. The requirement to prepare such lists of habitats and species was extended by the Natural Environment and Rural Communities (NERC) Act 2006 (see below).	See response to Wildlife and Countryside Act (above) and the NERC act (below).
Natural Environment and Rural Communities (NERC) Act (2006)	<p>The NERC Act places a duty upon public bodies to consider enhancement of biodiversity within all of their actions. Sections 40 and 41 of this Act superseded Section 74 of the CROW Act. Section 41 lists flora, fauna and habitats considered by the Secretary of State to be of principal importance for conserving biodiversity.</p> <p>In addition, this Act provides for those species identified within the UK Biodiversity Action Plan (UKBAP) and the relevant Local Biodiversity Action Plans (LBAPs) to be considered as biodiversity conservation priorities (see below).</p>	The protection and enhancement of UKBAP and LBAP habitats and species have been considered as part of this assessment. Section 41 and UKBAP habitats and species recorded within the proposed Exemplar development include: hedgerows; noctule, soprano pipistrelle, brown long-eared bats, and common lizard. LBAP habitats recorded within the proposed development include rivers, hedgerows, farmland, and aquatic habitats. The wider area is also considered potentially suitable for brown hares and hedgehogs.
Protection of Badgers Act (1992)	Badgers are extensively protected by the Protection of	A 'main' badger sett has been recorded within the proposed



Policy/Legislation	Requirements	Proposed Exemplar Development Response
	Badgers Act (1992) which consolidates the legislation specific to badgers. The Act makes it an offence to wilfully take, kill, injure or ill-treat a badger; to obstruct, destroy, or damage in any part, a badger's sett; or to disturb badgers within a sett.	Exemplar development. This sett would be retained and protected within an area of open space. One 'outlying' sett has also been recorded within the footprint of the proposed development. This sett would be retained as far as possible. Where this is not possible a licence may be required to close the sett. Setts will be protected during construction through the use of temporary protective fencing to prevent construction machinery or staff from damaging the setts.
The Hedgerows Regulations (1997)	The Hedgerows Regulations (1997) have been designed to protect 'important' hedgerows for which replanting is no substitute. The 'importance' of a hedgerow depends upon a number of archaeological, wildlife and landscape criteria.	There are 14 hedgerows within the proposed development, of which 11 are considered to be 'important' using the wildlife and landscape criteria. The design includes for the retention of the majority of these 'important' hedgerows. Where removal of sections of 'important' hedgerows is unavoidable, these will be translocated to locations close by to reduce the effects of fragmentation.
Planning Policy Statement: Eco-towns. A Supplement to Planning Policy 1  This policy sets out the minimum standards for Eco-town development to ensure that they are exemplars of good practice and provide sustainable, low carbon living. It states that the design of eco-towns should take full account of the impact on local eco-systems, mitigating negative impacts as far as possible and maximising opportunities to enhance their local environments	Key features of PPS1 that seek to safeguard biodiversity include:  ET14 Green Infrastructure sets that forty percent of the eco-town's total area should be allocated to green space, of which at least half should be open to the public. Eco-town applications will also need to demonstrate a range of types of green space. These should be multi-functional, including the supporting of wildlife.  ET16 Biodiversity stipulates that the eco-town will need to demonstrate a net gain in local biodiversity and planning permission may not be granted for eco-town proposals which have a significant adverse effect on internationally designated nature conservation sites or	43% of the proposed Exemplar development has been allocated to green space.  Whilst it is recognised that arable land and grassland habitats of low nature conservation value will be lost to the proposed development, opportunities to enhance the remaining green space for biodiversity will be taken to achieve a net gain.  No impact is envisaged on Internationally or Nationally designated sites within 10km of the proposed development (as outlined above with respect to European and UK designated sites). An Eco-town Biodiversity Strategy (ETBS) will also be produced for the proposed Exemplar development as well as the NW Bicester eco-

Policy/Legislation	Requirements	Proposed Exemplar Development Response
	Sites of Special Scientific Interest (SSSI). The eco-town development should include a strategy for conserving and enhancing local biodiversity, and this is to accompany the planning application.	development.
<p>Planning Policy Statement (PPS 9): Biodiversity and Geological Conservation (2005)</p> <p>The statutory planning process requires that full account is taken of biodiversity, in accordance with international and national law. PPS9 has been created to safeguard biodiversity throughout the planning process.</p>	<p>Key features of PPS9 include:</p> <ul style="list-style-type: none"> <li>Local Authorities (LA) are to store up to date information on ancient woodland and other important habitats not already designated.</li> <li>LA should aim to maintain, enhance, restore or add to biodiversity interests; and promote opportunities for the incorporation of beneficial biodiversity in and around new developments.</li> <li>Planning decisions should aim to prevent harm to biodiversity. Where significant harm cannot be prevented, adequately mitigated against or compensated for, then planning permission should be refused.</li> <li>Statutory Development Plans and Local Plans have a vital role to play in the protection and safeguard of important habitats and species (see below).</li> </ul>	<p>Opportunities for enhancement of areas for biodiversity within the proposed Exemplar development are considered within the assessment.</p> <p>No ancient woodlands are located within the proposed development.</p>
<p>Cherwell Local Plan</p> <p>Local plan policies that are of relevance to this site are contained within the Cherwell Local Plan (adopted July 1996), due to be replaced by the Local Development Framework (LDF).</p>	<p>The current 'saved' policies of the Cherwell Local Plan relevant to the development are the following:</p> <ul style="list-style-type: none"> <li>C1: the council will seek to promote the interests of nature conservation. Development which would result in damage to or loss of SSSIs or other areas of designated wildlife or scientific importance will not normally be permitted. Furthermore, the council will seek to ensure the</li> </ul>	<p>As outlined above it is not envisaged that the proposed Exemplar development would have any effect on a site of European or National Importance for nature conservation located within 10km of the proposed development. The proposed SuDS and the implementation of standard measures to protect water quality proposed within the Exemplar Development will ensure that no adverse effects on hydrologically linked statutory and non-statutory sites, including</p>

Policy/Legislation	Requirements	Proposed Exemplar Development Response
	<p>protection of sites of local nature conservation value. The potential adverse affect of development on such sites will be a material consideration in determining planning applications.</p> <ul style="list-style-type: none"> <li>▪ C2: development which would adversely affect any species protected by Schedule 1, Schedule 5 and Schedule 8 of the 1981 Wildlife and Countryside Act and by the E.C. Habitats Directive 1992 will not normally be permitted.</li> <li>▪ C4: the council will seek to promote the creation of new habitats. In urban areas the council will promote the interests of nature conservation within the context of new development and will establish or assist with the establishment of ecological and nature conservation areas, where such areas would further the opportunity for environmental education and passive recreation and would not conflict with other policies in the plan.</li> </ul> <p>Whilst the Revised Deposit Draft Cherwell Local Plan 2011 (the 'non-statutory Cherwell Local Plan 2011') and its proposed policies has been discontinued and will be replaced by a Local Development Framework for Cherwell, the proposed policies will still be a material consideration in planning decisions. Therefore, those policies relevant to nature conservation are listed below:</p> <ul style="list-style-type: none"> <li>▪ EN22: Development</li> </ul>	<p>Bure Park LNR and Wendlebury Meads and Mansmoor Closes SSSI, will arise as a result of the development.</p> <p>The assessment considers impacts on habitats and species of nature conservation concern within the proposed Exemplar development and wider Study Area, and where appropriate makes recommendations for the protection and enhancement of habitats and species of nature conservation concern through considered design.</p> <p>No adverse impacts on species protected by Schedule 1, Schedule 5 and Schedule 8 of the 1981 Wildlife and Countryside Act, and by the E.C. Habitats Directive 1992 will arise as a result of the design of the proposed development.</p> <p>Ecological surveys of the site have been undertaken to inform the assessment.</p> <p>The proposal seeks to ensure that overall there will be a net gain in biodiversity.</p> <p>There are opportunities for environmental education associated with the new primary school that forms part of the development proposal.</p>

Policy/Legislation	Requirements	Proposed Exemplar Development Response
	<p>proposals will be expected to incorporate features of nature conservation value within the site. Features of value should be retained and enhanced wherever possible. The use of planning conditions or planning obligations will be sought to secure their protection and management, or the provision of compensatory measures where appropriate.</p> <ul style="list-style-type: none"> <li>▪ EN23 before determining an application for development which may affect a known or potential site of nature conservation value, applicants will be required to submit an ecological survey to establish the likely impact on the nature conservation resource.</li> <li>▪ EN24 Protection of sites of ecological or geological value</li> <li>▪ EN25 Development which would adversely affect any species protected by schedule 1, schedule 5 and schedule 8 of the 1981 wildlife and countryside act, and by the E.C. habitats directive 1992, or its habitat will not be permitted.</li> <li>▪ EN27 Development proposals should incorporate the creation of new habitats, particularly those concerning priority habitats or species, wherever possible. The council will promote the interests of nature conservation within the context of new</li> </ul>	

Policy/Legislation	Requirements	Proposed Exemplar Development Response
	<p>development and will establish or assist with the establishment of ecological and nature conservation areas, where such areas would further the opportunity for environmental education and passive recreation.</p> <ul style="list-style-type: none"> <li>EN28 (iv) the council will seek to protect and enhance the ecological value, biodiversity and rural character of the flood plain of the River Bure and Langford Stream, Bicester through the control of development</li> </ul>	

## 7.3 Biodiversity Action Plans

Biodiversity Action Plans (BAPs) are strategies to conserve, protect and enhance habitats and species. The UKBAP sets out a national strategy for the conservation of biodiversity in Britain. Regional BAPs and Local BAPs (LBAPs) have also been produced to address biodiversity issues specific to particular areas in the UK. These are described in more detail below.

### 7.3.1 United Kingdom Biodiversity Action Plan

The UKBAP is the UK Government's response to the Convention on Biological Diversity (CBD) signed in 1992. It describes the UK's biological resources and sets out a detailed plan for the protection of these resources. Habitat types and species are listed within the UKBAP with specific targets for their conservation. The UKBAP includes 1150 priority species and 65 priority habitats. Species Action Plans (SAPs) and Habitat Action Plans (HAPs) have been produced for a number of these species. The Action Plans and Targets from the UKBAP which are relevant to the proposed Exemplar development (i.e. those targets for which it may be possible for the proposals to achieve a positive effect upon biodiversity) include: hedgerows, lowland calcareous grassland, soprano pipistrelle bats, brown long-eared bats, noctule bats, and song thrush.

### 7.3.2 Local Biodiversity Action Plans

Local BAPs relevant to the proposed Exemplar development are the Oxfordshire BAP and Cherwell BAP.

#### Oxfordshire BAP

The Oxfordshire BAP identifies Conservation Target Areas (CTAs) for the maintenance, restoration and creation of BAP habitats within the county. There are 17 UKBAP Priority Habitats within the county of Oxfordshire. Those habitats relevant to the proposed Exemplar development include hedgerows and rivers. Biodiversity targets have been created for these habitats within the CTAs. The Exemplar development is not within or in close proximity to any of

the identified CTAs. There are two CTAs located within 5km of the Exemplar development. The nearest CTA is the Tusmore and Shelswell Parks with Stoke Lyne Woodlands CTA located approximately 1.2km to the north-west. This CTA is designated for its parkland, lowland mixed deciduous woodland (including ancient woodland), and associated habitats including large parkland lakes, ponds and wet woodland. The River Ray CTA, located approximately 2.8km to the south-east of the site, largely comprises lowland meadow and wet grassland habitats.

## Cherwell BAP

The Cherwell BAP covers nine habitats, including HAPs for Farmland (incorporating hedgerows) and Aquatic habitats. The Cherwell BAP does not provide specific action plans for species but does include UKBAP Priority Species, species of conservation concern and local character species (i.e. those which are still uncommon and sometimes quite rare in the Cherwell District and which may be indicative of good habitat conditions) within the nine HAPs. Cherwell BAP habitats present within the proposed Exemplar development include Farmland and Aquatic habitats.

## 7.4 Methodology

### 7.4.1 Introduction

The methodology used to carry out the impact assessment is based upon the IEEM Guidelines for Ecological Impact Assessment. In accordance with the IEEM Guidelines, a detailed assessment has been carried out which attempts to collate all of the existing baseline information through a desk-based study and field surveys, and confidently predict all of the significant effects of the proposed Exemplar development on 'Key Ecological Receptors', both with and without mitigation. Where significant adverse effects are predicted, the assessment presents detailed measures to mitigate these effects such that the residual effects of the proposed development would not be significant.

In addition, measures have been developed to address the legislative and policy requirements associated with those protected species and valuable habitats for which significant effects are not expected, but which nevertheless warrant mitigation. Measures to enhance biodiversity in the area affected by the proposals and those which help to deliver Action Plan and local policy targets are also recommended. Although these have not been developed in response to significant effects, they do nevertheless contribute to the overall balance of effects on nature conservation for the proposed development and pose as an example for the proposed development of NW Bicester eco-development as a whole. The proposed development also provides opportunities for habitat creation and enhancement, incorporating ecological features of benefit to species already present with the proposed development area and habitats and species which have currently not been recorded but for which an overall benefit can be provided. This will ensure that a net gain in local biodiversity is provided and within the proposed development and is key to its design. This approach is considered to represent best practice.

### 7.4.2 Consultations

Consultations were undertaken with statutory and non-statutory nature conservation organisations, including: Natural England; the Environment Agency, Oxfordshire County Council; Cherwell District Council; the NW Bicester Eco Town BioRegional Development Co-ordinator; and Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT). Consultation meetings and workshops were held on 5<sup>th</sup> July 2010, 20<sup>th</sup> August 2010, 14<sup>th</sup> September 2010, 23<sup>rd</sup> September 2010, and 19<sup>th</sup> November 2010, with representatives of these organisations to discuss the results of the ecological surveys, implications for the emerging

Exemplar development masterplan, and opportunities for habitat creation and enhancements. Measures that were discussed that have been incorporated into the masterplan are identified below.

Consultees agreed with the scope of the ecological surveys and desk study assessment that has been undertaken to inform the impact assessment. It was agreed that the habitats and features of greatest value to biodiversity within the proposed Exemplar development should be retained with appropriate buffer zones as part of the masterplan. Surveys have revealed that these habitats and features include: the hedgerows; the watercourses; a main badger sett; and a confirmed bat roost. Care has been taken to ensure that the hedgerows and watercourses continue to provide wildlife corridors. The principal of locating habitats of value to biodiversity, including allotments and SuDS, adjacent to these key habitat features to create wide buffers and providing habitat niches for a range of species was agreed. It was considered that this approach would also ensure that dark corridors would be maintained across the site, to avoid adverse effects on nocturnal species. It was accepted at an early stage that if the surveys revealed that the land within the proposed Exemplar development is of value to agricultural specialist species it is likely that such species could not be accommodated within the masterplan design. Therefore, in order to achieve a net gain in biodiversity it may be necessary to enhance the value of the proposed development for non-agricultural specialist species. Although the proposed development was not found to support important populations of agricultural specialist species, the masterplan has sought to create a diversity of semi-natural habitats that will support a range of native species in order to achieve a net gain in biodiversity. Consultees were keen that a range of SuDS features supporting semi-natural habitats are created across the proposed development, including permanently wet features as well as more ephemeral features. They were also keen to see artificial nest sites and roosting sites incorporated in areas of green space and the built environment across the proposed development.

### 7.4.3 Study Area

The study area included field surveys of the proposed Exemplar development and habitats immediately adjacent in order to investigate impacts on species and habitats. The study area was extended to investigate particular species and groups of conservation concern where appropriate, including a distance of up to 500m from the proposed development boundary to investigate any waterbodies present which may have the potential to support breeding populations of great crested newts (where access was granted). Access was not available to all ponds within 500m of the site boundary. The suitability of these ponds was therefore assessed using a combination of inspections from adjacent land and aerial photographs to assess connectivity. A desk-based assessment also collated ecological records for the site itself and for the surrounding area up to a distance of 5km from the boundary of the proposed development. A distance of up to 10km was searched for European and nationally designated sites.

The assessment of the proposed development also makes use of surveys that have been undertaken by Arup within the area proposed for the NW Bicester eco-development. Together, these make up the Zone of Influence (Zoi) for the proposed Exemplar development. The Zoi describes the area over which the activities associated with the proposals could influence ecological resources in the wider area.

### 7.4.4 Establishment of Baseline Conditions

The baseline conditions have been established through a desk-based assessment which obtained existing records relating to habitats and species of nature conservation concern both within the proposed Exemplar development and within the 5km search area defined on the basis of the Zoi for the development. Records were obtained from Thames Valley



Environmental Records Centre (TVERC), Oxford Ornithological Society, Banbury Ornithological Society, and the Oxfordshire branch of the Barn Owl Conservation Network. The Oxfordshire Bat Group was also consulted with regard to likely bat species present in the local area. The invertebrate specialist consulted the County Butterfly and Moth recorders in order to obtain species records for the NW Bicester Eco-development and the wider area. In addition, the MAGIC and NBN websites were reviewed for designated sites within the Zol. Detailed results of the desk-based assessment are included in Appendix 7A.

Field surveys were also undertaken within the proposed Exemplar development and the surrounding habitats, including a Phase 1 Habitat and protected species walkover survey undertaken in Spring 2010 to identify any habitats likely to be of conservation value, and to investigate the presence (or likely presence) of protected species of plants and/or animals.

The walkover survey revealed the need for more detailed surveys to inform the assessment and the design of the masterplan for proposed Exemplar development. Consequently, further surveys were undertaken for terrestrial and aquatic invertebrates, white-clawed crayfish, great crested newts, breeding birds, badgers (including a bait-marking study), bats (including emergence surveys of potential roost sites and bat activity surveys), water voles and otters. A botanical survey was also undertaken of the hedgerows within the Exemplar development, and the woodland outside of the site but within the study area. The field surveys were completed between May and October 2010. Detailed methodologies for the various surveys can be found in the individual reports provided in Appendices 7B to 7L.

## 7.4.5 Assessment of Effects

### Valuation of Ecological Receptors

In accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 1999 (referred to as the 'EIA Regulations 1999'), and the guidance set out in the IEEM Guidelines, it is considered inappropriate to attempt to investigate in detail all potential ecological issues in relation to the proposed development. It is therefore necessary, under the Regulations, to focus on those activities that could potentially generate significant ecological effects on 'Key Ecological Receptors'.

In order to determine the likelihood of a significant ecological effect, it is first necessary to identify whether a receptor is sufficiently valuable for a significant effect upon it to be material in decision-making. To achieve this, where possible, animal species and their populations have been valued on the basis of a combination of their rarity, status and distribution, using contextual information where it exists. Habitats and plant communities are evaluated against existing selection criteria, wherever possible (such as those developed to aid the designation of Sites of Special Scientific Interest (SSSIs) or non-statutory designated sites). Only those receptors that it was considered could experience significant effects (i.e. impacts that could adversely affect the integrity of the habitat or the favourable conservation status of a species' local population), and which were identified as being of sufficient value to be material to decision-making (i.e. of 'District/Borough' level importance or above), have been classified as being 'Key Ecological Receptors' and have been considered in the detailed assessment.

The habitats and features within the Zol are known as the 'ecological receptors'. The nature conservation importance/value of each of the 'ecological receptors' considers the protected species and species of conservation concern that they may support, to avoid pseudo-replication. For example, the importance for species associated with the hedgerows (breeding birds, reptiles and hedgehogs) has been taken into account as part of categorising the overall importance/value of that feature.



The following geographic frame of reference has been used to determine the value of ecological receptors: International; National; County/Regional; District/Borough; and Parish/Neighbourhood.

Those sites, habitats and/or species classified at 'District/Borough' level and above are considered to be sufficiently valuable for a significant effect upon them to be material in decision making. Where habitats and species within the proposed Exemplar development do not constitute 'Key Ecological Receptors' based upon their nature conservation value, and have not formed part of the detailed assessment, they still warrant consideration during the design and mitigation of the proposed development on the basis of their legal protection, their implications for environmental (and related) policies and plans, or other issues such as animal welfare issues. Therefore, consideration has separately been given to these 'Other ecological receptors requiring mitigation'.

The results of the ecological valuation process are presented in Section 7.5 Description of Existing Baseline Conditions (below); this summarises the results of the desk study and field surveys, and identifies which of the resources are 'Key Ecological Receptors', which are 'Other ecological receptors' requiring mitigation, and those which have been scoped out of the assessment altogether. It is important to note that the selection of 'Key Ecological Receptors' has therefore been informed by an assessment not only of nature conservation value but also of the likely impacts upon them, the methodology for which is described below.

## Impact Characterisation

Once the ecological receptors within the ZoI have been identified and valued, it is then necessary to investigate potential impacts on those receptors in order to understand how they might be affected by the proposed Exemplar development.

The impact assessment has been based on an understanding of the likely activities associated with the proposed development, the biophysical changes that could be predicted as a result of these activities, and the area over which such effects might be experienced by different receptors. These impacts have been considered for the construction and operational phase of the proposed development. They have been characterised and described in detail using the following parameters: Significance (positive and negative effects); Probability of occurring; Complexity; Extent and context; Magnitude; Reversibility; Duration; Timing; and Frequency. The results of this assessment are presented in the summary tables at the end of this chapter.

## Integration of impact characteristics

An informed integration of each of these impact characteristics is necessary in order to underpin the determination of impact significance set out below.

## Assessing significance

The significance of an impact has been determined on the basis of an analysis of the factors that characterise the impact. The nature conservation value of significantly affected receptors has then been used to guide further mitigation and related measures and help interpret the significance of residual impacts. A summary of the detailed assessment for each 'Key Ecological Receptor' is presented in Table 7-13 to Table 7-16 at the end of this chapter. An explanation of the terms used is provided in Table 7-11 and Table 7-12.

## 7.5 Description of Existing Baseline Conditions

As described previously, a suite of surveys were undertaken within the proposed Exemplar development and the NW Bicester eco-development area by Arup, the results of which are presented in individual reports in Appendices 7A to 7L and summarised below.

### 7.5.1 Site description

The proposed Exemplar development comprises arable fields and field supporting species-poor semi-improved neutral grassland. Tall, wide hedgerows form the field boundaries. Fourteen hedgerows were recorded within the proposed development, the majority of which are species-rich and of these 11 would be classified as 'important' under the Hedgerows Regulations (1997) using the Wildlife and Landscape criteria. Interspersed within the hedgerows are small numbers of mature trees. A recently established plantation of mixed broadleaved trees within tall unmanaged grassland exists within the south-western corner of the proposed development.

Bat and barn owl boxes have been installed on a number of trees within and adjacent to the proposed development. One bat roost was confirmed in a tree within the proposed development boundary. A pair of barn owls was also confirmed to be breeding within a nest box close to the western boundary of the proposed development on one of the trees along the tributary of the River Bure. The hedgerows provide suitable foraging and commuting habitat for bats and nesting habitat for bird species, including five bird species of conservation concern<sup>1</sup>. The field margins adjacent to the proposed Exemplar development support common species of reptiles, including small numbers of grass snakes and common lizards and it is likely that these species would be present within the proposed development. These margins were found to be of limited value to invertebrates; however, two Notable species were recorded within the field margin in the north of the proposed development, comprising the Shaded Pug Moth and the Roesel's Bush-cricket. A 'main' badger sett was located within the boundary of the proposed development and another large sett belonging to the same social group of badgers was located in the woodland to the south-west (outside the proposed development boundary). The field surveys found no evidence of use of the hedgerows within or in close proximity to the proposed development by dormice. The River Bure and a tributary cross the proposed development. In the summer of 2010 these watercourses did not hold water and there was no evidence of use by protected species such as otters, water voles, or white-clawed crayfish. Water was present in these features in late September and it appeared likely that these features are seasonally wet holding water in the autumn/winter and into the spring, but largely dry in the summer months. The precise pattern of water flow is very much dependent on rainfall. More detail regarding particular receptors is provided below.

### 7.5.2 Habitats

#### Ardley Cutting and Quarry SSSI

Ardley Cutting and Quarry SSSI is located approximately 1.6km from the boundary of the proposed Exemplar development and is designated for its calcareous grasslands, woodland and wetland habitats which support a diverse invertebrate fauna including uncommon moth and butterfly species in Oxfordshire. The quarry ponds also contain significant populations of great crested newts. Given that there is no public access to the railway land, the distance from the proposed development to the quarry, the absence of suitable features to support breeding great

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<sup>1</sup> Birds of conservation concern indicate that the bird species concerned have undergone a significant population decline in the United Kingdom

crested newts within the proposed development, and the absence of hydrological links from the proposed development to the features that support the newts, it is considered unlikely that the proposed development would have direct or indirect effects on this site of National importance. It is also considered unlikely that any changes in air quality as a result of the Energy Centre within the proposed development will have an adverse impact on this SSSI and its ecological features, as concentrations of oxides of nitrogen (NOx) are predicted to return to background levels at approximately 1.5km from the site boundary. At its closest point to the development, Ardley Cutting and Quarry SSSI comprises calcareous grassland along an active railway line.. It is generally accepted that calcareous grasslands are not sensitive to that acidifying effects of airborne nitrogen; nor would they be enriched by airborne pollutants. Calcareous grasslands are stressed environments where plant growth is limited by low levels of Phosphate which is bound up in the soils and not accessible to the plants, thus even if there were elevated levels of nitrogen the lack of Phosphate would prevent the plants from utilising it. Wetland features within this SSSI, such as the ponds supporting great crested newts, are located at a distance greater than 3km from the proposed development boundary, and therefore adverse impacts arising from air quality are also considered to be unlikely. Ardley Cutting and Quarry SSSI will not be considered further within the EIA.

### Ardley Trackways SSSI

Ardley Trackways SSSI is located approximately 2.8km from the boundary of the proposed Exemplar development at its closest point, and is designated for its geological interest. Given the absence of Public Rights of Way linking this SSSI to the proposed development, and its nature as a geological SSSI it is considered unlikely that the proposals would have direct or indirect effects on this site of National importance. It is also envisaged that there will be no adverse impacts on this SSSI arising from the concentrations of NOx predicted to be released from the Energy Centre within the proposed development. NOx levels are predicted to return to background levels at approximately 1.5km from the development boundary. Ardley Trackways SSSI will therefore not be considered further within the environmental impact assessment.

### Stratton Audley Quarries SSSI and Local Wildlife Site (LWS)

Stratton Audley Quarries SSSI, located approximately 1.9km from the proposed Exemplar development boundary, is designated for its geological interest. It has also been designated a Local Wildlife Site (LWS). Recent Natural England assessments of this site have declared it destroyed through infilling with waste material and water. Given the absence of hydrological links, the absence of Public Rights of Way linking this site to the proposed development, and its nature as a geological SSSI it is considered unlikely that the proposals would have direct or indirect effects on this site of National importance. It is also envisaged that there will be no adverse impacts on this SSSI arising from the concentrations of NOx predicted to be released from the Energy Centre within the proposed development. NOx levels are predicted to return to background levels at approximately 1.5km from the development boundary. Stratton Audley Quarries SSSI will not be considered further within the environmental impact assessment.

### Wendlebury Mead and Mansmoor Closes SSSI

Wendlebury Meads and Mansmoor Closes SSSI is located approximately 7km from the proposed Exemplar development boundary. This SSSI comprises a series of traditionally-managed unimproved neutral meadows and supports over 160 plant species. The site also supports a number of bird species including breeding snipe and curlew, and the meadows support large numbers of common butterflies, including meadow brown, hedge brown, small copper, common blue, green veined white and marbled white. The site is hydrologically linked to the proposed Exemplar development and therefore there is the potential for adverse effects on water quality within this SSSI. However, it will be possible to avoid adverse effects on water quality during both construction and operational phases of the development. Standard techniques to protect water quality within the watercourses will be implemented during the

construction phase and Sustainable Drainage Systems (SuDS) form part of the development proposals; thus it is not envisaged that the development proposals would have adverse effects on this SSSI. It is also considered that any changes in air quality as a result of the Energy Centre within the proposed development will not have an adverse impact on this SSSI and its features, as concentrations of oxides of nitrogen (NOx) are predicted to return to background levels at approximately 1.5km from the site boundary. At 7km from the proposed development boundary, this SSSI is located at a significant distance and impacts would therefore be considered negligible. Wendlebury Meads and Mansmoor Closes SSSI will therefore not be considered further within the environmental impact assessment.

## Other SSSIs within 10km of the proposed Exemplar development

There are a further eight SSSIs within 10km of the proposed Exemplar development. These include: Arncott Bridge Meadows SSSI, located 6.5km to the south-east; Weston Fen SSSI, located 7km to the south-west; Long Herdon Meadow SSSI, located 8km to the south-east; Bestmoor SSSI, located 9.3km to the north-west; Otmoor SSSI, located 9.6km to the south; Kirtlington Quarry SSSI, located 9.5km to the south-west; Tingewick Meadows SSSI, located 9.7km north-east; and Whitecross Green and Oriel Woods SSSI, located 9.9km to the south. None of these sites of national importance are hydrologically linked to the proposed development; therefore, no hydrological impacts are envisaged on these sites. Predicted concentrations of oxides of nitrogen (NOx) and associated nitrogen deposition arising from the proposed Energy Centre will return to background levels at approximately 1.5km from the development boundary; therefore, it is considered that there will be no impacts on these SSSIs which are situated beyond 5km from the development boundary.

## Tusmore and Shelswell Parks with Stoke Lyne Woodlands CTA

Tusmore and Shelswell Parks with Stoke Lyne Woodlands CTA is situated outwith the proposed development, at a distance of approximately 1.2km at its closest point. The CTA comprises the large parklands at Tusmore and Shelswell, together with large areas of mixed deciduous broadleaved woodland, including ancient woodland sites near to Stoke Lyne, including the Local Wildlife Sites (LWS) of Twelve Acre Copse, Stoke Little Woods, Stoke Woods, and Stoke Bushes. Associated habitats of the CTA also include large parkland lakes and Cottisford Pond County Wildlife Site. It is not envisaged that the proposed development will impact on this CTA or the associated LWS given that the CTA is largely only accessible from Public Rights of Way, none of which are directly linked to the proposed Exemplar development. The Tusmore and Shelswell Parks with Stoke Lyne Woodlands CTA and associated LWS will therefore not be considered further within this environmental impact assessment.

## Ray CTA

The Ray CTA is located 2.8km to the south-east of the proposed development boundary, with Bicester town between the CTA and the site. The CTA comprises lowland meadow and wet grassland with species-rich and well-structured hedgerows. Although the watercourses within the proposed development are tributaries of the River Ray, they converge with this watercourse at a point which is downstream of the Ray CTA. It is therefore considered that the proposed Exemplar development would have no direct or indirect effects on the Ray CTA, a site of County importance. The Ray CTA will not be considered further within this environmental impact assessment.

## Bure Park LNR

The River Bure and a tributary of the river flow through the proposed Exemplar development before they enter Bure Park Local Nature Reserve (LNR). The LNR includes the River Bure, several ponds, mature hedgerows and trees, scrub, and meadow habitat. The LNR is linked hydrologically to the proposed development and therefore there is the potential for adverse

effects on water quality within this LNR. However, it will be possible to avoid adverse effects on water quality during both construction and operational phases of the proposed development. Standard techniques to protect water quality within the watercourses will be implemented during the construction phase and SuDS form part of the development proposals; thus it is not envisaged that the development proposals would have adverse effects on this LNR. The development proposal is likely to lead to an increase in the number of visitors to the park. However, this park is well used by the public and thus the habitats and species that it supports are already habituated to high levels of disturbance. It is therefore considered unlikely that the increase in visitor pressure would have a discernable impact on habitats or species. The LNR will not be considered further in this environmental impact assessment.

## Hedgerows

The majority of the hedgerows within the proposed development boundary are tall, wide, predominantly intact and species-rich. Eleven of the 14 hedgerows within the Exemplar development would be classified as 'important' under the Hedgerows Regulations (1997) using the Wildlife and Landscape Criteria. Most of the hedgerows do not support mature trees, and it would appear that Dutch elm disease may have affected the number of mature trees on the site. Several of the hedgerows have been replanted with a diverse mix of native shrub species. Hedgerows are a UKBAP Priority Habitat, an Oxfordshire LBAP habitat and are included within the Farmland Habitat Action Plan within the Cherwell BAP.

The hedgerows together with the stream corridors were found to be of value to foraging and commuting bats. These features provide links between the woodland and riparian habitat to the south and west of the proposed development, and also to confirmed roost sites within St Lawrence's Church (to the north) and Home Farm (adjacent to the proposed development). A number of mature trees potentially suitable for roosting bats are also present within the proposed development. Field surveys confirmed the presence of a common pipistrelle bat roost within one of the mature willows along the stream corridor running north to south within the proposed development. No other trees or features within the proposed development were found to be used as roost sites for bats in 2010. The hedgerows also provide suitable foraging links for common species of reptile and provide suitable habitat for hedgehogs, a UKBAP species which is likely to be present within the area. The hedgerows also support breeding bird populations; these are discussed in more detail below.

Due to their nature conservation value and the species they support, the hedgerows within the proposed Exemplar development are considered to be part of a hedgerow network of 'District/Borough' Importance.

## The River Bure and tributary

The River Bure and one of its tributaries converged in the centre of the proposed development before flowing south into Bicester. Within the proposed development the Bure is predominantly tree-lined whilst the tributary is more open. Rivers are a UKBAP Priority Habitat, an Oxfordshire LBAP habitat and Aquatic habitats are listed within the Cherwell BAP.

The upper reaches of these watercourses are winterbournes and during the field surveys both channels within the proposed development were largely dry by June. Due to the ephemeral nature of these watercourses, surveys for aquatic invertebrate surveys were undertaken in October once flow of water had returned. These surveys found no aquatic invertebrate species or assemblages of note. Only low numbers of common species were recorded and the watercourses are considered to be of little value to aquatic invertebrates due to the paucity of water throughout the spring and summer months.

The ephemeral watercourses were considered suitable for white-clawed crayfish, at least at certain times of the year; however, American signal crayfish have been recorded within the



catchment area. A dead American signal crayfish was found close to Crowmarsh pond, within the River Bure catchment approximately 1.8km to the south-west of the proposed development. It is therefore considered unlikely that white-clawed crayfish persist in this area and in the ephemeral watercourses within the proposed Exemplar development.

Neither watercourse showed evidence of use by otters and no potential resting sites were found during targeted surveys. One record of otters using Trow Pool, a coarse and carp fishery near Bucknell was provided by TVERC. Despite the lack of records for the local area, otters may be within the wider catchment area. A recent record of water voles within the River Bure in Bicester was provided by TVERC, and a pond located in Lower Farm, Bucknell, to the west of the proposed NW Bicester eco-development was found to support water voles during surveys undertaken as part of this proposal. This species has also been recorded within Bure LNR located to the south-east of the proposed Exemplar development; however, no evidence of water voles was recorded within the development site during targeted surveys. Given the ephemeral nature of water within these channels it is unlikely that they support a resident population of water voles or that these watercourses are of particular value to otters. Nevertheless, it is possible that otters may use these channels on occasion, when travelling across their range.

The ephemeral watercourses within the proposed development are used by commuting and foraging bats. Targeted bat activity surveys undertaken in 2010 recorded four different bat species using the riparian habitat within the proposed development. The majority of bat passes recorded were of common pipistrelle bats, and most activity was recorded along the watercourse running north to south within the proposed development. The watercourses are also likely to be valuable features for foraging common reptile species such as grass snakes, one of which was recorded in close proximity to the proposed development during targeted surveys, and also amphibians.

Given the scarcity of water within the proposed NW Bicester eco-development area it is considered that overall these watercourses are of 'District/Borough' Importance.

## Mixed broadleaved plantation

An area of recently established mixed broadleaved plantation within an area of tall unmanaged grassland is located in the south-west corner of the proposed development. This plantation comprises a mix of Pedunculate Oak, Hazel, Cherry and Gorse planted across eight rows. The stands are recently established (approximately five years old) and are 1m in height. The tall grassland and plantation area have the potential to be used by foraging barn owls and bats, and may also support common species of invertebrates.

The surveys did not identify it as a habitat of ecological value and overall this area is considered to be no more than 'Parish / Neighbourhood' Importance.

## Arable land and grasslands

Within the proposed Exemplar development the arable fields are intensively managed and the grassland habitats are species-poor, semi-improved and neutral. Both habitats are common and widespread in the locality and not considered to be of particular conservation value. The grasslands are intensively grazed by cattle, and the arable fields are sown with agricultural grass species which are regularly cut for silage. Whilst arable field margins and arable habitats are a UKBAP and LBAP habitat, the arable field margins, arable fields and grasslands do not support any notable or protected plant species, or any communities of high botanical value. They also do not support a valuable assemblage of invertebrates. The arable field margins present are largely narrow or absent; however, two adults of a Nationally Scarce moth, the Shaded Pug moth, and adult Roesel's Bush-cricket were recorded during invertebrate surveys of the field margin in the north-west edge of the Exemplar development. The latter species was

deemed to be a Nationally Notable species; however, it has undergone a substantial increase in its range over recent years due to climate change, and is generally now considered to be a Nationally Local species.

Overall these habitats are considered to be of no more than 'Parish/Neighbourhood' Importance.

### 7.5.3 Species

#### Invertebrates

Desk study records have not revealed any protected invertebrate species within or in close proximity to the proposed development. The hedgerows were found to be of low value to invertebrates as they are too frequently trimmed or flailed, thereby removing the foraging resource and breeding sites for invertebrates, such as brown hairstreak. This species relies heavily on young Blackthorn twigs for egg-laying and the adults require a complex of suitably managed woodland, hedgerows and mature (mast) trees, the latter are specifically required during the mating period. The proposed development and the wider study area contained very few mature trees and where present they were widely spaced apart, which would also limit the suitability of the area for Brown hairstreak. The River Bure and tributary were found to be dry during the summer months, which reduced their suitability for aquatic invertebrates, and only a low number of widespread and common invertebrate species were recorded during targeted surveys. The arable fields and field margins were also of limited invertebrate value; however, as discussed above the field margin within the north of the proposed development was found to contain two notable invertebrate species: the Nationally Scarce Shaded Pug moth and the Nationally Notable Roesel's Bush-cricket.

The proposed Exemplar development is generally considered to contain limited suitable habitat and features of value to invertebrates; however, given the presence of these two notable species within a margin feature of the proposed development the overall the value of the site for invertebrates is considered to be of 'Parish/Neighbourhood' Importance.

#### Great crested newts

A medium population of great crested newts has been recorded in ponds at Bucknell, outwith the proposed NW Bicester eco-development. The nearest pond found to support great crested newts was approximately 1.1km from the boundary of the Exemplar development. No ponds or features suitable for use by breeding great crested newts were found within the proposed Exemplar development. A small online pond associated with the ephemeral watercourse running west to east was located adjacent to the proposed development boundary; however, this pond dried out prior to early May and was therefore deemed unsuitable for use by breeding great crested newts.

A large pond located within the grounds of Caversfield House approximately 140m north-west of the proposed development boundary, and a pond located approximately 350m to the east, were identified from Ordnance Survey maps but due to access restrictions could not be comprehensively surveyed. However, the large pond in Caversfield House supported fish and was therefore considered unsuitable for use by great crested newts. Given the distance between the proposed development and the pond located to the east, and its separation from the site by two roads, it was considered unlikely that great crested newts (should they be present), would be foraging within the proposed development. Overall, it is considered unlikely that great crested newts would be present within the proposed Exemplar development and therefore they have not been considered further in this assessment.

## Reptiles

A small population of common lizards were recorded within the field margin and grassland habitats adjacent to the western corner of the proposed development. One grass snake was also observed basking along the northern boundary of the woodland outside of the proposed development. It is possible that small numbers of both common lizards and grass snake use the proposed development, particularly the field margins and riparian habitat along the River Bure and its tributary; therefore, these habitats within the proposed development are considered to be of 'Parish/Neighbourhood' Importance for reptiles.

## Breeding birds

The breeding bird surveys in 2010 identified five species of conservation concern using the proposed Exemplar development, including yellowhammer, song thrush, dunnock, whitethroat and kestrel. All of these species were associated with the hedgerows, trees and field margins within the proposed development and all are common species within areas of similar habitat in Oxfordshire (OOS, 2005). Given the size of the site and the abundance of suitable habitat in the locality, the proposed Exemplar development is considered to be of 'Parish/Neighbourhood' nature conservation value for breeding birds (excluding barn owls, discussed separately below).

Barn owls, a Schedule 1 protected species and amber listed species of conservation concern (Eaton et al. 2009), have been recorded breeding within the study area in the recent past, and suitable nesting sites for this species in the form of nest boxes have been installed within the proposed Exemplar development and in adjacent habitat. Breeding within one nest box, outside of the proposed development boundary along riparian habitat to the west, was confirmed during the surveys undertaken in 2010. Barn owls are widely spread throughout the county but are an uncommon resident breeding species (OOS, 2005). In light of this and the information above the proposed development is considered to be of 'District/Borough' nature conservation value for barn owls.

Although detailed surveys for wintering birds have not been undertaken, given that the habitats within the proposed Exemplar development are well represented in the locality it would appear unlikely that the area of proposed development would be of particular importance for wintering birds. Therefore wintering birds have not been considered further in this environmental impact assessment.

## Bats

A small number of the mature trees were identified as supporting features potentially suitable for use by roosting bats. Targeted emergence surveys undertaken in 2010 confirmed the presence of a small common pipistrelle bat roost within a mature willow along the River Bure within the proposed Exemplar development. Two further roosts outside of the proposed development were also confirmed during the surveys including: a common pipistrelle roost within the modern farmhouse at Home Farm and a roost of brown long-eared bats and other unconfirmed species within St Lawrence's Church, Caversfield north of the B4100 from the proposed development.

Bat activity surveys revealed that the ephemeral watercourses within the proposed Exemplar development were the main habitats used by foraging and commuting bats, and foraging activity was also recorded along the hedgerow that forms the eastern boundary in the northern part of the proposed development. Bat activity was also recorded along the edge of the woodland to the west of the proposed development boundary and around the properties at Home Farm. The arable fields and grazed pasture were found to be of limited value to foraging bats. Species recorded within the proposed development included common pipistrelle, soprano pipistrelle, Leisler's, noctule, and an undetermined myotis bat; however, the majority of passes recorded within the study area were of common pipistrelle bats. Two brown long-eared bats and a Nathusius pipistrelle bat were recorded within the study area in close proximity to the proposed



development. The majority of these species are common within Oxfordshire. Few records of Leisler's and Nathusius pipistrelle bats exist for the area; however, they are considered to be under-recorded species. Overall, the site is considered to be of 'District/Borough' value for bats.

## Dormice

No evidence of dormice was found during the targeted surveys undertaken within the proposed Exemplar development. No records of this species were obtained from TVERC and the links between the proposed development and suitable habitat for dormice offsite were limited. It is therefore considered unlikely that dormice would be present on site and therefore they have not been considered further within this environmental impact assessment.

## Badgers

A 'main' badger sett was located within on the tributary of the River Bure within the proposed Exemplar development. A further large sett was located in woodland approximately 200m from the proposed development boundary at its closest point. Several 'outlying' setts were also recorded within the study area, of which one was found along the banks of the River Bure within the proposed development. Bait-marking studies undertaken in May 2010 identified that the two large setts are likely to belong to the same social group of badgers. Signs of badger activity were largely focused on the woodland and grassland habitats. Although protected, badgers are not of conservation concern and they are reasonably common within the wider area. Consequently, the proposed Exemplar development is considered to be of 'Parish/Neighbourhood' value for badgers.

## Other mammals of conservation concern

### Brown hare

Brown hares have been recorded within the proposed NW Bicester eco-development area but not within the proposed Exemplar development. Brown hares are a UKBAP Priority Species. It is possible that brown hares would forage within the arable fields of the proposed Exemplar development; however, given the intensity of the cattle grazing it is considered unlikely brown hare would use the permanent pasture fields. Given the size of the proposed development and the availability of suitable habitat within the locality it is considered unlikely that the arable fields within the site would be of particular value to brown hare. Overall the proposed development is considered to be of no more than 'Parish/Neighbourhood' value for brown hares.

### Hedgehog

Although targeted surveys for hedgehog have not been undertaken it is likely that they would be present within the proposed Exemplar development, but it is considered unlikely that the proposed development would be of particular value to hedgehogs. Hedgehogs are a UKBAP Priority Species. Overall the site is considered to be of no more than 'Parish/Neighbourhood' value for hedgehogs.

### Polecats

It is possible that polecats could be present within the wider area, including the proposed NW Bicester eco-development; however, the proposed Exemplar development contains limited suitable habitat for this species. It is therefore considered unlikely that polecats will be affected by the proposed development and they have not been considered further in this environmental impact assessment.

### Harvest mice

The arable and grassland leys within the proposed Exemplar development do not contain tall grassland features on a regular basis which would support a viable population of harvest mice;

therefore, it is considered unlikely that harvest mice will be present within the proposed development and they have not been considered further in this environmental impact assessment.

## 7.5.4 Selection of Key Ecological Receptors

Table 7- summarises all ecological receptors that have been considered, and highlights those which have been selected as 'Key Ecological Receptors' for further investigation in this assessment. The locations of these habitats and features and other known ecological constraints are illustrated on Drawing 7-1.

**Table 7-2 Summary of Ecological Receptors**

<b>Ecological Receptor</b>	<b>Associated species/habitats</b>	<b>Nature Conservation Value</b>	<b>Potentially significant effect and mitigation measures</b>
<b>Key Ecological Receptors</b>			
Hedgerows (including breeding birds, reptiles, and hedgehogs)	Invertebrates, great crested newts, reptiles, breeding birds, bats	District/Borough	<p>Hedgerows fragmented by access roads. Context of hedgerows altered since no longer adjacent to farmland.</p> <p>The hedgerows would be retained with buffer zones and areas of green space. All sections of hedgerows that are removed will be translocated to maintain habitat links. Opportunities for enhancement through appropriate management, which will also benefit invertebrate species and assemblages.</p> <p>Timing of site clearance will be outside of breeding bird season, or if unavoidable, under close supervision by an experienced ecologist. Opportunities for habitat enhancements for bird species. Provision of bird nesting boxes during construction and for operation,</p> <p>Potential for mortality of reptiles during construction. Pre-translocation checks to be undertaken by an experienced ecologist. Opportunities for habitat enhancements for reptile species.</p> <p>Potential for temporary habitat loss for hedgehogs. Hedgerows will be checked for presence of nesting hedgehogs prior to any translocation operation by an experienced ecologist. Opportunities for habitat enhancements for hedgehogs.</p>
River Bure and tributary	Reptiles, bats and otters	District/Borough	<p>The implementation of standard mitigation techniques will ensure water quality is protected during construction, the SuDS that forms part of the proposal will ensure water quality is protected once the site is developed.</p> <p>Stream corridors would be fragmented by access roads; however, the bridges have been designed to ensure that fauna in</p>

Ecological Receptor	Associated species/habitats	Nature Conservation Value	Potentially significant effect and mitigation measures
			particular bats and badgers can continue to forage along these corridors.
Barn owls	Trees, arable fields, grasslands	District/Borough	<p>Nest sites retained but in close proximity to development; therefore, potential effects include disturbance to nesting barn owls, which in turn could potentially affect breeding success.</p> <p>Nest boxes will be relocated at further distance from the proposed Exemplar development and further nesting opportunities provided offsite, including within the NW Bicester eco-development, in land away from developed areas and close to suitable foraging areas.</p> <p>Small areas of suitable foraging habitat including the grassland leys will be lost under the footprint of the proposed development; however, retained habitat adjacent to the site will ensure foraging habitat remains available to this species.</p>
Bats	Mature trees, hedgerows, River Bure and tributary	District/Borough	<p>Confirmed and potential bat roosts to be retained. Hedgerows and stream corridors will be retained. Unlit corridors will be provided. Provision of bat boxes and bat 'bricks'.</p> <p>Potential for habitat enhancements.</p>
<b>Other ecological receptors requiring mitigation</b>			
Mixed broadleaved plantation	Barn owls, bats, invertebrates	Parish/Neighbourhood	<p>The plantation would be removed to permit the proposed development.</p> <p>All suitable native trees and scrub within this plantation will be translocated to other areas within the proposed development, including areas proposed for woodland planting and within street planting and home zones.</p>
Invertebrates	Arable field margins, hedgerows, mature trees	Parish/Neighbourhood	<p>Potential loss of habitat for Shaded Pug moth and Roesel's Bush-cricket during construction. However, buffers of diverse grassland areas will be maintained along hedgerows suitable for the cricket ; and proposed planting will incorporate plants favoured by the moth, such as Field Scabious; thus retaining habitat for these species within the development layout.</p> <p>At least fifty invertebrate boxes, suitable for use by species such as ladybirds, lacewings and solitary bees, will also be provided within suitable habitat to create shelter for these species within the proposed development.</p> <p>No further invertebrate species or assemblages of note exist within the proposed</p>

<b>Ecological Receptor</b>	<b>Associated species/habitats</b>	<b>Nature Conservation Value</b>	<b>Potentially significant effect and mitigation measures</b>
			Exemplar development.
Reptiles	Stream corridor, hedgerows, grasslands	Parish/ Neighbourhood	Included within Hedgerow receptor above. Receptor not sufficiently valuable for significant impacts to arise. Potential for mortality during construction considered within Hedgerow receptor above. Opportunities for habitat enhancements.
Breeding birds (excluding barn owls)	Trees, hedgerows, arable fields, grasslands.	Parish/ Neighbourhood	Included within Hedgerow receptor above. Receptor not sufficiently valuable for significant impacts to arise. Potential for disturbance and mortality during hedgerow translocation if undertaken during the breeding bird season. This is considered within Hedgerow receptor above. All hedgerows are to be retained with buffer zones. Timing of site clearance outside of breeding bird season or if unavoidable, under close supervision by an experienced ecologist. Opportunities for habitat enhancements.
Badgers	Hedgerows, arable fields, grasslands.	Parish/ Neighbourhood	Large sett retained with appropriate buffer zone. Sett will be protected during construction through the use of temporary protective fencing to prevent accidental damage by construction machinery or staff. Potential loss of one small outlying sett and foraging habitat. This would have no discernable effect on the badger social group. Bridges will be designed to allow badgers to pass under main access roads. Hedgerows retained to provide corridors that allow badgers to cross the proposed development to access other areas with their territory. Badgers unlikely to be killed on residential roads due to low road speeds. Provision of foraging areas in close proximity to 'main' sett.
Brown hares	Arable fields	Parish/ Neighbourhood	Habitat loss, but receptor not sufficiently valuable for significant effects to arise. Timing of topsoil stripping in arable fields to avoid brown hare breeding season or when dependent young could be present. Pre-construction check to be undertaken by experienced ecologist.
Hedgehogs	Hedgerows, tall grassland	Parish/ Neighbourhood	Included within Hedgerow receptor above. Habitat loss, but receptor not sufficiently valuable for significant effects to arise, this has been considered within Hedgerow receptor above. Hedgerows to be checked for presence of nesting hedgehogs prior to any

Ecological Receptor	Associated species/habitats	Nature Conservation Value	Potentially significant effect and mitigation measures
			translocation operation. Opportunities for habitat enhancements.
<b>Ecological receptors not considered further</b>			
Ardley Cutting and Quarry SSSI	Calcareous grassland, woodland, wetlands	National	No direct effects or no indirect effects predicted.
Ardley Trackways SSSI	Geological interest	National	No direct effects or no indirect effects predicted.
Stratton Audley Quarries SSSI	Geological interest	National	No direct effects or no indirect effects predicted.
Wendlebury Meads and Mansmoor Closes SSSI	Un-improved neutral meadows, bird and butterfly assemblage	National	No direct effects. The implementation of standard mitigation techniques during construction to protect water quality within the River Bure will ensure no adverse effects on this SSSI. SuDS will ensure water quality is protected once the site is developed.
Eight further SSSIs within 10km of proposed development	Various	National	No direct or indirect effects predicted.
Tusmore and Shelswell Parks with Stoke Lyne Woodlands CTA	Parkland, mixed broadleaved deciduous woodland	County/Regional	No direct effects or no indirect effects predicted.
Ray CTA	Lowland meadows, riparian habitat, hedgerows.	County/Regional	No direct effects or no indirect effects predicted.
Bure Park LNR	River, riparian, woodland, grassland, water voles	District/Borough	No direct effects. The implementation of standard mitigation techniques during construction to protect water quality within the Bure will ensure no adverse effects on the LNR, SuDS will ensure water quality is protected once the site is developed. Habitats sufficiently robust to cope with additional visitor pressure.
Arable land and grasslands	Invertebrates, reptiles, farmland birds, barn owls	Parish /Neighbourhood	Habitat loss, but receptor not sufficiently valuable for significant effects to arise. Opportunities for habitat creation.
Great crested newts	Riparian corridor, hedgerows	Negligible	No direct effects and no indirect effects predicted.

Ecological Receptor	Associated species/habitats	Nature Conservation Value	Potentially significant effect and mitigation measures
Dormice	Hedgerows	Negligible	No effects predicted as considered to be absent from Exemplar development.
Water voles	River Bure and tributary	Negligible	No effects predicted as considered to be absent from Exemplar development.
Otters	River Bure and tributary	Negligible	No effects predicted as considered to be absent from Exemplar development.
Polecats	Hedgerows, River Bure and tributaries	Negligible	No effects predicted as considered to be absent from Exemplar development.
Harvest Mice	Arable fields, grasslands	Negligible	No effects predicted as considered to be absent from Exemplar development.

## 7.6 Design and Mitigation

Around 46% of the proposed Exemplar development comprises green space, of which over 37% is public open space. This exceeds Policy ET14 in the guidance document PPS: Eco-towns (a supplement to PPS1). The green space will include the most valuable habitats: the riparian habitat along the River Bure and its tributaries, the hedgerows, the 'main' badger sett, and the confirmed bat roost.

As well as retaining the most valuable features, ecological corridors will be maintained and enhanced on site to provide important ecological links from the River Bure and its tributary to Bure Park LNR to the south, and to habitats adjacent to Home Farm and Caversfield House in the north. Links are also provided from the tributary of the River Bure to riparian and woodland habitats to the west of the proposed development. Mitigation and enhancement measures that have been incorporated into design with respect to Key Ecological Receptors are identified below. Habitat enhancement and creation measures that form part of the design to ensure a 'net gain in biodiversity' in keeping with Policy ET14 are also identified.

### Protection and translocation of hedgerows

The proposed Exemplar development has been designed to retain as many of the hedgerows as possible. Where sections of hedgerows require removal to permit access, the width of the removed section will be kept to a minimum and all sections of hedgerows will be translocated, together with their associated ground flora, to areas nearby within the Exemplar Site. The majority of hedgerows within the Exemplar Site will also have a buffer comprising 3m of tall, less-intensively managed grassland. Adjacent to the majority of these hedgerow buffers there will be areas of green space, such as allotments, native tree and shrub planting, orchards, diverse grassland and SuDS features. The retention of hedgerows and the maintenance of buffer habitats will maintain nesting opportunities and foraging resources for birds, and provide continued habitat and wildlife corridors for species such as invertebrates, reptiles, hedgehogs and bats. In addition, the buffer and adjacent green spaces will protect the hedgerows from indirect disturbance arising from increased human presence, site traffic, noise and lighting during the operational phase of the proposed development. The translocation coupled with new planting to bolster the hedgerows will ensure that in the long-term, new links are created and that there is no net loss in the length of hedgerows within the proposed development.

The translocation of sections of hedgerow will preferably be undertaken during the autumn/winter period when plants are dormant. This will also avoid conflicts with nesting birds.

The translocation would be overseen by an experienced ecologist and checks for any species of

conservation concern, such as reptiles and hedgehogs, would be undertaken prior to the removal operation. Any features of value to hibernating reptiles would be left *in-situ* until the following spring to avoid adverse impacts on this species, and should a nesting hedgehog(s) be found this, and surrounding vegetation, would be left until vacated. If it is not possible to undertake the translocation in the autumn/winter period, it will be carried out under specialist ecological supervision to confirm the absence of nesting birds and any other species of conservation concern. Should the presence of nesting birds be established, works will cease until the young have fledged. Bird nesting boxes will also be installed on retained trees and in hedgerows, in suitable locations away from the works. This will be carried out in advance of construction to ensure alternative nesting opportunities are provided to mitigate for any temporary loss. Translocating hedgerows outside of the autumn/winter may also require further after-care, such as watering, to ensure their continued survival. The translocated hedgerows will be monitored regularly as part of the Landscape and Ecology Conservation Management Plan for the Exemplar Site (see Section 7.8 below), and any remedial works undertaken as necessary to ensure their continued survival and growth. Hedgerow translocations are a proven technique and would ensure that there is not net loss of habitat as a result of the proposed development.

Hedgehogs and reptiles will be expected to persist within the Exemplar Site once the site is developed (should they be present), as the hedgerows and riparian habitat will be maintained and bolstered with additional woodland and shrub planting. Hedgehogs are also likely to benefit from the increased diversity of habitats within the areas of open space and gardens following construction compared to the habitats present on site in 2010.

Indirect impacts associated with disturbance will be minimised by having haul routes and storage/staff facilities located away from retained hedgerows. In addition, any night-time lighting will be kept away from retained hedgerows and will be limited only to those areas where it is absolutely necessary. Retained hedgerows will also be carefully fenced to ensure that they are not subject to accidental damage. This protective fencing together with a suitable buffer will be implemented in order to ensure that the roots of the hedgerow trees and shrubs are not undermined during any excavation works.

## River Bure and tributary

Construction site drainage will be carefully designed and controlled, with silt traps established at the outset of the works. The drainage proposals will incorporate measures to ensure that all runoff is treated and returned to the watercourses at greenfield runoff rates. All works will incorporate relevant legislation for the protection of surface and groundwater and implement codes of good practice, and best practice guidelines for works within or near water. Relevant guidance including Pollution Prevention Guidelines (PPGs) prepared by the Environment Agency and literature produced by CIRIA would form the basis for pollution control measures.

Surface water drainage within the proposed development during operation will be managed using SuDS. This will involve a combination of gravel-filled channels, swales, open ditches, underground storage facilities and above ground attenuation basins (some of which will support water for most of the year). The attenuation basins will be specifically designed to create habitats of value to wildlife. Similarly, the drainage channels and swales will be planted with a diverse mix of native species to provide habitats for wildlife. These features will provide habitats of value to for invertebrates, amphibians and reptiles, such as grass snakes which have been recorded in close proximity to the site. Together the SuDS features create a network of wet and dry habitats across the site.

Pre-construction water quality monitoring of the River Bure and tributary will be collected from three points: upstream of both watercourses; and downstream of the proposed Exemplar Site development after the River Bure and its tributary have converged. This will ensure a baseline



of water quality is provided against which both pre-, during- and post-construction monitoring can be compared.

Where the roads within the proposed development cross the watercourses, these will be designed to minimise impacts on the watercourses and associated protected species, creating a dark corridor beneath the structures. Care will be taken to avoid damage to the banks and/or any sensitive features in close proximity, such as the 'main' badger sett and confirmed bat roost tree. As discussed above, current best practice guidance will be followed to control the construction of these structures in close proximity to the watercourses. Night-time construction lighting is not proposed for the Exemplar Site, but should it be necessary it will be kept away from the watercourses. During the operation phase of the proposed development, the bridges will need to be lit for safety reasons. However, the lighting selected will be shielded and the lighting column heights would be reduced. In addition the road surface material will comprise a low-reflective surface. These measures will prevent light spilling onto the dark corridor below. The River Bure, its tributary and the 'main' badger sett will be also be buffered from development and any associated lighting through additional tree and shrub planting.

A pre-construction survey will be undertaken to ascertain the presence of badger setts, and/or any potential otter holts/resting sites and water vole burrows which would constrain the construction of the bridges over the River Bure and its tributary.

## Mixed broadleaved plantation

The proposed development will include the translocation of the recently established trees and shrubs within the mixed broadleaved plantation from the south-west corner to the proposed woodland planting in close proximity to the River Bure and its tributary, and other areas of tree and shrub planting, including planting within home zones and streets.

## Barn Owls

Given the close proximity of the nest site to the proposed Exemplar Site development (location shown on Drawing 7-1), the confirmed nest box would be moved to a location on the edge of the woodland to the west of the Exemplar Site, thus ensuring the nest box remains within suitable foraging habitat but in an area that will not be developed as part of the NW Bicester eco-development in the future. The barn owl nest boxes currently installed within the proposed Exemplar Site development would also be removed and relocated to suitable habitat outside the proposed development. Should these nest boxes no longer be suitable for barn owls, or if they are damaged when they are moved, further barn owl nest boxes will be provided. These will also be located outside the proposed development. These boxes will also provide suitable nesting habitat for the kestrels that were recorded nesting within a barn owl box on the site. Existing nest boxes would only be moved once it has been confirmed, by an experienced, licensed ecologist, that no birds are currently using the boxes.

## Bats

The design of the proposed Exemplar Site development has ensured the retention of all confirmed and potential bat roost trees in unlit corridors. The design also retains the most valuable commuting and foraging habitat along the River Bure and tributary, these areas will also be unlit. Night-time lighting is not proposed during the construction of the Exemplar Site development but should it be necessary it will be kept away from the confirmed and potential bat roosts and the watercourses, and will be limited only to those areas where it is absolutely necessary.

During the operation phase of the proposed development, the road bridges will need to be lit for safety reasons. However, the lighting selected will be shielded with lighting columns of reduced height. The road surface material will comprise a low-reflective surface, this will prevent light



spilling onto the dark corridor below; thus ensuring the retention of a continuous dark corridor along the watercourses avoiding impacts on light-sensitive bat species such as brown long-eared bats.

As further enhancement of the proposed development for bats, at least 20 bat bricks and 20 bat boxes will be installed in dwellings or public buildings and the latter installed on mature trees in suitable locations throughout the proposed development, thus providing increased roosting opportunities. The current study area contains very few natural roost sites and only a few bat boxes have been installed.

As well as retaining the most valuable features for bats, ecological corridors across the site will be maintained and enhanced through additional woodland planting adjacent to the River Bure and tributary to further enhance the corridor for species such as brown long-eared bats. This planting will also provide further shielding from any lighting associated with properties within the proposed Exemplar Site development.

Habitat enhancement and creation measures that will improve the value of this proposed development for invertebrates will also be of benefit to the bats that feed on them. Such measures include the creation of long grassland habitats, SuDS features, areas of diverse grassland and allotments.

## Badgers

The design of the proposed development includes for the retention of the 'main' badger sett. The single 'outlying' sett within the banks of the River Bure will also be retained as far as possible, although it may be necessary to close this sett during the construction of the bridge structure across the River Bure to prevent disturbance. This may need to proceed under licence to Natural England, depending on activity levels at the sett at the time of site construction works. All setts will be protected during construction through the use of temporary protective fencing to prevent construction machinery or staff from damaging the setts. Any works close to the 'main' badger sett will also be carried out under close ecological supervision to ensure disturbance to badgers is minimised as far as possible.

## Habitat Enhancements

A total of 25% of the green space within the proposed Exemplar Site development is dedicated to nature conservation. Green spaces within the proposed development will also include allotment areas and community orchards. Whilst these elements will be primarily for food production, they will also be of benefit to wildlife. The 'scruffy' habitats that will be created within the allotments, when areas are left fallow, when compost heaps are created or when crops are not gathered, coupled with any deliberate interventions to create wildlife habitats will provide habitats of value to fauna. Species and groups that are likely to benefit include invertebrates, reptiles, amphibians, birds and potentially bats.

The provision of nest boxes within retained vegetation, and the planting of new native trees and shrubs within the proposed development will provide enhancement measures and also compensate for the temporary loss of bird nesting habitat during the translocation of hedgerows. At least 100 nest boxes will be installed on retained mature trees, close to retained hedgerows and within appropriate locations within the built areas during construction. These will comprise a mixture of open-fronted boxes and those suitable for hole nesting species. Nest boxes will also be installed in strategic places within dwellings and public buildings, to provide nesting opportunities for species that are not currently present. The latter nest boxes will be targeted towards species that have undergone population declines that are closely associated with the built environment. These comprise: 20 swift boxes, 10 house martin boxes, 10 house sparrow boxes, four starling boxes, and 10 swallow boxes, in keeping with TCPA's Biodiversity Positive: Eco-towns Biodiversity Worksheet guidance (TCPA, 2009). These boxes will be installed on

dwellings or public buildings and facing suitable habitat to provide nesting opportunities for these colonial nesting species. No provision has been made for peregrine falcon as there are no suitable structures for an appropriate nesting platform. Nesting opportunities will therefore be provided for birds that have been recorded on the site as well as species which are not currently present on the site due to the lack of natural nest sites. The boxes will ensure no net loss in available nesting habitat and biodiversity gain within the proposed development. Nest boxes will be checked on an annual basis to monitor the success of the mitigation measures.

Roosting opportunities for bats will also be provided within dwellings and public buildings and on retained trees within the proposed development site, thus incorporating wildlife into the built environment and increasing roosting opportunities for species that are frequently limited by suitable sites, particularly where energy efficient housing is created. At least 20 bat bricks will be installed in dwellings and public buildings, in suitable unlit locations and at a variety of aspects, ideally facing open space. A minimum of 20 bat boxes will also be installed on retained trees and dwellings and public buildings. On trees these will be installed in groups of three, facing north, south-east and south-west to provide a variety of suitable aspects, and in locations adjacent to suitable foraging habitat such as the watercourses, hedgerows and woodland planting. Prior to development there were few natural roost sites. No boxes suitable for use by horseshoe bats will be provided since this species has not been recorded within the area.

Fifty invertebrate boxes will also be provided suitable for use by ladybirds, lacewings, and solitary bees in suitable areas across the proposed development, including residential areas.

New mixed broadleaved woodland and orchard planting will be provided in habitat adjacent to the River Bure and tributary, which will provide a buffer between the retained farmland and the development, and also provides a link between the retained hedgerows and the riparian habitat. This woodland planting will also widen the tree-lined stream corridor and form part of the buffer to retained hedgerows. This planting will be of benefit to invertebrates and the species that feed on them, such as bats and hedgehogs, and provide nesting sites for birds. Prior to the development there were no mature woodlands within the site. Providing woodlands will contribute to UKBAP targets for Lowland Mixed Broadleaved Woodland habitat, The Oxfordshire LBAP for Woodlands, and the Cherwell LBAP habitat for Woodlands. It will also be in keeping the Oxfordshire Landscape Strategy for this area, which is Wooded Estatelands. These areas will also provide an increase in biodiversity, in keeping with Policy ET 16.1 of PPS: Eco-towns, A Supplement to PPS1.

Tree and shrub planting within the proposed development will also be designed to provide a diverse range of food sources for birds and structural heterogeneity to maximise their value for hedgerow/scrub nesting birds. The hedgerows will be bolstered in areas bordering the fields associated with Home Farm. Additional tree planting will provide a link between hedgerows where no boundary feature previously existed, improving connectivity on the proposed development boundary.

Areas of diverse grassland, including damp grassland and dry calcareous grassland comprising native species, will be provided in areas of open space within the proposed development. The grassland planting will include large numbers of wildflowers including species which are attractive to invertebrates such as the Shaded Pug moth, and will ensure the site is of increased value for this species and invertebrate species assemblages as a whole. These areas will also be of potential value to bats and birds that are insectivorous. Prior to development there were no areas of diverse grassland within the site; therefore, its inclusion within the design will help to contribute to UKBAP targets for Lowland Calcareous Grassland habitat and the Cherwell LBAP for Grassland, Grazing Marsh and Heathland. These grassland areas will also provide an increase in biodiversity, in keeping with Policy ET 16.1 of PPS: Eco-towns, A Supplement to PPS1.

Surface water drainage within the proposed development will be managed using SuDS. This will involve a combination of ditches, swales and attenuation basins (including ephemeral and permanently wet features). This combination of features will provide habitat conditions for a range of native plants including wetland species, and enhance the value of these areas for a diversity of fauna, including invertebrates, amphibians, and reptiles such as grass snakes which have been recorded in close proximity to the site. These features will form a network of wetland features across the site. Prior to development the watercourses were the only wetland features on the site and there were no permanently wet features on the site.

Other features of biodiversity value that have been incorporated into the design include green walls, which will be used as a feature around the bus stop and on the biomass storage silo associated with the Energy Centre. These will be covered with climbing plants of value to wildlife, in particular invertebrates.

## Habitat Management

Management of the hedgerows will be relaxed to provide increased value for invertebrates and nesting birds. The buffer adjacent to the hedgerows will also be less intensively managed to encourage long grassland areas which would support invertebrates and reptiles. The management including the replacement of nest/roost boxes would be controlled through a Landscape and Ecology Conservation Management Plan (see Section 7.9 below). Heads of Terms for the management plan are documented within the NW Bicester Exemplar Biodiversity Strategy accompanying this ES (see Appendix 7M).

## Climate Change

The proposed development includes within its design, elements which will increase the resilience of biodiversity to climate change and ensure it can adapt in the long term. Such elements include: measures to conserve existing biodiversity, such as the maintenance existing key ecological habitats within the proposed development and the conservation of a variety of habitats, to ensure local species and habitats are maintained. It also includes measures to increase habitat diversity and the availability of ecological niches within the proposed development by creating new habitat types using native species. These include woodland, ponds and diverse grassland. Retained habitats and newly created habitats will also form linear corridors allowing for the migration of species across the proposed development and into the wider countryside, to counteract isolation and potential loss of species.

The proposed development will also ensure that the River Bure and its tributary are retained, protected, and are given sufficient space to adapt by allowing for natural processes of erosion and deposition. Retained riparian habitats together with increased planting along the banks of these watercourses will also assist in soil retention and damaged which may potentially arise from any future flood events. The provision of ponds and the SuDS treatment system will also ensure that the water resources within the proposed development are controlled and maintained for the future. For example, the SuDS will hold back water following heavy rain, therefore allowing the watercourses to cope more effectively with extremes of weather than traditional piped drainage systems. The system will also improve the quality of the riparian habitats.

The retention and improvement of the riparian corridor and the hedgerows, and the provision of woodland planting and areas of green space such as the Village Green, school playing fields and green walls, together with interconnecting green corridors will also help to reduce temperatures across the proposed development, thus assisting to counteract any temperature rises associated with built developments. The provision of increased tree and shrub planting, within the street areas and home zones, and the provision of allotments and gardens will also provide green networks and will help to retain moisture within the proposed development and reduce urban temperatures. Tree and shrub planting will be of local provenance where possible

and native species will be selected to ensure that they thrive in the anticipated future climatic conditions. Cultivars have been selected where appropriate to the urban setting to cope with the stressed environment created when much of the surrounding area comprises hard surfaces.

The seeding of diverse grassland with both dry and wetland species will also help to maximise the future survival of green habitats within the proposed development. The provision of long grassland buffer areas and other supplementary habitats, such as allotments, will also help to reduce any future droughting effects on the hedgerows.

## 7.7 Assessment of Impacts

### 7.7.1 Impacts on Key Ecological Receptors

#### Hedgerows (including breeding birds, reptiles and hedgehogs)

Sections of four 'important' hedgerows will need to be translocated to provide access (including visibility splays) into the Exemplar Site from the north and east, and for the new road crossing the centre of the site. Short sections will also be lost to create footpaths and minor access roads. These sections of translocated hedgerow will be relocated to suitable areas within the Exemplar Site, close to their original location, thus ensuring there is no net loss of hedgerows within the site.

Hedgerows are a UKBAP Priority habitat and are also considered to be of intrinsic nature conservation value for the species they support, such as breeding birds, reptiles and hedgehogs. The hedgerows also form important boundary features and wildlife corridors across the Exemplar Site. Any loss and/or fragmentation will therefore affect species closely associated with these hedgerows.

#### Construction Impacts

Translocation of hedgerow sections will involve the temporary loss of nesting habitat for birds, prior to their translocation and regeneration; however, the provision of additional nest boxes during the construction phase, as described in Section 7.6 above, will mitigate for this temporary loss. To further avoid impacts on breeding birds, the translocation operation will preferably be undertaken outside of the bird breeding season (i.e. between the months of September and February, inclusive). Where this is not possible and removal is undertaken within the breeding bird season, to minimise the risk of killing and/or injuring birds, or damaging or destroying nests (all of which would be unlawful should they occur), specialist ecological supervision will be provided to confirm the absence of nesting birds prior to the translocation, and ensure the protection of any confirmed nesting sites, thus minimising the risk of adverse impacts on bird species. The hedgerows also represents a valuable foraging resource for many of the bird species recorded within the proposed Exemplar Site development, and the translocation will result in the loss of a small area of foraging habitat on a temporary basis.

It is not envisaged that the hedgerow translocation will have any impact on the confirmed or potential bat roosts in trees as these features will be retained and are not in close proximity to any of the removed sections of hedgerows. The hedgerows do provide valuable foraging and commuting habitat for bats and temporary removal of sections of hedgerows during the construction phase may result in the disruption of foraging and commuting bats. Impacts on bats are discussed in more detail under the 'Bats' receptor below.

It is possible that small numbers of common reptile species use the hedgerows within the proposed development at times, for foraging or potentially hibernating should features be present. Therefore, removal of hedgerows has the potential risk of killing or injuring reptiles.

However, this is considered unlikely given the small area of hedgerows to be removed, the low

numbers of reptiles recorded within the vicinity of the site, and the proximity between the reptile records and the hedgerows to be removed.

The hedgerows may also be used by foraging, nesting and hibernating hedgehogs. The removal of sections of hedgerows has the potential to kill or injure this species, should they be present. However, a search of the affected hedgerows for hedgehogs will be undertaken by an experienced ecologist, thus minimising the potential to kill or injure this species.

In addition to direct impacts associated with the removal of sections of hedgerows, there will be periods when they may be subject to disturbance from nearby construction works within the site. While all hedgerows will be protected by fencing there may be some disturbance during the breeding bird season which may deter the use of some areas of hedgerow by nesting birds, potentially resulting in a temporarily reduced breeding success of the species recorded on site.

Assuming the implementation of effective mitigation described in Section 7.6, and due to the temporary nature of these impacts, it is considered that there would be no significant residual effect on this receptor.

### Operational impacts

Following construction, the context of some of the hedgerows will have changed as they will no longer be adjacent to arable or grazed farmland on at least one side, which may change the nesting locations of bird species. However, all hedgerows will be retained or translocated where removal is necessary; therefore, potential nesting sites for birds will be retained. Two of the breeding bird species of nature conservation concern, namely song thrush and dunnock, are likely to remain within the proposed development hedgerows. The nesting sites for the two yellowhammers recorded breeding within the western boundary hedgerows of the northern section of the proposed development will also be retained, together with suitable arable foraging habitat outside of the site. The arable leys within the proposed development were considered unlikely to provide this species with a significant seed or insect resource due to the current land management practices, which limits the site's value for invertebrates. Yellowhammers may, however, still be deterred from nesting due to the presence of new residents and their pets. It is likely that whitethroat, the fourth species of conservation concern, would not remain on the site.

It is not anticipated that there would be a significant residual impact on the hedgerow network due to operational impacts. In time the habitat enhancement measures that form part of the design and the improved management of these features in accordance with a Landscape and Ecology Conservation Management Plan would ensure that the proposed development would have a significant beneficial effect on this 'Key Ecological Receptor'.

### River Bure and tributary

The River Bure and its tributary both bisect the proposed Exemplar Site development. These watercourses will be retained, together with adjacent riparian and woodland habitat. Rivers are a UKBAP Priority Habitat. The River Bure, its tributary and adjacent habitats were found to support foraging and commuting bats, a confirmed bat roost within a tree along the River Bure, and an 'outlying' badger sett. There was no evidence of use of these watercourses by white-clawed crayfish, water voles and otters, and only low numbers of widespread and common aquatic invertebrates were recorded during the surveys. These watercourses do not hold water in the summer months and are therefore considered to be of limited value to aquatic invertebrates (including white-clawed crayfish), water voles and otters.

The design of the proposed Exemplar Site development includes the provision of SuDS to control and manage surface water run-off from the site. The SuDS will ensure that any water released from the Exemplar Site to the River Bure and tributary will be treated prior to being released at greenfield run-off rates.



## Construction Impacts

While preventative measures will be in place to control construction site drainage, there is a small risk that run-off from ground works within the proposed development could enter into the River Bure and its tributary. The implementation of control measures will ensure that levels of pollutants/sediment will be low and of a temporary nature, which means that there is a low likelihood of deleterious impacts on water quality, aquatic vegetation and potentially water voles and otters, which are known to be present in the wider area.

The proposed access route into the site will cross the River Bure and its tributary, at two locations within the proposed development. The control measures discussed in Section 7.6 will minimise the risk of localised impacts at these crossing points. Works close to the badger sett will be undertaken under close ecological supervision to ensure disturbance to badgers is minimised as far as possible, and temporary protective fencing will be provided to prevent damage to the sett from site machinery or staff during construction activities. The need for works to proceed under licence to Natural England would also be reviewed and methods of working devised to ensure that activities likely to cause disturbance are avoided if at all possible.

A number of potential bat tree roosts are located along the banks of the River Bure, including one confirmed common pipistrelle bat roost. In addition, the bat activity transect surveys identified that the stream corridor was a valuable foraging area for bats. These trees will be retained within the River Bure corridor; however, their value for bats could potentially be reduced due to noise associated with construction. It is not however, considered that this disturbance will have a significant impact on the local bat population, since the construction activity will take place at times when bats are not active.

Assuming the implementation of effective mitigation described in Section 7.6, there would be no significant residual effect on the River Bure and tributary and associated species during construction.

## Operational impacts

Surface water drainage within the proposed development will be managed using SuDS, which will ensure any water released from the Exemplar Site to the River Bure and tributary will be treated prior to entering the watercourses at greenfield run-off rates. Therefore, no adverse impacts on water quality and the habitats and species associated with these watercourses are envisaged.

Indirect impacts on fauna from lighting on the new road bridges will be minimised through sensitive design. These watercourses are currently unlit, providing a dark foraging area and commuting route for nocturnal species such as bats and badgers. Lighting these previously dark corridors may render them less suitable for nocturnal foraging species, particularly light sensitive species such as brown long-eared bats, which are known to roost within St Lawrence's Church to the north of the proposed development. The riparian habitat along these watercourses provides a suitable dark link between the church roost and suitable habitat to the west of the proposed development; therefore, lighting could prevent bats from reaching foraging areas, thereby having a detrimental impact on the local population. Sensitive lighting of the bridge across the River Bure tributary will minimise adverse effects on the badgers within the 'main' badger sett close to this watercourse.

The design ensures that there are no residential properties close to the watercourses, thus reducing the likelihood that those features could be lit by uncontrolled security lighting. Buffers and screening planting will also be provided, and footpaths have been aligned to avoid impacting on the watercourses and sensitive features within them such as the 'main' badger sett and tree containing a confirmed common pipistrelle bat roost. Therefore, it is not considered

likely that the proposals would result in significant impacts on the River Bure and its tributary and the protected species they support due to increased public access.

Assuming the implementation of effective mitigation described in section 7.6, there would be no significant residual effect on the River Bure, its tributary and associated species during operation. The creation of diverse semi-natural habitats within the riparian corridor as part of the proposed development will ensure that overtime there is beneficial effect on these 'Key Ecological Receptors'.

## Barn owls

One breeding pair of barn owls was recorded within a barn owl nest box in close proximity to the Exemplar Site during the 2010 surveys. Desk study records provided also record barn owls breeding within the local area in the recent past. Several barn owl nest boxes have been installed within the Exemplar Site; however, recent surveys have not recorded their use by barn owls. The Exemplar Site ensures the retention of this nest site. The area of proposed development closest to this confirmed nest site is approximately 125m from the Exemplar Site boundary. The development closest to this nest site largely comprises allotments and low numbers of residential properties.

## Construction Impacts

Should construction works be undertaken during the barn owl breeding season (March to August) it is possible that increased human presence in the area, site traffic, noise and lighting could disturb nesting barn owls. Significant disturbance may affect their use of this nest site and potentially their breeding success.

The proposed Exemplar Site development will also result in the loss of grassland leys and cattle-grazed grassland fields. These areas may be part of the confirmed breeding pair of barn owls' home range; however, most of the grassland habitat within the proposed development is intensively cattle-grazed, with a small area of rough grassland associated with tree and shrub planting which could provide suitable limited food resources, such as voles, for barn owls. The grassland leys are also regularly cut and have narrow margins which support a small amount of rough grassland habitat suitable for foraging barn owls. A significant proportion of suitable foraging habitat will remain outwith the proposed development, including areas immediately surrounding the nest site and areas to the north, south and west. Therefore, it is not considered that the proposed development will remove valuable foraging resources from the barn owls nesting adjacent to the site.

It is considered that the potential exists for the proposals associated with construction of the proposed development to disturb nesting barn owls, however assuming the implementation of effective mitigation described in Section 7.6, there would be no significant residual effect on their breeding success whilst construction works occur.

## Operational impacts

The main impacts on barn owls are likely to be disturbance from increased public use of areas within the vicinity of the nest site, and noise and light impacts from the proposed development itself. Disturbance from increased public use of the retained grasslands within the area is also likely to have a significant impact on barn owls, which may forage during the day at certain times of year, and are sensitive to disturbance at these times. At present there is no public access to the areas containing the barn owl nest site or the new proposed nest site location and therefore, these impacts are considered to be low; however, this may change as a result of future development within the area.

It is considered that the potential exists for the proposals associated with operation of the proposed development to disturb nesting barn owls; however, assuming the implementation of effective mitigation described in Section 7.6, there would be no significant residual effect.

## Bats

A total of three potential bat roosts were identified within the proposed Exemplar Site development. Emergence surveys undertaken in 2010 of all potential roosts confirmed the presence of a small common pipistrelle bat roost within a mature willow tree adjacent to the River Bure. A brown long-eared bat roost was also confirmed within St Lawrence's Church and a common pipistrelle bat roost confirmed within a building at Home Farm both located to the north of the proposed development. The grassland and arable fields within the site were not identified as being of value to foraging bats. This is likely to be due to the low value of these areas for invertebrates. The key areas of the site for foraging and commuting bats were along three boundary features, including the River Bure, its tributary, and along the hedgerow on the eastern edge of the northern part of the proposed development.

The proposed development design has ensured the retention of all confirmed and potential bat roost trees. The design also retains the riparian habitat along the River Bure and its tributary. Bridges will be installed where the access road is required. These have been designed to ensure that bats would continue to be able to forage along the watercourses. Sections of the hedgerow running north to south within the centre of the site will be translocated to permit the construction of the road linking the northern and southern sections of the Exemplar Site. This hedgerow will be translocated to form a new hedge alongside the road, maintaining links across the proposed development.

## Construction Impacts

Protective fencing will ensure that the confirmed or potential bat roosts in trees will be retained and protected during construction. Site ground clearance works will also be buffered from these potential roosts by retained vegetation, thus ensuring that potential impacts from increased human presence in the area such as site traffic, noise and lighting will not disturb roosting bats.

Removal of vegetation to install the bridges over the River Bure will result in a gap being created in this currently vegetated corridor. The removed vegetation will be kept to a minimum. Given that this watercourse links to areas containing larger gaps in vegetation (such as the B4100 separating the proposed development from the brown long-eared roost at St Lawrence's Church) and the less vegetated corridor of the tributary, and that the majority of bats passes recorded using the Exemplar Site were of common pipistrelle bats, it is unlikely that the creation of this gap will deter the use of this area by foraging and commuting bats during the construction phase.

The arable fields and grassland habitats which will be lost under the footprint of the proposed development were not considered to be of particular value to the bat species recorded within the activity and emergence surveys, and dark vegetated links will be retained across the site to link to suitable foraging habitat outside the development site boundary. This will be particularly important for more vulnerable species such as brown long-eared bats, which emerge after dark and prefer to fly in dark, cluttered environments, should they be commuting along this area; however, few registrations of brown long-eared bats were recorded during the surveys and as discussed above, to reach these locations within the site they have to cross already existing gaps such as the B4100 and the less vegetated corridors to the west. It is therefore not considered likely that the loss of low value arable leys and grassland would have a significant impact on the local bat population.

Overall it is considered that the construction of the proposed Exemplar Site development would not result in a significant adverse impact on bats.



## Operational impacts

The confirmed and potential bat roosts will be retained in dark corridors within the proposed development and bridges have been designed to ensure bats can continue to forage along the River Bure and its tributary. However, as discussed under the River Bure and tributary receptor above, there could be direct impacts on bats commuting or foraging along these corridors if the associated lighting for these new bridges is not installed in a sensitive manner. Should lighting spill over from the bridges onto the riparian corridor, it may render them less suitable for light sensitive bat species such as brown long-eared bats. Commuting and foraging brown long-eared bats follow dark corridors; therefore, lighting these corridors could prevent them from reaching foraging areas, thereby having a detrimental impact on the local population. It is unlikely that lighting on the bridges or within the development itself will adversely affect other bat species recorded within the area such as pipistrelle, noctule and Leisler's bats, as these species have been recorded foraging under certain artificial light sources, and are fast flying species that are not deterred from flying through lit areas.

Small numbers of common pipistrelle bats were recorded foraging along the hedgerow on the eastern boundary of the northern half of the proposed development and the adjoining hedgerow to the south. A section of this hedgerow will be translocated as part of the proposals; therefore, the potential exists for foraging habitat for this species to be temporarily lost as part of the construction. However, this loss will be temporary as the hedgerow will be translocated alongside the new access road and further hedgerow and tree planting will be established adjacent to Home Farm land, which previously did not exist; thus ensuring a continuous link around the proposed development boundaries linking the northern and southern sections. The hedgerow translocations will also ideally be undertaken in the winter months outside the active period for bats.

Assuming the implementation of effective mitigation described in Section 7.6, there would be no significant residual effect on this receptor. The creation of a diverse range of semi-natural habitats within the proposed development will enhance the value of the site for invertebrates and thus the bats that feed on them. Thus the proposed development would have a beneficial effect on this 'Key Ecological Receptor' as these habitats mature.

## 7.7.2 Impacts on Other Ecological Receptors

### Reptiles

Small numbers of common lizard and a grass snake were recorded outside, but within close proximity to, the proposed development. These species may utilise the boundary features of the proposed development on occasions; therefore, there is the potential risk of killing and/or injuring reptiles during the construction phase of the development, where potentially suitable habitat for these species, such as the hedgerows and riparian habitat, are to be removed as part of the access roads. All reptiles are protected from killing or injuring under the Wildlife and Countryside Act, 1981 (as amended); therefore measures will be taken to avoid their incidental mortality during the removal of vegetation.

Hedgerow removal should ideally be undertaken during the autumn/winter. However, at this time reptiles will be entering into or be within their hibernating period (typically between the beginning October and early-April) and disturbing reptiles at this time can cause mortality. It is considered unlikely that hibernating reptiles will be present under the footprint of the small sections of hedgerows/vegetation to be removed; however, a check for features suitable for hibernating reptiles will be carried out by a suitably experienced ecologist prior to their removal. Any features considered to be of high value for hibernating reptiles would be identified and their removal left until the following April, in suitable warm weather conditions, to avoid killing or injuring reptiles.

Should hedgerow/vegetation removal be carried out during the reptiles' active period, a check for the presence of reptiles would be undertaken by an experienced ecologist. If suitable habitat for reptiles is present then habitat manipulation techniques would be employed to displace any reptiles present into nearby retained areas of suitable habitat, or if no such habitat was nearby, a small-scale translocation operation of any reptiles would be undertaken in advance of site clearance, and any reptiles captured would be moved to a suitable area of retained habitat. In either case reptiles would not be moved outside the area in which the small populations have already been found to exist, so there would be no implications associated with introducing individuals to a different population or creating new populations with small numbers of animals.

Following the displacement and/or translocation of reptiles, destructive searches will be undertaken, as appropriate; to further avoid the incidental mortality of individual animals and the need for reptile-resistant fencing would be reviewed throughout the construction phase. Given the small area of suitable habitat for reptiles being removed as part of construction of the Exemplar Site, this is considered unlikely to be a requirement.

## Badgers

The layout of the proposed development has been designed to allow the retention of the 'main' badger sett *in situ* and provides a retained vegetated buffer surrounding the sett to minimise construction activities in close proximity.

It may be necessary to close a single outlying sett located within the banks of the River Bure in the southern part of the proposed development, to prevent disturbance to any badgers which may be present during the installation of the bridge structure over the River Bure. Badgers are afforded protection under the Protection of Badgers Act 1992. As a consequence, the exclusion and closure of this sett may need to proceed under licence to Natural England, depending on activity levels at the sett at the time of site construction works. Works close to active setts which may disturb badgers could also be licensable, and there are seasonal restrictions associated with such works. Consequently works that could disturb badgers should not be undertaken during the badger breeding season, which is taken to be from the 1st December to the 30th June.

The 'main' badger sett will be protected from accidental damage and destruction by being clearly marked out for the duration of works being undertaken in the proposed development. The installation of the bridge over the tributary to the River Bure will be undertaken in a sensitive manner to avoid potential damage to the nearby 'main' badger sett and to avoid disturbing any badgers present. The area around the 'main' sett would also be planted with scrubby vegetation, incorporating a high proportion of fruit-bearing trees and shrubs, to screen the sett from any works and discourage interference or disturbance of the sett.

There will be some loss of foraging habitat for badgers within the proposed development; however, the habitat within close proximity to the sett will be retained together with well-connected grassland and woodland habitat along the watercourses which will ensure links to other areas of suitable habitat within this badger social group's territory. It is therefore not anticipated that this will significantly affect the badger population. Planting fruit trees within the area of open space next to the sett will also enhance the value of this area for badgers on a seasonal basis.

Underpasses for badgers and badger-resistant fencing are not considered necessary along the new access roads within the proposed development due to the relatively low predicted speed of the traffic. Badgers are also more likely to continue to forage along the river corridors travelling under the bridges to access suitable foraging habitat rather than crossing the roads themselves.

## Brown Hares

Given the low value of the proposed development for brown hares it is unlikely that they will be utilising the area; however, site clearance works could result in the mortality of dependent young brown hares (should they be present), if carried out during the brown hare breeding season. Therefore, topsoil stripping works will, as far as possible, aim to avoid unnecessary impacts on brown hares; either by taking place at appropriate times of year, or following a check by an experienced ecologist to confirm the absence of brown hares and dependent young.

Brown hares are unlikely to utilise the site following operation due to disturbance from increased public use of area. Brown hares are also likely to be particularly sensitive to disturbance from exercising of dogs. Retained areas of suitable habitat will be present outside of the proposed development.

## 7.8 Cumulative Impacts

Other developments of relevance to this assessment are detailed in Table 18-2. The cumulative effects in relation to ecology are detailed below.

The impact assessment concluded that there will be no residual impacts on habitats and species present within the proposed Exemplar Site development. The proposed NW Bicester eco-development lies immediately adjacent to the proposed Exemplar development and therefore has the potential to impact on mobile species present within the proposed Exemplar development which may use habitat in this wider area for foraging, commuting or as resting sites. Examples of such species include the barn owls known to be breeding close to the edge of the proposed Exemplar development, and the social group of badgers occupying two large setts within and in close proximity to the proposed development. The proposed NW Bicester eco-development will, however, include for the provision of wide ecological corridors and adjacent areas of open green space surrounding the habitat occupied by these species; therefore, it is not considered that the proposed NW Bicester eco-development will have an adverse impact on these species.

The proposed NW Bicester eco-development could be designed to retain the most valuable ecological features within the area, including: hedgerows, watercourses and riparian corridors; the railway corridor; valuable grassland habitat; bat roosts and foraging/commuting habitat; and 'outlying' badger setts. The masterplan design would ensure that 40% of the development land is allocated to green space, which will include significant opportunities for habitat creation, thus ensuring a net gain in biodiversity. Overall it is considered that there will be no adverse impact on habitats and species known to be present on the proposed Exemplar development due to future development of the NW Bicester eco-development. Given the scale of the eco-development and the opportunities for habitat creation there is the potential for a significant beneficial impact on habitats and species.

Given the distances between the proposed Exemplar development and other known developments within the local area (see Table 18-2), it is not considered that there will be any in combination effects associated with these developments.

## 7.9 Monitoring and Management

A programme of monitoring of the 'Key Ecological Receptors' will be developed covering the period during construction, and post-completion of relevant phases of the development. As a minimum, monitoring is likely to be necessary to confirm: the continued use of retained badger setts; continued use of the confirmed bat roost and continued use of the watercourses by

foraging bats; use of the hedgerows and shrub areas by nesting birds; and biological water quality of the River Bure and tributary, both pre-, during and post-construction.

The retained and newly created habitats will be managed in accordance with a Landscape and Ecology Conservation Management Plan to ensure the value to wildlife of the habitat and features is realised. Monitoring will form part of this plan to ensure that management is modified if required to ensure that its aims are achieved. The Heads of Terms for this Management Plan are provided as an annex to the Exemplar Biodiversity Strategy (Appendix 7M).

## 7.10 Summary

The ecological impact assessment has been informed by desk studies, the results of detailed and targeted ecological field surveys and consultations with the Eco-development's Biodiversity team, comprising representatives from the statutory nature conservation organisations, the local authorities and the local wildlife trust. The results of this work has influenced the masterplan to reduce impacts on wildlife and habitats as far as possible, and to produce a design that incorporates habitat enhancement and creation measures that will result in a proposal that leads to a net gain in biodiversity, as required by statutory planning policies. Care has been taken to ensure that the habitats that have been retained and created as part of the proposed development are resilient to the anticipated effects of climate change.

The field surveys revealed that the proposed Exemplar development comprises arable fields sown with grass seed that are regularly cut and closely grazed permanent pastures. The grassland habitats in these fields support species-poor plant communities of limited value to wildlife. There is also an area of recently established plantation comprising mixed broadleaved trees within an area of tall unmanaged grassland. This plantation is approximately five years old and the trees are 1m in height. This young plantation has the potential to be used by foraging barn owls and bats, and may also support common species of invertebrates. There are two watercourses within the proposed development which are the River Bure and a tributary to this watercourse. Within the proposed development the River is shaded by semi-mature trees; the tributary is largely unshaded. Both watercourses are seasonally dry holding water in the winter months and during periods of high rainfall at other times of the year. A 'main' badger sett was recorded adjacent to the tributary and a confirmed common pipistrelle bat roost was recorded in one of the trees on the riverbank. Two further bat roosts were identified in nearby buildings that are outside the proposed development area.

Species-rich hedgerows form the boundaries to the fields and these features together with the River Bure were found to be used by foraging bats. The River Bure and the parallel hedgerows to the west were also found to be used by commuting bats. Common pipistrelle, soprano pipistrelle, Leisler's, noctule, and an undetermined myotis bat were recorded on the proposed development site; however, the majority of passes recorded within the study area were of common pipistrelle bats.

Two uncommon invertebrate species were recorded within the proposed development area, but the majority of the area supported few invertebrates. Small numbers of common lizards were recorded on the field boundaries and it is likely that hedgehogs may also use these features. Small numbers of birds were recorded nesting in the hedgerows, but the fields were found to be of limited value to nesting birds. An occupied barn owl nest box was recorded close to the proposed development. This box, including other barn owl boxes present, will be relocated to suitable habitat to ensure that barn owls are not disturbed by the proposed development.

The proposed Exemplar development will have no effect on designated sites of nature conservation importance. It is also envisaged that there will be no adverse impacts on designated sites of national nature conservation importance located within 10km of the

proposed development as a result of the construction and operation of an Energy Centre within the proposed development. The proposed development layout has ensured that the hedgerows are retained as far as possible. Where it is necessary to breach these features to provide access, or to create visibility splays, the affected areas will be moved and replanted nearby within the proposed development. This will ensure that the hedgerow network is retained and that there is no loss. It will be necessary to coppice these features before moving them, thus nest boxes will also be provided to maintain suitable nest sites.

All hedgerows will be retained with an appropriate buffer zone of tall grassland habitat. Care has also been taken to locate other areas of open space including allotments and semi-natural habitats associated with the drainage features (ponds, grassland and ditches) close to these features to increase the buffer between the hedgerows and the built land.

Care has been taken to ensure that each watercourse is only breached once to provide access so that these natural wildlife corridors are retained. Sensitive lighting will be used on the bridges to ensure that dark corridors are retained to avoid disturbance to nocturnal species such as bats and badgers. Careful lighting design will also be used close to the hedgerows in order to maintain their value to wildlife. New tree, shrub and orchard planting will take place close to the watercourses to enhance the value of these wildlife corridors. Both the badger sett and the confirmed bat roost are also retained within areas of green space.

New habitats of value to wildlife will be created as part of the proposed development. These include permanent and ephemeral ponds, ditches, areas of diverse damp and dry grassland, woodland planting, orchard planting, and green walls. Large numbers of trees and shrubs will also be planted alongside the access roads and within the residential areas. Whilst their primary function is to provide an attractive environment for people, this planting will also provide habitats for wildlife and help to offset impacts of climate change. Similarly, although the primary function of the allotments is for the benefit of the allotment holders, they will also contain habitats and features of value to wildlife. Bird nest boxes and boxes for roosting bats will also be provided as part of the proposed development. These features will be located on and within buildings and trees in unlit areas that have ready access to suitable foraging areas for these species and where they can also be accessed for maintenance.

A Landscape and Ecology Conservation Management Plan will be produced to ensure that the retained and newly created habitats are managed for wildlife in the long-term. This plan will be monitored to ensure that remedial action will be taken if required. Monitoring will also take place to ensure that water quality within the River Bure and its tributary is protected during construction.

The proposed development will ensure that features of value to wildlife are retained (the hedgerows and watercourses) and that new habitats of value to wildlife will be created. The latter will ensure that there is a net gain in biodiversity as required by statutory planning policies.

# 7.11 Detailed Impact Assessment Tables

The summaries of the detailed assessments of the potential impacts on the ecological receptors of ‘key’ nature conservation importance are provided in the following tables.

Table 7-11 Key to Characterisation of Impact

Code	Descriptor	Sub-codes	Definitions
SI	Sign	Positive (beneficial (+ve)) or Negative (adverse (-ve))	This characteristic simply describes whether the Proposed Scheme would have a beneficial effect of the upon the receptor in terms of the policy objectives defined for it at the appropriate geographic level (positive), or would be harmful to the receptor, contrary to its policy objectives (negative).
PO	Probability of occurring	Certain, Probable, Unlikely	
CO	Complexity	Direct, Indirect, Cumulative	
EC	Extent and context	Area measures and percentage of total	Extent refers to the area over which the effect occurs, for example: the size in square metres of the area of species-rich grassland which would be lost as a result of the Proposed Scheme.
MA	Magnitude	In words, describe level of severity of influence (e.g. complete loss)	Magnitude refers to the size or amount of the effect. This has been quantified wherever possible, for example: the number of bat roosts lost as a result of the Proposed Scheme.
RE	Reversibility	Reversible or Not Reversible (can the effect be reverse, whether or not this is planned)	Reversibility addresses the permanence of the effects of the Proposed Scheme upon each ‘Key Ecological Receptor’. A reversible (or temporary) effect is one which can be undone either spontaneously through natural processes or through guaranteed mitigation. An irreversible (or permanent) effect is one for which natural recovery would not be possible within a reasonable timescale, or for which there is no reasonable chance of successful mitigation action being undertaken to reverse it. The reversibility of each impact has been stated.
DU	Duration	The duration of the impact, whether Short Term (ST), Medium Term (MT), Long Term (LT) or Permanent (P) in ecological terms	Duration refers to the time over which the effect is expected to last, until recovery or reinstatement (which may be longer than the effect causing activity). This has been quantified, wherever possible, and interpreted in relation to the ecological processes involved.
TF	Timing and frequency	In words, describe whether the timing or the frequency of the impact may influence its significance	The timing of the activities may have a role in determining the significance of the effects they have on the ‘Key Ecological Receptors’, and therefore this has been considered in relation to each effect. Many ecological receptors have important seasons and/or periods of their life cycle during which the effects of a particular activity may be particularly significant. Similarly, the frequency with which the activities would take place can be an important determinant of the effect on receptors, and has therefore also been assessed and described.

For each effect, the likelihood that it will occur has been described on a four-point scale, as set out within the IEEM Guidelines:

Table 7-12 Confidence in Predictions

Certain/near-certain:	probability estimated at 95% chance or higher
Probably:	probability estimated above 50%, but below 95%;
Unlikely:	probability estimated above 5%, but below 50%;
Extremely unlikely:	probability estimated at less than 5%.



Table 7-13 Hedgerows

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
<p>The hedgerow network within the Exemplar development is a receptor of 'District/Borough' Importance.</p> <p>Hedgerows are a UK BAP Priority Habitat and are considered to be of intrinsic nature conservation value due to the diversity of species that they support either directly (nesting birds) or indirectly (foraging resource).</p> <p>'Important' hedgerows; that is, those where replanting is no substitute, are protected by the Hedgerows Regulations (1997).</p> <p>Eleven of the hedgerows within the Exemplar development were assessed as being 'important', using the wildlife and landscape criteria described in the Regulations. A hedgerow which is of most value to wildlife contains a wide variety of plant species and is not regularly cut or flailed, enabling the flowers and fruits to set seed and providing maximum cover and foraging opportunities. The hedgerows within the Exemplar development has been bolstered with a variety of additional planting; however, they are regularly trimmed and flailed; therefore have limited value as a foraging resource or breeding habitat for invertebrates,</p>	<b>Construction and Operational Impacts</b>				
	<p><i>Removal of sections of hedgerows</i></p> <p>Sections of four 'important' hedgerows will be translocated to permit the construction of access roads.</p> <p>Translocation will be preferably undertaken during the autumn/winter, when plants are no longer growing. Success will be dependent on timing and after care.</p> <p>Impacts may include:</p> <ul style="list-style-type: none"> <li>the temporary loss of hedgerows</li> <li>the temporary loss of connectivity of hedgerows</li> <li>potential damage or disturbance during construction works.</li> </ul>	SI: -ve	<p>All hedgerows will be retained and translocated. In the absence of a translocation operation this loss would be significant. However, this is considered unlikely to occur (less than 5%).</p> <p>Negative effect on connectivity of hedgerow network. Due to translocation this impact will be temporary (less than 5%).</p> <p>Construction works could cause damage and disturbance if unmitigated (between 5% and 50%).</p>	<p>As part of the Exemplar development design, all of the removed sections of species-rich hedgerows and their ground-flora will be translocated to nearby locations within the Exemplar. This will ensure no net loss of hedgerows and will ensure replacement of foraging resources for birds, reptiles and hedgehogs in the short to medium term.</p> <p>Removal and translocation of the hedgerows will preferably be undertaken the autumn/winter. This will be overseen by an experienced ecologist. If it is not possible to undertake the translocation in the autumn/winter period, it will be carried out under specialist ecological supervision and after care may be required, such as watering.</p> <p>Hedgerows will be bolstered with diverse native tree and shrub planting in certain locations to provide structural heterogeneity. Additional tree and hedgerow planting will be provided to create a new corridor of planting along the centre of the Exemplar development, where no boundary feature previously existed, thus linking existing hedgerows and increasing connectivity across the site.</p> <p>Haul routes and storage/staff facilities will be located away from retained hedgerows. Any night-time lighting will also be kept away from retained hedgerows and limited only to those areas where absolutely necessary. Protective fencing will be used to ensure that they are not subject to accidental damage. A suitable buffer will be implemented in order to ensure that the roots of the hedgerow trees and shrubs are not undermined during any excavation works.</p>	Not Significant
		PO: Certain			
		CO: Direct			
		EC: Only four sections of hedgerow will be translocated to permit road access. This equates to approximately 10% of the hedgerow network. As all sections of hedgerow will be translocated, therefore there will be no net loss of hedgerows.			
		MA: Temporary loss during translocation operation			
		RE: Reversible			
		DU: Temporary			
	<p><i>Impacts on protected species</i></p> <p>Removal of the hedgerows will directly affect any protected species or species of conservation concern that are associated with the hedgerows.</p> <p>Impacts may include:</p> <ul style="list-style-type: none"> <li>Temporary loss of nesting habitat for birds, prior to their translocation</li> <li>Potential risk of killing and injury of birds and damage or destruction of nests during the breeding season</li> <li>Indirect impacts associated with disturbance of protected species associated with any retained hedgerows include increases in human presence, site traffic, noise and lighting during construction</li> <li>Temporary removal of hedgerows may contribute to fragmentation of the hedgerow network, disturbing commuting routes and preventing species such as bats from reaching their foraging/roosting areas.</li> </ul>	SI: -ve	<p>Negative effect on value of hedgerow network to protected species: 50% and 95% certain</p> <p>All hedgerows will be retained and translocated. In the absence of a translocation operation this loss would be significant. However, this is considered unlikely to occur (less than 5%).</p>	<p>Removal and translocation of sections of hedgerow will be undertaken the winter to prevent disturbance to any nesting birds. Protective fencing will be used to prevent damage or disturbance during construction works. The indirect impacts associated with disturbance will be mitigated by having haul routes and storage/staff facilities located away from retained hedgerows. In addition any night time lighting will be kept away from retained hedgerows and limited to those area where it is absolutely necessary.</p> <p>Where translocation works or works adjacent to retained hedgerows have to commence during the breeding bird season, the hedgerows will be subject to a pre-construction survey to determine whether breeding birds are present. Should the presence of nesting birds be established, works will cease until the young have fledged.</p> <p>Nest boxes will be installed in retained vegetation away from areas of works to provide alternative nesting opportunities during the construction phase.</p> <p>Hedgerows and associated buffer will be managed less intensively to provide increased value for invertebrates, reptiles, birds and mammals.</p>	<p>Not Significant</p> <p>Potential for beneficial effects in the longer term associated with less intensive management of the hedgerows and the adjacent buffer-strip of diverse grassland.</p> <p>Value of hedgerows for associated fauna also enhanced through the creation of more diverse habitats, SuDS features, allotments, diverse grasslands, and tree planting alongside these features.</p> <p>Provision of nesting boxes for birds during construction and operation.</p>
		PO: Probable			
		CO: Direct (through habitat loss) and Indirect (through disturbance)			
		EC: Four sections of hedgerow will be removed for road access. This equates to approximately 10% of the hedgerow network, and a small area unavailable to protected species. All sections of hedgerow will be translocated; therefore there will be no net loss of hedgerows.			
		MA: Disturbance to protected species during the breeding season may inhibit successful rearing of young. Likely to be a small number of common bird species and low numbers of reptiles, given the numbers recorded within the vicinity of the Exemplar development.			
		RE: Not Reversible			
		DU: short-to-medium term			

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
		TF: Removal of the hedgerows during the period March to September would cause the most significant impact to nesting birds and foraging reptiles. Winter removal may disrupt hibernating reptiles and hedgehogs, should they be present.			

**Table 7-14 River Bure and tributary**

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
<p>The River Bure and tributary</p> <p>Rivers are a UKBAP Priority Habitat, and Oxfordshire LBAP habitat and Aquatic habitats are within the Cherwell LBAP. The River Bure, its tributary and adjacent habitats were found to support foraging and commuting bats, a confirmed bat roost within a tree along the River Bure, and an ‘outlying’ badger sett.</p> <p>The River Bure and tributary do not hold water in the summer months and are therefore considered to be of limited value to aquatic invertebrates (including white-clawed crayfish), water voles and otters.</p> <p>The design of the Exemplar development includes the provision of a SuDS to control and manage surface water run-off from the site. The SuDS will ensure that any water released from the Exemplar development to the River Bure and tributary will be treated prior to being released at greenfield run-off rates.</p> <p>Policy EN28 of the non-statutory Cherwell Local Plan seek to protect and enhance the ecological value, biodiversity and rural character of the flood plain of the River Bure and Langford Stream, Bicester through the control of development.</p>	Construction Impacts				
	<p><i>Pollution during construction</i></p> <p>Without preventative measures to control construction site drainage, it is possible that run-off from ground works within the Exemplar development could enter the River Bure and its tributary. High levels of pollutants/sediment, or pollutants/sediment entering the watercourses over a long period of time, which could have deleterious impacts on water quality, aquatic vegetation and potentially water voles and otters, which are known to be present in the wider area.</p> <p><i>Removal of vegetation and impacts on protected species</i></p> <p>Removal of small sections of vegetation to permit construction of the road bridges.</p> <p>There is the potential for localised impacts at these crossing points, such as damage to the bank structures and impacts on water quality, as well as disturbance to species such as badgers, given the proximity to the ‘main’ badger sett.</p>	SI: -ve	<p>Unmitigated, pollution incidents during construction could have a negative effect on habitats and species (95% certainty)</p> <p>Negative effects of removing small sections of vegetation and installing structures is unlikely (5 to 50%)</p>	<p>Construction site drainage would be carefully designed and controlled, with silt traps established at the outset of the works.</p> <p>The drainage proposals would incorporate measures to ensure that all runoff is treated and released at greenfield runoff rates.</p> <p>All works would incorporate relevant legislation for the protection of surface and groundwater and implement codes of good practice, and best practice guidelines for works within or near water.</p> <p>Any pollution/ sedimentation events are recorded and dealt with immediately.</p> <p>Suitable pre-construction water quality monitoring of the River Bure and tributary will be collected to ensure a baseline of water quality is provided against which both pre-, during- and post-construction monitoring can be compared.</p> <p>Support structures for the road bridge structures will be located outside of the watercourses to avoid water quality impacts or damaging the banks and/or any sensitive features in close proximity, such as the ‘main’ badger sett and confirmed bat roost tree.</p> <p>Temporary protective fencing will be installed around all badger setts to prevent damage from site machinery or staff during construction.</p> <p>Night-time construction lighting is not proposed but should it be necessary it will be kept away from the watercourses.</p> <p>Pre-construction surveys for the presence of badger setts, and/or potential otter holts/resting sites and water vole burrows would be undertaken of the River Bure and its tributary.</p>	<p>Not Significant</p>
		PO: Unlikely			
		CO: Direct			
		EC: Variable (see MA below). Disturbance of protected species is likely to be localised to the vicinity of the bridge installation.			
		MA: Small-scale events would not be expected to have any significant impact. However, major or diffuse pollution events could result in a greater deterioration in water quality, potentially affecting the River Bure, its tributary and habitats downstream.			
		RE: Reversible			
		DU: Temporary			
		TF: Pollution incidences occurring when water levels within the River Bure and tributary are high (i.e. in winter) is likely to affect a wider range of habitats and species.			
	Operation Impacts				
	<p>Surface water drainage will be managed using SuDS which will ensure any water released from the Exemplar development to the River Bure and tributary will be treated prior to being released at greenfield run-off rates, ensuring no adverse impacts on water quality and associated habitats and species.</p> <p>Insensitive lighting of the bridges may render the currently dark riparian corridor less suitable for nocturnal foraging species, particularly for light sensitive species such as brown long-eared bats. If</p>	SI: -ve	<p>Impacts on water quality are extremely unlikely due to use of SuDS (less than 5%).</p> <p>Negative effects of insensitive lighting could have an effect on light-sensitive species (Probable 50 to 95%).</p>	<p>Surface water drainage will be managed using SuDS. These will retain damp areas which will allow wetland plants to grow, and will form an enhancement of these areas for invertebrates, amphibians and reptiles, such as grass snakes which have been recorded in close proximity to the site. Linear swales will also provide habitat for these species and provide an ecological corridor through the site.</p> <p>The road bridges will need to be lit for safety reasons. The lighting selected will be directional, low-intensity lighting and the road surface material will comprise a low-reflective surface to prevent light spilling onto the dark corridor below. The River Bure, its tributary and the ‘main’ badger sett will be also be buffered from development and any</p>	<p>Not Significant</p> <p>Potential for beneficial effects associated with the creation of biodiverse habitats within the riparian corridor including woodland planting, orchard planting, diverse grassland and SuDS features.</p>
		PO: Unlikely			
		CO: Indirect (through disturbance)			
		EC: Disturbance of protected species is likely to be localised to the vicinity of the bridge installation and adjacent habitats.			



Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
	<p>lighting these corridors prevents species from reaching foraging areas, it may have a detrimental impact on the local population.</p> <p>Insensitive lighting of the bridge across the River Bure tributary could also adversely affect the badgers within the 'main' badger sett close to this watercourse, potentially deterring the use of this sett by badgers.</p>	MA: Should bats be deterred from crossing the River Bure and tributary preventing access to preferred foraging areas, this may have a detrimental impact on the local population. Badgers may also be deterred from using their 'main' sett, although an alternative place of shelter is available to them in adjacent woodland, this restriction of range may affect the breeding success of this social group.		<p>associated lighting through additional tree and shrub planting.</p> <p>The riparian habitat surrounding the River Bure and tributary will be retained, protected and enhanced through further woodland planting, thus providing a larger buffer from development.</p>	
		RE: Not Reversible			
		DU: Long-term			
		TF: The affects of lighting is likely to only affect light-sensitive species during their active period (i.e. between March and October).			

Table 7-15    Barn owls

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
<p>Barn owls</p> <p>Barn owls are listed on Schedule 1 of the Wildlife &amp; Countryside Act 1981 (as amended) and are a UKBAP species, and amber listed bird species of conservation concern.</p> <p>One pair of barn owls was confirmed to be breeding in a nest box outside of the Exemplar development, within the study area.</p>	Construction Impacts				
	<p>Should construction works be undertaken during the barn owl breeding season (March to August) it is possible that increased human presence in the area, site traffic, noise and lighting could disturb nesting barn owls.</p> <p>It is not considered that development of the Exemplar development will remove valuable foraging resources from the barn owls nesting adjacent to the site.</p>	SI: -ve	<p>Negative effects on the breeding success of the local barn owl population is considered probable (50 to 95%).</p>	<p>The confirmed nest box is to be moved to a location on the edge of the woodland to the west of the Exemplar development, to ensure the nest box remains within suitable foraging habitat but in an area that will not be developed as part of the whole Eco-development site in the future.</p> <p>All barn owl nest boxes currently installed within the Exemplar development would also be removed and relocated to suitable habitat outside the Exemplar development.</p> <p>Nest boxes would only be moved once it has been confirmed that no owls are currently using the box by an experienced, licensed ecologist.</p> <p>Further nest boxes would be provided in suitable locations within the wider Eco-development area, to increase nesting opportunities for barn owls in the local area.</p>	<p>Not Significant</p>
		PO: Probable			
		CO: Direct			
		EC: Within the local area			
		MA: Significant disturbance may affect their use of this nest site and potentially their breeding success.			
		RE: Not Reversible			
		DU: Temporary			
		TF: Disturbance will be most significant if construction works are undertaken in the barn owl breeding season (March to August)			
	Operation Impacts				
<p>Disturbance from increased public use of areas within the vicinity of the known barn owl nest site, which may deter barn owls from nesting in this location. At present there is no public access to this</p>	SI: -ve	<p>Negative effects on the breeding success of the local barn owl population is considered probable (50 to 95%).</p>	<p>The confirmed nest box will be moved during construction phase to a location away from the Exemplar development, thus ensuring the nest box remains within suitable foraging habitat and at a greater distance</p>	<p>Not Significant</p>	
	PO: Probable				

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
	area; therefore, these impacts are considered to be low. However, this may change as a result of future development within the area.  Disturbance may also arise from noise and light associated with the operational Exemplar development.	CO: Direct		from the Exemplar development and potential public access.	
		EC: Within the local area			
		MA: Significant disturbance may affect their use of this nest site and potentially their breeding success.			
		RE: Reversible			
		DU: Long-term			
		TF: Disturbance will be most significant during the barn owl breeding season (March to August)			

Table 7-16    Bats

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
<p>Bats</p> <p>All bat species and their roost sites are protected by European and National legislation.</p> <p>Certain bat species recorded within the Exemplar development, including: soprano pipistrelle, brown long-eared and noctule bats are UKBAP Priority Species.</p> <p>One small common pipistrelle bat roost was found within a mature willow within the Exemplar development.</p> <p>Two further roosts were found outside of the Exemplar development including: a common pipistrelle roost within a modern farmhouse and a roost of brown long-eared bats and other unconfirmed species within St Lawrence's Church, Caversfield.</p> <p>Five species of bat were recorded within the Exemplar development during activity surveys, including; common pipistrelle, soprano pipistrelle, Leisler's, noctule, and an undetermined myotis bat.</p> <p>Overall, the site is considered to be of 'District/Borough' value for bats</p>	Construction Impacts				
	<p>There is potential for construction activities to damage or disturb bat roosting sites due to increased human presence, including impacts from noise, lighting and site traffic. This could deter bat species from using these roost sites.</p> <p>Removal of vegetation to install the bridges over the River Bure and its tributary will result in a gap being created in this currently vegetated corridor, which may deter species from commuting and foraging in this area. However, given that these watercourses link to areas containing larger gaps in vegetation (such as the B4100 separating the Exemplar development from the brown long-eared roost at St Lawrence's Church) and less vegetated corridors between the woodland to the west of the Exemplar development, and that the majority of bats passes recorded using the Exemplar development were of common pipistrelle bats, it is unlikely that the creation of this gap will deter the use of this area by foraging and commuting bats during the construction phases.</p>	SI: -ve	<p>Negative effects on the local bat population using the Exemplar development to roost, forage and for commuting is considered unlikely (5% to 50%)</p>	<p>All confirmed and potential bat roost trees, and the most valuable commuting and foraging habitat along the River Bure and tributary will be retained and protected in unlit corridors.</p> <p>Site clearance works will be buffered from potential bat roosts by retained vegetation and will be delineated using fencing to prevent damage or disturbance from increased human presence in the area including site traffic, noise and lighting.</p> <p>Night-time lighting is not proposed during the construction of the Exemplar development, but if necessary it will be kept away from the confirmed and potential bat roosts and the watercourses, and be limited only to those areas where absolutely necessary.</p> <p>Removed vegetation from the River Bure and tributary riparian corridor will be kept to a minimum</p>	<p>Not Significant</p>
		PO: Unlikely			
		CO: Direct			
		EC: Within the local area			
		MA: Significant disturbance may affect their use of roost sites and potentially breeding success.			
		RE: Not reversible			
		DU: Short-term			
		TF: Construction activities taking place during the active period for bats, generally considered to be between April and October, would cause the most disturbance.			
	Operation Impacts				
	<p>There is potential for direct impacts on bats commuting or foraging along the riparian corridors if the associated lighting for the new road bridges is not installed in a sensitive manor. Lighting the riparian corridor may render them less suitable for light sensitive bat species such as brown long-eared bats, and prevent them from reaching foraging areas.</p>	SI: -ve	<p>Negative effects on the local bat population using the Exemplar development to roost, forage and for commuting is considered unlikely (5% to 50%)</p>	<p>The lighting selected for the road bridges will be shielded with lighting columns of reduced height. The road surface material will comprise a low-reflective surface, this will prevent light spilling onto the dark corridor below; thus ensuring the retention of a continuous dark green corridor along the watercourses avoiding impacts on light-sensitive bat species such as brown long-eared bats.</p> <p>Approximately 20 bat boxes will be installed in dwellings or public buildings and also on mature trees in suitable locations throughout the</p>	<p>Not Significant</p> <p>A greater diversity of semi-natural habitats will be created within the proposed development than was present prior to the development, this will be of benefit to invertebrates and thus to the bats that feed on them.</p>
		PO:			
		CO: Direct			
		EC: Within the local area			

Ecological feature, value, policy and legal framework and factors on which its integrity or conservation status depends	Proposed activity, biophysical change and relevance to receptor in terms of ecosystem structure and function	Characterisation of Impact	Ecologically significant if unmitigated? (Effect on integrity or conservation status, confidence in this, and rationale)	Mitigation proposals	Residual impact and ecological significance
	It is unlikely that lighting of the bridges or within the development itself will adversely affect other bat species recorded within the area such as pipistrelle, noctule and Leisler's bats, as these species have been recorded foraging under certain artificial light sources, and are fast flying species that are not deterred from flying through lit areas.	MA: Significant disturbance may affect their use of roost sites and potentially breeding success.		Exemplar development, thus providing increased roosting opportunities.  Ecological corridors across the site will be maintained and enhanced through additional woodland planting adjacent to the River Bure and tributary to further enhance the corridor for species such as brown long-eared bats. This planting will also provide further shielding from any lighting associated with properties within the Exemplar development.	Habitats likely to support a greater diversity of invertebrates than were present within the area prior to development include: the hedgerows, through improved management; SuDS features (swales, ditches, ephemeral and permanent waterbodies), tree planting; orchards; and allotments
		RE: Not reversible			
		DU: Long-term			
		TF: Construction activities taking place during the active period for bats, generally considered to be between April and October, would cause the most disturbance.			

## 8 Flood Risk and Hydrology

### 8.1 Introduction

This chapter considers the potential associated risks to the water environment that development of the proposed Exemplar Site development may present. This chapter also describes:

- The current baseline conditions of the water environment at the proposed Exemplar Site.
- The mitigation measures required to prevent, reduce or offset any potentially significant adverse effects to the water environment.
- The likely residual effects after these measures have been implemented.

To assist the understanding of the principles of this subject and their particular application within the context of the proposed development, it is recommended that the reader refers to the associated Hyder Consulting Ltd. (HCL) Flood Risk Assessment (0505-UA001881-UP31R-01)<sup>1</sup>, Drainage Strategy (0505-UA001881-UP31R-01)<sup>2</sup> and Water Cycle Study (0505-UA001881-UP31R-01)<sup>3</sup>.

### 8.2 Regulatory and Policy Framework

This impact assessment has been undertaken in accordance with current international and national legislation, and national, regional and local plans and policies relating to flood risk and hydrology in the context of the proposed Exemplar Site development. A summary of the relevant legislation and policies, the requirements of these policies and the Eco development response has been provided in Table 8.1 below.

**Table 8-17 Flood Risk and Hydrology Regulatory and Policy Framework**

<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Bicester Exemplar Site Response</b>
Planning Policy Statement 25 (PPS25)	PPS25 sets out Government policy on development and flood risk. Its aims are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall.	A Flood Risk Assessment (FRA) has been carried out in accordance with PPS25 for the development. The FRA concluded the proposed site can be developed safely, without exposing the new development to an unacceptable degree of flood risk or increasing the flood risk to third parties.
The Water Framework Directive (2000/60/EEC)	The Directive provides a framework for the protection of surface (fresh) water, estuaries, coastal water and groundwater. The objectives of the Directive are to enhance the status, and prevent further deterioration, of aquatic ecosystems, promote the sustainable use of water, reduce pollution of water (especially by	The proposed development will aim to attain the highest achievable level of water quality standards. This will be achieved with the incorporation of Sustainable Drainage Systems (SuDS) into the design to improve the quality of the runoff from the Proposed Exemplar

Policy/Legislation	Requirements	Bicester Exemplar Site Response
	'priority' and 'priority hazardous' substances) and ensure progressive reduction of groundwater pollution. Among the main features of the Directive are that all inland and coastal waters within defined river basin districts must reach at least good status by 2015.	Site.
The Flood and Water Management Act 2010	The Flood and Water Management Act 2010 will provide better, more comprehensive management of flood risk for people, homes and businesses. It will also help tackle bad debt in the water industry, improve the affordability of water bills for certain groups and individuals, and help ensure continuity of water supplies to the consumer. The Flood and Water Management Act encourages the use of sustainable drainage in new developments and re-developments. National Standards for the design, construction, operation and maintenance of SuDS are currently being drafted.	Through the preparation of the FRA and the Drainage Strategy, the proposed development has incorporated SuDS into the design. It has been concluded that the proposed development will not be exposed to an unacceptable degree of flood risk or increase the flood risk to third parties.

## 8.3 Methodology

### 8.3.1 Introduction

The assessment is being undertaken in accordance with the guidelines set out in Planning Policy Statement 25: Development and Flood Risk (PPS25), The Water Framework Directive and Planning Policy Statement 1: Delivering Sustainable Development (PPS1).

### 8.3.2 Study Area

The study area consists of the proposed Exemplar Site, along with the catchment area of the two tributaries to the River Bure and the extents of the Bure from the A4095 (the downstream boundary of the proposed development) to the confluence upstream of Caversfield House. The tributaries of the Bure included within the study area are:

- 1 The stream following in an easterly direction from the north-western boundary from its head to its confluence with the Bure at the A4095.
- 2 The tributary that collects surface water runoff from Bucknell and flows in a southerly direction to converge with the Bure south of Home Farm is included from the pond south of Bucknell to the confluence.

The study area has been extended from the proposed development area to ensure that the flood risk posed to the proposed Exemplar Site and elsewhere is not increased as a result of the

proposals. Baseline data will be gathered for the aforementioned study area. Where information is not available from within the study area, the best available information from outside the study area may be utilised.

The scoping response received from Natural England also referred to the hydrological link between the proposed Exemplar Site development and Wendlebury Meads and Mansmoor Closes SSSI. The study area was therefore extended to include this site.

### 8.3.3 Establishment of Baseline Conditions

The flood risk to the proposed Exemplar Site has been assessed through the use of a hydraulic model which covers the extents of the streams within the study area. The hydraulic model has been developed in ISIS, a standard hydraulic modelling package, with the flows estimated using standard Flood Estimation Handbook (FEH) techniques.

A conceptual drainage strategy has been developed for the development to ensure that there is no increase in flood risk elsewhere as a result of the development. This drainage strategy is based upon SuDS principles and aims to provide flow reduction at source.

An assessment of the water quality has been undertaken using published information for local watercourses, where available, to enable inferences to be drawn for the water quality within the Bure.

In order to establish the baseline conditions at the proposed Exemplar Site, the following data has been utilised as part of this assessment:

- Topographic survey (Drawing 7013)<sup>4</sup>
- Hydrological data for the River Bure derived from the FEH CD-ROM v3<sup>5</sup>
- Hydrological data from the Environment Agency's River Bure model<sup>6</sup>.
- Ground conditions have been assessed within a desk study (NW Bicester Eco development- Phase 1 Desk Study, 2501-UA001881-UP33R-01, Hyder Consulting Ltd July 2010)<sup>7</sup>
- Water quality data from the Environment Agency collected for the Town Brook, downstream of the proposed Exemplar development within Bicester<sup>8</sup>.

### 8.3.4 Assessment of Effects

The assessment criteria used to assess potential impacts on the water environment are outlined below and have been used to assess and report the significance of the effects associated with the proposed Exemplar development on the Bure and other features of the water environment within the study area. The method comprises the following stages:

- Assessment of baseline environmental importance (value)
- Assessment of impact magnitude
- Assessment of significance of effects

The overall baseline conditions have been assigned a value / importance based upon criteria contained within Table 8-18:



**Table 8-18 Criteria for estimating the receptor value / importance of water features**

Value / Importance	Typical Descriptors	Typical Example	
Very High	Attribute has a high quality and rarity on a regional or national scale.	<b>Surface Waters:</b>	EC Designated Salmonid / Cyprinid fishery River Quality Objective (RQO) River Ecosystem Class RE1. Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site)
		<b>Groundwater:</b>	Major aquifer providing a regionally important resource or supporting site protected under wildlife legislation Source Protection Zone (SPZ) I
		<b>Flood Risk:</b>	Flood plain or defence protecting more than 100 residential properties from flooding
High	Attribute has a high quality and rarity on a local scale.	<b>Surface Waters:</b>	RQO River Ecosystem Class RE2 Major Cyprinid Fishery Species protected under EU or UK wildlife legislation
		<b>Groundwater:</b>	Major aquifer providing locally important resourced or supporting river ecosystem SPZII
		<b>Flood Risk:</b>	Flood plain or defence protecting between 1 and 100 residential properties or industrial premises from flooding.
Medium	Attribute has a medium quality and rarity on a local scale.	<b>Surface Waters:</b>	RQO River Ecosystem Class RE3 or RE4
		<b>Groundwater:</b>	Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZII
		<b>Flood Risk:</b>	Flood plain or defence protecting 10 or fewer industrial properties from flooding
Low	Attribute has a low quality and rarity on a local scale.	<b>Surface Waters:</b>	RQO River Ecosystem Class RE5
		<b>Groundwater:</b>	Non-aquifer
		<b>Flood Risk:</b>	Flood plain with limited constraints and low probability of flooding of residential and industrial properties.

The magnitude of changes caused during the operational and construction phases of the Scheme are qualitatively described, based on the descriptions detailed in Table 8-19:

**Table 8-19 Criteria used to determine the magnitude of impacts on water features**

Magnitude of Potential Impact		Criteria
Major	Adverse	Results in loss of attribute and/or quality and integrity of the attribute
	Beneficial	Results in major improvement of attribute quality.
Moderate	Adverse	Results in effect on integrity of attribute, or loss of part of attribute.
	Beneficial	Results in moderate improvement of attribute quality.



Magnitude of Potential Impact		Criteria
Minor	Adverse	Results in some measurable change in attribute's quality or vulnerability.
	Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.
Negligible		Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.

The significance of effects has been assessed using a matrix which correlates the importance of the attribute against the magnitude of the impact. This is reproduced in Table 8-20, with the definitions of the criteria contained in Table 8-21.

**Table 8-20 Criteria for estimating the significance of effects on water features**

		MAGNITUDE OF IMPACT			
		Negligible	Minor	Moderate	Major
IMPORTANT OF ATTRIBUTE	Very High	Neutral	Moderate/Large	Large/Very Large	Very Large
	High	Neutral	Slight/Moderate	Moderate/Large	Large/Very Large
	Medium	Neutral	Slight	Moderate	Large
	Low	Neutral	Neutral	Slight	Slight/Moderate

Where a choice of two significance criteria is given in Table 8-20, professional judgement has been used to decide on the overall significance of impacts.

**Table 8-21 Definition of significance criteria**

Criteria	Definition
Large Beneficial	Proposals that will result in a 'very' or 'highly' significant improvement to water attribute(s), without significant adverse impacts on other water attributes.
Moderate Beneficial	Where the proposal provides an opportunity to enhance the water environment, because it results in a moderate improvement for an attribute
Slight Beneficial	All other situations where the proposal provides an opportunity to enhance the water environment or provide an improved level of protection to an attribute.
Neutral	Where the net impact of the proposals is neutral, because it results in no appreciable effect, either positive or negative, on the identified attributes.
Slight Adverse	Where the proposal may result in a degradation of the water environment because it results in a predicted slight impact on one or more attributes.
Moderate Adverse	Where the proposal may result in the degradation of the water environment, because it results in predicted moderate adverse impacts on at least one attribute.
Large Adverse	Where the proposal would result in a degradation of the water environment, because it results in predicted highly significant adverse impacts on a water attribute and/or significant adverse impacts on several water attributes.
Very Large Adverse	Where the proposal would result in degradation of the water environment, because it results in predicted very significant adverse impacts on at least one water attribute and/or on several water attributes.

The water environment features, identified to date are assessed in terms of their quality and importance in Table 8-22.

### 8.3.5 Consultation

The Environment Agency has been consulted via telephone and email throughout the preparation of this ES Chapter and the associated Flood Risk Assessment. Oxfordshire County Council has been consulted regarding the SuDS design and the views expressed by Natural England in their scoping response were also considered.

## 8.4 Description of Existing Baseline Conditions

The existing baseline conditions for the water environment are described below.

### 8.4.1 Water Environment Features

**Table 8-22 Value of water environment features**

Feature	Attribute	Quality	Importance
River Bure and associated tributaries	Recreation	Downstream of the proposed Exemplar there is a green river corridor and park land on the banks of the Bure. This can be considered as being rare on the local (Bicester) scale	High
	Dilution and removal of waste products	There are discharge permits for the Bure and its tributaries however these are for low volumes which do not require a high volume of dilution until the Bicester effluent treatment works, downstream of Bicester	Medium
	Biodiversity	The River Bure and tributary did not hold water in the summer months and are therefore considered to be of limited value to aquatic invertebrates (including white-clawed crayfish), water voles and otters. These features provide a wildlife corridor of value to foraging and commuting bats.	Medium
	Conveyance of flow	There are four watercourses within the study area.	High
Floodplain	Conveyance of flow	Within the study area the flood plain associated with the Bure provides attenuation and reduces the magnitude of the flooding within Bicester.	High
Groundwater	Water supply/quality	The proposed Exemplar development is underlain by a secondary bedrock aquifer and the river deposits are classified as a secondary superficial aquifer. There are no groundwater protection zones in the area.	High
Springs	Water supply/quality	There are several springs within the proposed Exemplar development	Medium

## 8.4.2 Surface Water

Within the proposed Exemplar Development there are several water features: the Bure and its associated tributaries, field drains, ponds and springs. The Bure (a main river) flows in a southerly direction from Caversfield House to a culvert beneath the A4095. Downstream from this it flows in an open channel between Lucerne Avenue and Purslane Drive.

There is a tributary flowing in an easterly direction from Bucknell which converges with the Bure downstream of Home Farm, and the Langford Brook (an ordinary watercourse) flows in an easterly direction from Crowmarsh Farm which converges with the Bure at the A4095 culvert. There is a field drain south of Gowell Farm flowing in a southerly direction to a culvert under the A4095 and the downstream urban area.

There are several ponds within the proposed Exemplar development boundaries, most notably at Crowmarsh Farm and south of Himley Farm and a spring is shown to present east of Himley Farm. In addition to these prominent water features, it is likely that a number of ditches and other smaller features drain individual fields and feed in to the network.

Surface water runoff across the proposed Exemplar development flows largely at Greenfield rates to the Bure and its tributaries with the potential for localised ponding to occur in small low lying areas.

## 8.4.3 Flood Risk

Flood risk is considered in more detail in the report Flood Risk Assessment (0505-UA001881-UP31R-01). The proposed Exemplar development lies near to the watershed between the Gagle Brook and the River Bure, which runs in a northwest-southeast direction. The following watercourses are relevant to the proposed Exemplar development:

- **Gagle Brook** – The Gagle Brook runs in a southwesterly direction from the Ardley Trackways SSSI, before flowing southeast, past the southern boundary of the proposed Exemplar development. It then continues towards Chesterton. The Gagle Brook is an ordinary watercourse.
- **River Bure** – The River Bure and its tributaries cross directly through the proposed Exemplar development before their confluence into a single channel at the A4095 Lord's Lane. The River Bure then flows into Bicester in a southeasterly direction, where it is split into the urbanised Back Brook and Town Brook through the town. The River Bure is a tributary of the Ray, Cherwell and ultimately the Thames.
- **Pingle Stream** – The Pingle Stream flows eastwards through the south of Bicester. It is an Environment Agency main river, and confluences with the River Bure before its confluence with the Langford Brook.
- **Langford Brook** – The Langford Brook flows in a southwesterly direction, through the eastern edge of Bicester. The Langford Brook flows into the River Bure south of Bicester. The Wastewater Treatment Works for Bicester are located a short way downstream of the confluence.

The local tributaries of the River Bure on the proposed Exemplar development and included within the study area are:

- The stream flowing in an easterly direction from its source at the north-western boundary of the proposed Exemplar development to its confluence with the River Bure at the A4095
- The channel that collects surface water runoff from Bucknell and flows in a southerly direction to meet the River Bure south of Home Farm.

The flood risk to the proposed Exemplar development displayed on the online EA flood maps are based upon a coarse DTM and JFLOW modelling and are not considered suitable to delineate the flood plain to support flood a planning application. Therefore a hydraulic model has been constructed to confirm the flood plain extents across the proposed Exemplar development.

An unsteady state ISIS model of the River Bure and associated tributaries and floodplains was constructed and is described more fully in the Flood Risk Assessment. The model contains three watercourses and a lake outflow.

**Table 8-23 Watercourses contained in model**

<b>Watercourse</b>	<b>Name in model</b>	<b>Length of reach (metres)</b>	<b>Upstream extent (NGR)</b>	<b>Downstream extent (NGR)</b>
<b>River Bure</b>	Tributary 3 (T3) down to confluence with Tributary 2 (T2) down to confluence with Tributary 1 (T1) to downstream extent of model	1952	458174, 225414	457695, 223804
<b>Tributary 1</b>	Tributary 1 (T1)	2588 (to confluence with T2)	455409, 224548	457606, 224230
<b>Tributary 2</b>	Tributary 2 (T2)	1510 (to confluence with T3)	456707, 225662	457979, 224508
<b>Lake outflow</b>	Tributary 4 (T4)	260 (to culverted confluence with T3)	458207, 225342	458100, 225070

Drawing 8-1 shows the modelled flood extent across the proposed Exemplar development for the 100-year and 1,000-year events (i.e. Flood Zones 3 and 2 respectively). This shows that flooding occurs predominantly on the flatter land around the confluence between the River Bure and the northernmost of the two tributaries. Away from the confluence, flooding is confined to the relatively narrow valley of the watercourse.

Drawing 8-1 also shows that the flooding only impacts on green space within the development, and no buildings or roads are affected by flood water. The two bridges where roads cross the watercourses will be designed to cause no constriction to flow, and therefore will not increase the flood risk to the proposed Exemplar development. The development therefore has been placed entirely within Flood Zone 1, as is required for an eco development.

The model predicts that floodwater is generally confined to the valleys in which the watercourses flow, with ponding occurring at confluences and upstream of constricting structures. The model does not predict any overland flow occurring.

The model results have confirmed that the proposed development is predominantly located within the Low Flood Risk Zone, with small areas of Medium and High risk restricted to around the watercourses. All proposed development has been located within the areas of Low risk, and therefore the development is considered to be at **low** risk of flooding from fluvial sources.

## 8.4.4 Water Quality

The Water Framework Directive sets standards for water quality in rivers, estuaries, coastal waters and aquifers. River Basin Management Plans aim to protect and improve the water environment by identifying the main issues within a catchment, and outlining the means of achieving the targets set by the Water Framework Directive.

There is no water quality monitoring data for the River Bure in the vicinity of the proposed Exemplar development, however as the catchment is largely agricultural it can be assumed that water quality is good though subject to normal diffuse inputs from agricultural practice. The River Bure is a tributary of the Town Brook. Water quality data for the Town Brook is presented in Table 8-24 below:

**Table 8-24 Town Brook Water Quality Data**

Parameter	Value
Waterbody ID	GB106039030150
Waterbody Name	Town Brook at Bicester
Management Catchment	Cherwell
River Basin District	Thames
Typology Description	Low, Small, Calcareous
Hydromorphological Status	Heavily Modified
Current Ecological Quality	Moderate Potential
Current Chemical Quality	Does Not Require Assessment
2015 Predicted Ecological Quality	Moderate Potential
Status Objective (Overall):	Good by 2027
2015 Predicted Chemical Quality	Does Not Require Assessment
Overall Risk	At Risk
Protected Area	Yes

The Water Framework Directive (WFD) requires that all inland and coastal waters within defined river basin districts must reach at least Good Status or Good Potential. The River Bure status objective is Good by 2027. The WFD requires no deterioration in the current status of the water body. It also includes an objective to 'aim to improve' any water body that is not presently at Good Status or Potential and defines how this should be achieved through the establishment of environmental objectives and ecological targets for surface waters.

## 8.4.5 Water Supply

The proposed Exemplar development will draw potable water from the Thames Water supply main but measures will be incorporated within the development to reduce water consumption and meet the targets set by level 5 of the Code for Sustainable Homes (less than 80 litres/head/day).

These measures will include installation of water-efficient appliances and provision of rainwater harvesting for individual homes and communal harvesting systems for commercial and public

buildings. These measures are expected to reduce the potable water supply requirement to 70 litres/head/day, exceeding the Code for Sustainable Homes level 5 target.

Larger users, such as schools may also use groundwater abstraction if this can be shown to be practical and environmentally sustainable.

These measures will ensure that the environmental impact of the proposed Exemplar development is minimised.

#### 8.4.6 Foul Water

Work is underway to model the impact of waste water discharge on the existing drainage infrastructure. Early indications are that it is likely that there is insufficient capacity within Thames Water's existing infrastructure to service a large development. However in the medium term discharge of foul drainage from the proposed Exemplar development to the existing wastewater treatment site at Bicester could be feasible, subject to a full assessment of the impact on the treatment works and the receiving watercourse.

Blackwater recycling is being considered as a potential solution for in the longer term.

### 8.5 Design and Mitigation

The Development is designed as an eco development and an exemplar. It therefore includes mitigation of water environment impacts built into the design. An outline of this mitigation during both the construction and operational phases is given below.

#### 8.5.1 Construction

During the construction phase, a Construction Environmental Management Plan (CEMP) will be prepared and implemented based upon Environment Agency and CIRIA 2001 guidance<sup>9,10</sup>. This will provide a means by which impacts on the water environment will be minimised. These include the following measures:

- Soil stripping will be managed to ensure the minimum of exposed soil is available at any one time
- Provision will be made for water treatment to remove sediment before discharge
- Careful planning of materials storage and use will prevent accidental release of oils and other harmful contaminants
- Regular monitoring will ensure the plan is being followed and is successful in managing water quality impacts
- Design and installation of temporary bridges to manage flood risk
- Avoidance of large areas of stripped or compacted soil to minimise flood runoff
- Avoidance of release or flotation of items which could cause blockages of bridges and culverts downstream
- Management of groundwater, including dewatering
- Control of potential contaminants which could harm groundwater

## 8.5.2 Operation

The development will avoid the floodplain and there will be no change in the flood storage capacity of the river channel. The potential impacts arising from surface water drainage after construction will be addressed using SuDS techniques, and are described in the Drainage Strategy Report<sup>2</sup>. The majority of the drainage is likely to be discharged by infiltration. This will maintain or improve the existing quantity of water infiltrated. Before infiltration, the water will pass through the SuDS treatment train to remove oils, solids and other potential contaminants. Adopted roads within the proposed Exemplar development will drain via a mixture of swales and permeable block paving. Private roads, parking and other areas of paving will drain surface water via permeable block paving.

The SuDS systems will slow runoff, reduce flood flows and increase base flow to the water course compared to the existing condition. Where discharged to the watercourse, the quality of surface runoff is likely to be an improvement over the existing agricultural runoff through the use of a combination of filtration and natural biological treatment within the SuDS treatment trains.

The water features within the proposed Exemplar development will be enhanced to provide increased values for biodiversity and recreation. This will be achieved through green corridors, channel maintenance, creation of a two stage channel

Water consumption will be minimised in the proposed Exemplar development through the use of water efficient appliances and use of rainwater harvesting.

## 8.6 Assessment of Effects

### 8.6.1 Construction

#### Recreation

There are no water-based recreational facilities in the development area itself and public access is limited. There will therefore not be any direct impacts arising from within the proposed Exemplar development itself. Control of sediment and discharges during construction will minimise impacts downstream of the proposed Exemplar development. The magnitude of impact on recreation is therefore judged to be **Minor**. As there is no direct access for the public to watercourses through the proposed Exemplar development, the significance of effects during construction will be **Neutral**.

#### Dilution and Water Quality

Implementation of the CEMP will provide a means by which impacts on the watercourse will be minimised. Any residual impact will be limited and local and not be detectable at the Wendlebury Meads and Mansmoor Closes SSSI, seven kilometres downstream. Given the small size of the receiving watercourses, potential magnitude of impacts upon these receptors is considered to be **Moderate**. Following implementation of the mitigation measures, the significance of effects would be **Slight Adverse**

#### Flood Risk

The CEMP will provide measures to minimise the flood risk on proposed Exemplar development and downstream during construction. Following implementation of mitigation measures, the magnitude of the impact will be Minor and the significance of effect on the conveyance and flood risk features of the water environment is likely to be **Slight Adverse**.



## Groundwater

There is a secondary bedrock aquifer underlying the proposed Exemplar development but there are no groundwater protection zones in the area. The proposed development is unlikely to pose a high risk to groundwater and there is underlying soil and unsaturated zone which could dilute release of normal contaminants arising from the development. The superficial aquifer would be more at risk of contamination, but is very limited in extent and restricted to the river channel where there will be no development.

The magnitude of impacts on groundwater resources arising from the development are therefore likely to be **Minor**. The significance of this effect on the underlying groundwater resources following mitigation is likely to be **Neutral**.

## 8.6.2 Operation

### Recreation

Although the development would lead to a local increase in population using recreational facilities in the area this is unlikely to have a significant impact on the water features which provide recreational opportunities. Currently, there is no direct access for the public to watercourses through the site. After construction, during the operational phase, there will be public access to the water features within the proposed Exemplar development and they will be enhanced to provide increased values for biodiversity and recreation. This will be achieved through channel maintenance, creation of a two stage channel and integration of the water environment with green corridors.

This will result in a **Major Beneficial** magnitude of impact on recreation within the proposed Exemplar development itself. The significance of this effect on the recreational features of the water environment is therefore likely to be **Large Beneficial**.

### Dilution and Water Quality

SuDS will be installed into the proposed Exemplar development to manage impacts arising from surface water drainage once the development is operational. The SuDS system will provide treatment to surface runoff and enhance infiltration and provide an increase in low flow in the watercourse. Both of these impacts will be beneficial.

However, the magnitude of any impact on dilution and water quality is judged to be **Minor** and localised with a resultant **Slight Beneficial** significance of effect.

### Flood Risk

Although the development itself is located in areas of relatively low flood risk, there are some limited areas of flood risk downstream in Bicester so any increase in peak flows in the River Bure could have an impact on flood risk downstream. The drainage strategy utilising SuDS measures will ensure that surface water runoff from the proposed Exemplar development is maintained at or below greenfield rates. The hydraulic modelling undertaken has delineated the floodplain and has shown that no development is to occur within the predicted localised areas of floodplain. There will therefore there is no loss of floodplain up to and including the 1 in 1,000 year event.

This proposed mitigation will result in a **Negligible** magnitude of impact on flood risk, which will therefore have a **Neutral** significance of effect.

## Groundwater

Following installation of the SuDS drainage strategy, the magnitude of impacts on groundwater resources arising from the development is likely to be **Negligible**. The significance of effects on the underlying groundwater resources is therefore likely to be **Neutral**.

### 8.6.3 Cumulative Effects

Development of the proposed Exemplar Development, together with NW Bicester and other potential sites in the Bicester wastewater treatment works catchment area, may produce an excessive demand on the existing treatment facility and/or the ability of the receiving watercourse to absorb the resultant effluent. Further work is underway<sup>3</sup> to assess the treatment requirement. Alternative on site measures to treat effluent from the eco development are also being considered<sup>3</sup> and these may become available to the proposed Exemplar development in the future. If these become available there will be no cumulative impacts arising from the proposed Exemplar Development on the Bicester wastewater treatment works, otherwise the infrastructure modelling currently underway will assess the need for an infrastructure upgrade.

Similarly, the cumulative effects of all potential development may be significant in terms of water supply. However there is an aspiration to attain water neutrality, i.e. reducing overall demand to allow new development within the existing supply, and Thames Water has a long term water supply strategy to ensure demand can be met without harm to the environment.

As indicated in Sections 8.6.1 and 8.6.2, the development of the proposed Exemplar development will not have any other adverse effects on the water environment. There will, therefore, be no cumulative effects arising from this development and others planned in the area.

## 8.7 Summary

The development can be undertaken without increasing the flood risk to the proposed Exemplar development or elsewhere, through the locating development in Flood Zone 1 and maintaining surface water runoff at or better than greenfield rates through the use of SuDS measures across the proposed Exemplar development. The drainage strategy will seek to provide attenuation at source, infiltration and treatment through the SuDS management train and result in a likely improvement over the existing water quality from agricultural activity.

There is no access to water-based recreation in the area of the proposed Exemplar development at present, but this will be transformed by the development, which will use the watercourse as an asset and provide recreational opportunities in the Eco-development.

The likely operational effects of the Eco development have been assessed, and the results are summarised in Table 8-25 below.

**Table 8-25 Summary of Significance of Effects**

<b>Receptor/Water Feature</b>	<b>Importance</b>	<b>Significance of Effect with Mitigation</b>
Recreation	High	Large Beneficial
Dilution and Water Quality	Medium	Slight Beneficial
Conveyance and Flood Risk	High	Neutral
Groundwater	High	Neutral

## 9 Air Quality

### 9.1 Introduction

This Chapter assesses the development's potential to impact on air quality during both the construction and operational phase. Dust and emissions from the construction phase and operational emissions from traffic movements and on-site energy production associated with the development all have the potential to impact on local air quality.

### 9.2 Regulatory Framework

#### 9.2.1 UK Air Quality Legislation

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS<sup>1</sup> was published by DEFRA in July 2007. The AQS sets out Air Quality Objectives, which are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale.

The regulations referred to in the AQS have been replaced by the Air Quality Regulations (2010), which came into force on 11<sup>th</sup> June 2010 and transpose the European Union (EU) Air Quality Directive (2008/50/EC) into UK law. Air Quality Limit Values (AQLVs) were published in these regulations for 7 pollutants, in addition to Target Values for an additional 5 Pollutants. Table 9-26 below shows the AQLVs for pollutants considered within this assessment.

**Table 9-26 Air Quality Limit Values**

Pollutant	Air Quality Limit Value	
	Concentration ( $\mu\text{g}/\text{m}^3$ )	Averaging Period
Nitrogen dioxide ( $\text{NO}_2$ )	200	1-hour average; not to be exceeded more than 18 times a year
	40	Annual average
Particulate matter with an aerodynamic diameter of less than $10\mu\text{m}$ ( $\text{PM}_{10}$ )	50	24-hour average; not to be exceeded more than 35 times a year
	40	Annual average

It is a requirement of the Environment Act (1995) that Local Authorities (LAs) review current and future air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). Any areas of relevant exposure where the AQLVs are not, or unlikely to be, achieved should be identified.

Where it is anticipated that an AQLV will not be met, it is a requirement that an Air Quality Management Area (AQMA) be declared. Where an AQMA is declared, the LA is obliged to produce an Action Plan in pursuit of the achievement of the AQLVs.

## 9.2.2 National Planning Policy

Planning Policy Statement 23<sup>2</sup> (PPS 23) sets out the Government's core policies and principles with respect to land use planning, including air quality. PPS 23 states that air quality is capable of being a material planning consideration. Appendix 1G of the PPS outlines the situations in which air quality is likely to be particularly important. These are summarised as:

- Where the development is proposed inside, or adjacent to, an AQMA.
- Where the development could in itself result in the designation of an AQMA.
- Where to grant planning permission would conflict with, or render unworkable elements of a LA's air quality action plan.

The implications of PPS 23 have been considered throughout this assessment and the proposed development compared against the policies contained within the statement.

## 9.3 Methodology

### 9.3.1 Introduction

Construction impacts will primarily be related to dust emissions that can result in health effects and enhanced dust soiling which can, without adequate mitigation, temporarily affect amenity use and, potentially, commercial operations. It is recognised that dust from construction activity can also cause statutory nuisance under the Environmental Protection Act 1990. Exhaust emissions from on-site plant and from vehicles accessing the works may also affect local air quality; this will be in a similar way to that described for operational traffic effects. Construction dust and emissions are assessed following the Best Practice Guidance issued by the London Councils and Greater London Authority, 'Control of Dust and Emissions from Construction and Demolition'. Although Bicester Eco Development is not within the Greater London area, this guidance provides a good method of assessing the impacts and provides a summary of mitigation and control measures.

Operational impacts may be negative and/or positive and will arise from changes in exposure to traffic pollutants in response to new patterns of traffic flows on local road networks. This will give rise to local changes in concentrations of NO<sub>2</sub> and PM<sub>10</sub>. Operational air quality impacts have been assessed in accordance with the guidance in Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 HA 207/07<sup>4</sup> and Local Air Quality Management Technical Guidance (LAQM.TG(09))<sup>5</sup>. These methodologies have been agreed in consultation with Sean Gregory, Environmental Protection Officer (EPO) at Cherwell District Council (CDC).

It is proposed to include an energy centre with a biomass boiler and two gas fired Combined Heat and Power (CHP) plants within the development. These will result in atmospheric emissions of combustion gases, including NO<sub>2</sub> and PM<sub>10</sub>. Although the exact energy centre specification had not been finalised at the time of assessment, the preliminary energy strategy was reviewed in order to provide an indication of likely emissions. Potential impacts have been screened using the methodology outlined in LAQM.TG(09) and the Environmental Protection UK document 'Biomass and Air Quality Guidance for Local Authorities'<sup>6</sup>. Detailed assessment of potential impacts has been undertaken where necessary.

## 9.3.2 Study Area

### Construction Dust

Dust impacts have been identified within 1,000m of the construction site boundary. Minerals Policy Statement 2 (MPS 2) Annex 1: Dust, Office of the Deputy Prime Minister<sup>7</sup>, identifies 1,000m as being an adequate extent for the assessment of potential dust impacts.

### Road Vehicle Exhaust Emissions

The DMRB outlines the roads that should be included in the assessment, these selection criteria are defined below:

- Road alignment will change by 5m or more
- Daily traffic flows will change by 1000 Annual Average Daily Traffic (AADT) or more
- Heavy Duty Vehicle Flows will change by 200 AADT or more
- Daily average speed will change by 10 km/hr or more
- Peak hour speed will change by 20 km/hr or more

In addition, local roads that don't meet the above criteria have been included for completeness where data is available. Baseline traffic data was obtained in July 2010 through seven day traffic counts, and forecast traffic data for the opening year with (do-something) and without (do-minimum) the proposed development was obtained by using growth rates from the Central Oxfordshire Traffic Model. This model takes account of other committed developments as outlined in Table 18-2 and therefore cumulative impacts are considered in the final results that are presented in this chapter. The traffic data is presented in Table 9-27.

**Table 9-27 Traffic data**

Link	2010 baseline			2016 do-minimum			2016 do-something		
	AADT	Speed (kph)	%HGV	AADT	Speed (kph)	%HGV	AADT	Speed (kph)	%HGV
Middleton Stoney Rd	5,223	79	7.1	6,459	79	7.1	6,464	79	7.1
Howes Lane	5,291	69	4.9	6,542	69	4.9	7,528	69	5.0
Bucknell Rd (S)	4,250	50	4.9	5,255	50	4.9	5,483	50	5.0
Banbury Rd (S of A4095)	7,583	48	4.1	9,377	48	4.1	9,963	48	4.2
Lords Lane	9,389	72	4.4	11,609	72	4.4	12,951	72	4.5
Banbury Rd (N of A4095)	10,138	76	9.1	12,535	76	9.1	14,886	76	8.5
Kings End*	19,192	40	6.1	23,731	40	6.1	24,001	40	6.1
Bucknell Rd *(N)	2,672	80	4.9	3,304	80	4.9	3,304	80	4.9

\*Data collected October 2010

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of the proposed development. LAQM.TG(09) (DEFRA, 2009) includes the following examples of receptors where annual average AQLVs should apply:

- Residential properties
- Schools
- Hospitals
- Care homes

Receptors chosen for this assessment are outlined in Table 9-28 and marked on Drawing 9-1.

**Table 9-28 Road Vehicle Exhaust Emission Receptors**

Receptor number	Receptor address
R1	Linkslade
R2	Lovelynych House
R3	78 Isis Avenue
R4	14 Dryden Avenue
R5	1 Trefoil Drive
R6	13 Saffron Close
R7	114 Bucknell Road
R8	112 Bucknell Road
R9	43 Juniper Gardens
R10	62-72 Mullen Road
R11	2 The Courtyard (Home Farm)
R12	The Lodge
R13	Proposed house
R14	Proposed house
R15	Proposed house
R16	1 Queens Court
R17	Oldwell House
R18	Hawkwell Farm Cottages

## Energy Centre Emissions

Receptors sensitive to potential energy centre emissions were identified based on the previously outlined criteria for locations where the annual mean AQLVs apply. These are shown in Table 9-29 and illustrated on Drawing 9-3. They were chosen to represent the closest residential properties to the proposed energy centre.

**Table 9-29 Energy Centre Emission Receptors**

Sensitive Receptor		NGR (m)	
		X	Y
E1	Green Acres	458092	224942
E2	49 Mullen Road	458051	224394
E3	Nashers Nook	458448	224759



Natural England also requires consideration of potential impacts associated with energy centre emissions at any designated sites within 10km of the proposed development. Although these have not been considered individually, assessment results have been discussed with the EIA Ecologist and potential impacts discussed fully within Chapter 7 Ecology.

### 9.3.3 Establishment of Baseline Conditions

Baseline air quality conditions in Bicester have been defined from a number of sources. These include:

- Review of CDC LAQM reports.
- Review of the UK National Air Quality Archive ([www.airquality.co.uk](http://www.airquality.co.uk)).
- Review of the Department for Food, Environment and Rural Affairs (DEFRA) LAQM website ([www.defra.gov.uk/environment/quality/air/airquality/local/index.htm](http://www.defra.gov.uk/environment/quality/air/airquality/local/index.htm)).

In order to establish baseline conditions in the vicinity of the proposed development, a six month NO<sub>2</sub> diffusion tube survey has been commissioned in agreement with the EPO at Cherwell District Council. The monitoring locations are attached in Drawing 9-2. This is being undertaken to establish background concentrations in the area and to identify a current baseline along roads where the proposed development will be, along roads in the vicinity of the proposed development and ultimately in order to verify the modelling. The timescale set for the submission of this application meant that only 2 months of data has been collected and analysed so far, the results are in Table 9-37 in the baseline section. LAQM.TG(09) requires a minimum of 3 months data, once this is obtained these results can be converted to a predicted annual average following the guidance in LAQM.TG(09) and used for verification. Background concentrations from the DEFRA air quality website have been obtained for this submission, see Table 9-38. An addendum to this ES will be submitted with verification for all results identified once the complete monitoring results become available, and before the planning application is determined.

### 9.3.4 Assessment of Effects

#### Construction Dust

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the following methodology.

The value (sensitivity) of each receptor was initially defined for dust sensitive locations within 1,000m of the proposed development based on the criteria contained within Table 9-30. These examples are based on the guidance provided in Minerals Policy Statement 2 (MPS 2) Annex 1: Dust, which also identifies 1,000m as being an adequate extent for the assessment of potential dust impacts.

**Table 9-30 Construction Site Dust – Value of Potential Receptors**

Value	Example of Potential Receptors
Very High	<ul style="list-style-type: none"> <li>▪ Hospitals and clinics</li> <li>▪ Retirement homes</li> </ul>
High	<ul style="list-style-type: none"> <li>▪ High-tech industries</li> <li>▪ Painting and furnishing</li> </ul>

Value	Example of Potential Receptors
	<ul style="list-style-type: none"> <li>Food processing</li> <li>Schools</li> <li>Residential areas</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Food retailers</li> <li>Glasshouses and nurseries</li> <li>Horticultural land</li> <li>Offices</li> </ul>
Low	<ul style="list-style-type: none"> <li>Farms</li> <li>Industry</li> <li>Outdoor storage</li> </ul>

The potential for dust impacts depends significantly on the distance between the dust generating activity and receptor location. MPS 2 provides guidance on the potential dispersion area of dust emissions. This was reviewed to produce the criteria for the determination of the magnitude of change, as outlined in Table 9-31.

**Table 9-31 Construction Site Dust - Magnitude of Change**

Magnitude of Change	Description
Large	Dust sensitive location is situated less than 10 m from the construction site boundary
Medium	Dust sensitive location is situated between 10 m and 100 m from the construction site boundary
Small	Dust sensitive location is situated between 100 m and 500 m from the construction site boundary
Negligible	Dust sensitive location is situated between 500 m and 1,000 m from the construction site boundary
No change	No discernable dust impact at dust sensitive location

Impact significance has been defined based on the interaction between the value (sensitivity) of the affected receptor and the magnitude of change, as summarised in Table 9-32.

**Table 9-32 Construction Site Dust - Significance of Impacts**

Value of Receptor	Magnitude of Change			
	Negligible	Small	Medium	Large
Very High	Negligible	Slight	Moderate	Substantial
High	Negligible	Slight	Moderate	Moderate
Medium	Negligible	Negligible	Slight	Slight
Low	Negligible	Negligible	Negligible	Slight

In order to identify suitable mitigation measures for the control of construction dust emissions, a further risk assessment has been undertaken in accordance with the Greater London Authority 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition'. This document provides an assessment of potential risk associated with specific construction sites and activities, as summarised in Table 9-33, and provides suitable mitigation options to reduce potential impacts based on the risk rating of the particular site in question.

**Table 9-33 Construction Site Dust - Risk Rating Criteria**

<b>Risk Rating</b>	<b>Criteria</b>
High	<ul style="list-style-type: none"> <li>Development of over 15,000 m<sup>2</sup> of land</li> <li>Development of over 150 properties</li> <li>Potential for emissions and dust to have significant effect on sensitive receptors</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Development of between 1,000 m<sup>2</sup> and 15,000 m<sup>2</sup> of land</li> <li>Development of between 10 to 150 properties</li> <li>Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors</li> </ul>
Low	<ul style="list-style-type: none"> <li>Development of up to 1,000 m<sup>2</sup> of land</li> <li>Development of 1 property and up to a maximum of 10</li> <li>Potential for emissions and dust to have an infrequent impact on sensitive receptors</li> </ul>

## Road Vehicle Exhaust and Energy Centre Emissions

The significance criteria for predicted road vehicle exhaust and energy centre emissions are outlined in the Environmental Protection UK 'Development Control: Planning for Air Quality (2010 update)'. The method for defining the magnitude of impact is outlined in Table 9-34.

**Table 9-34 Definition of Impact Magnitude**

<b>Magnitude of Change</b>	<b>Change in Annual Average NO<sub>2</sub> or PM<sub>10</sub> Concentration (µg/m<sup>3</sup>)</b>	<b>Change in Number of Days with PM<sub>10</sub> Concentrations Greater than 50µg/m<sup>3</sup></b>
Large	Greater than 4.0	More than 4
Medium	2.0 – 4.0	2 – 4
Small	0.4 – 2.0	1 – 2
Imperceptible	Less than 0.4	Less than 1

The guidance also provides descriptors for potential impacts based on predicted concentrations and magnitude of change. These are outlined in Table 9-35.

**Table 9-35 Impact descriptors**

<b>Prediction with Development</b>	<b>Predicted Magnitude of Change</b>		
	<b>Small</b>	<b>Medium</b>	<b>Large</b>
Above AQLV	Slight	Moderate	Substantial

Prediction with	Predicted Magnitude of Change		
<ul style="list-style-type: none"> <li>Annual average greater than 40µg/m<sup>3</sup></li> <li>More than 35-days greater than 50µg/m<sup>3</sup></li> </ul>			
Just below AQLV <ul style="list-style-type: none"> <li>Annual average 36 - 40µg/m<sup>3</sup></li> <li>32 to 35-days greater than 50µg/m<sup>3</sup></li> </ul>	Slight	Moderate	Moderate
Below AQLV <ul style="list-style-type: none"> <li>Annual average 30 - 36µg/m<sup>3</sup></li> <li>26 to 32-days greater than 50µg/m<sup>3</sup></li> </ul>	Negligible	Slight	Slight
Well below AQLV <ul style="list-style-type: none"> <li>Annual average below 30µg/m<sup>3</sup></li> <li>Less than 26-days greater than 50µg/m<sup>3</sup></li> </ul>	Negligible	Negligible	Slight

Finally, the document provides guidance on determining the overall air quality significance of a proposed development. The following factors are identified for consideration by the assessor:

- Number of properties affected by slight, moderate or major air quality impacts and a judgement on the overall balance.
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant.
- The magnitude of changes and the descriptions of the impacts at the receptors.
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.
- The extent to which an objective or limit value is exceeded e.g. an annual average NO<sub>2</sub> concentration of 41µg/m<sup>3</sup> should attract less significance than an annual average of 51µg/m<sup>3</sup>.

It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable.

## 9.4 Baseline Conditions

A review of CDCs recent Review and Assessment documents indicate there are currently no AQMAs in the district. The 2009 Updating and Screening Assessment did, however, identify monitored exceedences of the annual average AQLV for nitrogen dioxide (NO<sub>2</sub>) and has recommended a detailed assessment for three areas. This includes Queens Avenue within Bicester itself which is the only one of the three areas in the vicinity of the proposed

development. The detailed assessment is not due to be completed until February 2011. All other pollutants have been found to be below the AQLVs.

CDC has one continuous automatic monitor but this is located in Banbury, a significant distance from Bicester. There are a number of NO<sub>2</sub> diffusion tube monitoring locations closer to the proposed development. The 2006 to 2009 annual average results are presented in Table 9-11 and exceedences are highlighted in bold. Further diffusion tubes have been commissioned in the vicinity of the exceedence at Queens Avenue in late 2009. Provisional NO<sub>2</sub> monitoring results in the area are presented in Table 9-36. These results are provisional and verification will therefore take place once the results are finalised and monitoring is available. All other pollutants have been found to be below the AQLVs.

**Table 9-36 Annual Average NO<sub>2</sub> diffusion tube results in Bicester as managed by CDC**

Location	Site type*	2006 (µg/m <sup>3</sup> )	2007 (µg/m <sup>3</sup> )	2008 (µg/m <sup>3</sup> )	2009 (µg/m <sup>3</sup> )	2010** (µg/m <sup>3</sup> )
Tamarisk Gardens	UB	22.2	21.6	22.3	21.0	19.8
Market Square	K	34.6	34.9	35.4	33.7	33.7
Queens Avenue 1	R	-	-	-	-	<b>44.5</b>
Queens Avenue 2	R	-	-	-	-	39.9
Queens Avenue 3	R	-	-	-	<b>46.9</b>	<b>41.6</b>
North St	R	-	-	-	-	<b>41.8</b>
Field St	R	-	-	-	-	<b>42.7</b>
Kings End N	R	-	-	-	-	<b>44.4</b>
Kings End S	R	-	-	-	-	<b>47.2</b>
Kings End W	R	-	-	-	-	32.7
Villiers Rd	UB	-	-	-	-	24.3

\* UB = urban background, K = kerbside, R = roadside, RB = rural background \*\* All results provisional

The monitoring data suggests that exceedences of the annual average NO<sub>2</sub> objective have occurred at the Queens Avenue site for the last two years. Concentrations at the Market Square site have been consistently below the objective, showing the variation of concentrations within central Bicester. Tamarisk Gardens monitoring location is closest to the Exemplar Site development, on the edge of Bicester with the diffusion tube located approximately 30 metres back from the A4095. This indicates that at background locations away from roads, the concentrations are significantly below the annual average objective for NO<sub>2</sub>.

Site specific monitoring for NO<sub>2</sub> began at the start of August 2010. Only two months monitoring data is currently available as discussed in section 9.3.3. The results to date are presented in Table 9-37 and monitoring locations illustrated in Drawing 9-2.

**Table 9-37 Nitrogen dioxide diffusion tube data collected to date**

Location	Site type*	Monthly average NO <sub>2</sub> August 2010 (µg/m <sup>3</sup> )	Monthly average NO <sub>2</sub> September 2010 (µg/m <sup>3</sup> )
B1	K	-	-

Location	Site type*	Monthly average NO <sub>2</sub> August 2010 (µg/m <sup>3</sup> )	Monthly average NO <sub>2</sub> September 2010 (µg/m <sup>3</sup> )
B2	R	16.1	21.8
B3	R	15.7	20.5
B4	R	18.5	24.0
B5	UB	19.9	23.7
B6	R	22.5	29.2
B7	RB	18.1	19.7
B8	RB	-	16.9
B9	RB	27.0	30.6
B10	R	36.1	37.0
B11	R	23.4	32.8
B12	UB	-	-
B13	R	23.6	27.2
B14	R	21.3	29.3
B15	R	17.8	22.7

\* UB = urban background, K = kerbside, R = roadside, RB = rural background

Background data used in this assessment is shown in Table 9-38 below.

**Table 9-38 Background pollutant concentrations for NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub>**

Receptor numbers	2010			2016		
	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>
R1, R2	17.3	12.0	16.4	12.3	8.8	15.6
R3	15.5	11.0	15.7	11.6	8.3	15.1
R4, R7, R8	15.6	11.6	15.5	11.9	9.0	14.9
R5, R6	14.1	10.0	16.1	10.7	7.8	15.4
R9, R10, R15	15.0	11.0	14.8	11.3	8.6	14.9
R11, R12, R13, R14	13.2	9.5	15.8	10.0	7.4	15.1
R16, R17	17.1	12.5	15.6	12.9	9.7	14.3
R18	14.3	10.0	16.5	10.7	7.6	15.8

The baseline modelled annual average NO<sub>2</sub> and PM<sub>10</sub> concentrations at each of the receptors are presented in Table 9-39. These results will undergo verification when monitoring results are available.

**Table 9-39 2010 baseline NO<sub>2</sub> and PM<sub>10</sub>**

Receptor number	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )
R1	13.0	16.6
R2	13.7	16.7
R3	13.5	16.2
R4	14.4	16.0
R5	13.4	16.7
R6	13.7	16.8
R7	14.0	16.0
R8	13.8	15.9
R9	14.3	15.5
R10	14.6	15.5
R11	16.1	15.79
R12	15.8	16.9
R13	14.5	16.8
R14	13.5	16.6
R15	15.9	15.6
R16	19.9	17.2
R17	20.2	17.2
R18	11.3	16.7

## 9.5 Design and Mitigation

### 9.5.1 Construction

Table 9-40 details the necessary mitigation measures for the Exemplar development during the construction phase. A Construction Environmental Management Plan (CEMP) detailing the proposed construction methods and mitigation measures will also be submitted to CDC prior to the commencement of construction. Monitoring of depositional and suspended dust will be undertaken during construction in order that trigger levels may be set where mitigation must be increased to protect the health and amenity of local residents. These monitoring requirements should be agreed in advance with the EPO at CDC.



**Table 9-40 Mitigation measures for construction phase**

<b>Mitigation Measures for High Risk sites</b>	
<b>Site Planning</b>	<ul style="list-style-type: none"> <li>▪ Erect solid barriers to site boundary.</li> <li>▪ No bonfires.</li> <li>▪ Plan site layout – machinery and dust causing activities should be located away from sensitive receptors.</li> <li>▪ All site personnel to be fully trained.</li> <li>▪ Trained and responsible manager on site during working times to maintain logbook and carry out site inspections.</li> <li>▪ Hard surface site haul routes.</li> <li>▪ Use nearby rail or waterways for transportation to/from site.</li> <li>▪ Put in place real-time dust monitors across site.</li> </ul>
<b>Construction Traffic</b>	<ul style="list-style-type: none"> <li>▪ All vehicles to switch off engines – no idling vehicles.</li> <li>▪ Effective vehicle cleaning and specific fixed wheel washing on leaving site and damping down of haul routes.</li> <li>▪ All loads entering and leaving site to be covered.</li> <li>▪ No site runoff of water or mud.</li> <li>▪ On-road vehicles to comply to set emission standards.</li> <li>▪ All non road mobile machinery (NRMM) to use ultra low sulphur tax exempt diesel (ULSD) where available and be fitted with appropriate exhaust after-treatment from the approved list.</li> <li>▪ Minimise movement of construction traffic around site.</li> <li>▪ Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site.</li> </ul>
<b>Earth Moving Works</b>	<ul style="list-style-type: none"> <li>▪ Minimise dust generating activities.</li> <li>▪ Use water as dust suppressant where applicable.</li> <li>▪ Cover, seed or fence stockpiles to prevent wind whipping.</li> <li>▪ Re-vegetate earthworks and exposed areas.</li> <li>▪ If applicable, ensure concrete crusher or concrete batcher has permit to operate.</li> </ul>

## 9.5.2 Operation

This application is accompanied by a Travel Plan which includes a number of measures designed to promote sustainable travel. The traffic data presented in Table 9-27 reflects these mitigation measures. The measures are outlined below:

- Land use containment
- Working from home
- Branding and Marketing/ Travel Awareness Promotions
- Personalised Travel Planning
- Individual Travel Plan – Primary School
- Individual Travel Plans – Other Non Residential Uses
- Parking Strategy

- Car Club
- Car sharing
- Bus Service
- Bus Infrastructure
- Rail Linkages
- New Occupant Travel Incentives
- Walking Routes
- Cycling Routes and storage
- Cycle Purchase/ Hire and Facilities for Cyclists

In addition, the implementation of electric car charging points, assisted purchase of electric vehicles and the use of Hybrid buses will also reduce the emissions of pollutants from the type of vehicles used as part of the site.

## 9.6 Assessment of Effects

### 9.6.1 Construction

Following the criteria outlined in 'Control of Dust and Emissions from Construction and Demolition', the NW Bicester Eco Development as a whole and the Exemplar Site development as a standalone site are high risk construction sites as they are developments of greater than 150 units. Minerals Policy Statement 2 (MPS 2) provides guidance on dust deposition where large dust particles (greater than 30µm) will largely deposit within 100m of sources. This would affect receptors such as Home Farm (R11) and The Lodge (R12) which would be classified as **high** value (Table 9-4). Intermediate-sized particles (10–30µm) are likely to travel up to 200–500m. Smaller particles (less than 10µm) are only deposited slowly but may travel 1,000m or more. Concentrations decrease rapidly on moving away from the source, due to dispersion and dilution. Prior to mitigation, the magnitude of change at the receptors considered to be of **high** value would be **medium**. Therefore, the significance of the residual impact at these receptors would be **moderate adverse**. With mitigation measures in place, this will reduce to **slight adverse**.

Potential dust impacts are considered to be probable, short-term, local, occasional, and temporary in nature. They are probable as impacts are likely to occur throughout the construction phase, short-term as impacts will only occur during the construction phase, local as impacts are not predicted to occur beyond 1km from the site boundary, occasional as impacts would only occur when specific activities and meteorological conditions combine to cause the predicted level of impact at sensitive locations, and temporary as there is unlikely to be any lasting impacts after construction is complete.

It should be noted that the potential for impacts would depend significantly on the distance between the dust generating activity and receptor location. Impacts have been predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual impacts are likely to be lower than those predicted during the majority of the construction phase.

There is no residual impact from construction.

## 9.6.2 Operation

### Road Vehicle Exhaust Emissions

Operational phase traffic emissions, including cumulative developments detailed in Table 18-2, have been assessed and the results for the opening year of the development are presented for NO<sub>2</sub> in Table 9-41 and the results for PM<sub>10</sub> are presented in Table 9-42. LAQM.TG(09) states that where annual average concentrations are below 60µg/m<sup>3</sup>, there is no risk of exceedence of the hourly mean AQLV for NO<sub>2</sub>. There are no modelled increases in exceedences of the daily average PM<sub>10</sub> limit. On the basis of the results, neither AQLV is considered further in this chapter in the context of road vehicle exhaust emissions.

**Table 9-41 Annual average NO<sub>2</sub> assessment results (µg/m<sup>3</sup>)**

Receptor number	NO <sub>2</sub> 2016 without (µg/m <sup>3</sup> )	NO <sub>2</sub> 2016 with (µg/m <sup>3</sup> )	Impact magnitude
R1	9.9	9.9	Imperceptible
R2	10.6	10.6	Imperceptible
R3	10.9	11.3	Small
R4	11.7	12.1	Small
R5	10.5	10.9	Small
R6	10.7	11.2	Small
R7	11.4	11.5	Imperceptible
R8	11.1	11.3	Imperceptible
R9	11.9	12.2	Imperceptible
R10	12.2	12.5	Imperceptible
R11	13.3	14.1	Small
R12	13.0	13.8	Small
R13	11.8	12.4	Small
R14	10.9	11.4	Small
R15	13.2	13.8	Small
R16	15.6	15.6	Imperceptible
R17	15.9	15.9	Imperceptible
R18	8.9	8.9	Imperceptible

**Table 9-42 Annual average PM<sub>10</sub> assessment results (µg/m<sup>3</sup>)**

Receptor number	PM <sub>10</sub> 2016 without (µg/m <sup>3</sup> )	PM <sub>10</sub> 2016 with (µg/m <sup>3</sup> )	Impact magnitude
R1	15.8	15.8	Imperceptible
R2	15.9	15.9	Imperceptible
R3	15.5	15.6	Imperceptible
R4	15.4	15.4	Imperceptible

Receptor number	PM <sub>10</sub> 2016 without (µg/m <sup>3</sup> )	PM <sub>10</sub> 2016 with (µg/m <sup>3</sup> )	Impact magnitude
R5	16.0	16.0	Imperceptible
R6	16.0	16.1	Imperceptible
R7	15.3	15.4	Imperceptible
R8	15.3	15.3	Imperceptible
R9	15.5	15.6	Imperceptible
R10	15.6	15.6	Imperceptible
R11	16.0	16.2	Imperceptible
R12	16.0	16.1	Imperceptible
R13	15.8	15.9	Imperceptible
R14	15.7	15.8	Imperceptible
R15	15.6	15.7	Imperceptible
R16	15.5	15.5	Imperceptible
R17	15.6	15.6	Imperceptible
R18	16.0	16.0	Imperceptible

The largest impact on NO<sub>2</sub> concentrations is predicted to occur on Banbury Road North in the vicinity of receptors R11 to R15 with a maximum increase of 0.8µg/m<sup>3</sup>. Following the method outlined in Table 9-34, the magnitude of impact at these receptors and receptors R3 to R6 is considered to be small. All other changes are imperceptible. Following the guidance in Table 9-35, as all concentrations are predicted to below 30µg/m<sup>3</sup> the overall impact is **negligible**. Verification will be undertaken once complete monitoring data is available to confirm these conclusions. It is important to note in these initial conclusions, before verification, that at the two receptors modelled in the area of CDC's ongoing detailed assessment for possible declaration of an AQMA for NO<sub>2</sub>, there is no change in NO<sub>2</sub> concentration and impact is **imperceptible** and **negligible** overall.

The largest impact on PM<sub>10</sub> concentrations occurs on Banbury Road North in the vicinity of receptors R11 to R15 with a maximum increase of 0.2µg/m<sup>3</sup>. Following the method outlined in Table 9-34, the magnitude of impact at all receptors is imperceptible. Following the guidance in Table 9-35, as all concentrations are predicted to below 30µg/m<sup>3</sup> the overall impact is **negligible**.

The overall rating for the impact of traffic emissions is **negligible**. Verification will be undertaken once complete monitoring data is available to confirm these conclusions.

## Energy Centre Emissions

The proposed energy centre has the potential to cause air quality impacts as a result of combustion emissions of NO<sub>2</sub> and PM<sub>10</sub> from the biomass boiler and gas CHP plants. These will be emitted to atmosphere via dedicated stacks located on the roof of the energy centre. A screening assessment in accordance with the methodology outlined in LAQM.TG(09) has been undertaken in order to determine the potential for significant impacts on existing pollutant concentrations in the vicinity of the site as a result of energy centre emissions.

A number of parameters were required as input to the screening assessment. These are summarised in Table 9-43. It should be noted that the assessment has been based on the proposed energy centre plant and associated emissions. Although these had not been finalised at the time of assessment, it is considered that the relevant inputs provide a suitable representation of the fully operational energy centre.

**Table 9-43 Biomass Boiler Screening Assessment Inputs**

Parameter	Unit	Input
Stack height ( $U_{act}$ )	m	15
Building height (H)	m	10
NO <sub>2</sub> emission rate ( $E_{NO_2}$ )	g/s	0.3
PM <sub>10</sub> emission rate ( $E_{PM10}$ )	g/s	0.15
NO <sub>2</sub> background concentration ( $G_{NO_2}$ )	µg/m <sup>3</sup>	7.8
PM <sub>10</sub> background concentration ( $G_{PM10}$ )	µg/m <sup>3</sup>	15.5

The first step within the screening method outlined within LAQM.TG(09) is the calculation of effective stack height ( $U_{eff}$ ) using the following equation:

$$U_{eff} = 1.66 \times (U_{act} - H)$$

This resulted in a  $U_{eff}$  value of 8.3m.

In order to assess the requirement for Detailed Assessment of annual mean NO<sub>2</sub> concentrations, LAQM.TG(09) includes the following formula for the calculation of the background adjusted emission rate ( $E_{ANO_2}$ ):

$$E_{ANO_2} = E_{NO_2} / (40 - G_{NO_2})$$

This resulted in an  $E_{ANO_2}$  value of 0.009g/s. The nomogram shown in LAQM.TG(09) was then analysed in order to determine the relevant threshold emission rate. This was found to be 0.01g/s. As the calculated  $E_{ANO_2}$  value is lower than the threshold emission rate, LAQM.TG(09) would not require progression to Detailed Assessment.

A similar equation is provided for the screening of NO<sub>2</sub> emissions for potential exceedences of the 1-hour AQLV:

$$E_{ANO_2} = (40 \times E_{NO_2}) / (200 - (2 \times G_{NO_2}))$$

This resulted in an  $E_{ANO_2}$  value of 0.065g/s. The nomogram shown in LAQM.TG(09) was then analysed in order to determine the relevant threshold emission rate. This was found to be 0.05g/s. As the calculated  $E_{ANO_2}$  value is higher than the threshold emission rate, LAQM.TG(09) requires progression to Detailed Assessment.

In order to assess the requirement for Detailed Assessment for 24-hour mean PM<sub>10</sub> concentrations, LAQM.TG(09) includes the following formula for the calculation of the background adjusted emission rate ( $E_{APM10}$ ):

$$E_{APM10} = E_{PM10} / (32 - G_{PM10})$$

This resulted in an  $E_{APM10}$  value of 0.009g/s. The nomogram shown in LAQM.TG(09) was then analysed in order to determine the relevant threshold emission rate. This was found to be

0.004g/s. As the calculated  $E_{APM10}$  value is higher than the threshold emission rate, LAQM.TG(09) requires progression to Detailed Assessment.

The results of the screening assessment indicated that a Detailed Assessment of potential air quality impacts associated with the proposed energy centre was required. As such, detailed dispersion modelling was undertaken in order to quantify potential changes in  $NO_2$  and  $PM_{10}$  concentrations. The relevant assessment inputs are summarised in Table 9-44. Reference should be made to Drawing 9-3 for a graphical representation of the dispersion modelling inputs.

**Table 9-44 Dispersion Modelling Assessment Inputs**

Parameter	Unit	Input
Dispersion model	-	AERMOD
Meteorological data	-	2009 Brize Norton
Terrain data	-	OS 1:50,000 scale digital height contour data at 10m vertical intervals
Assessment extents	NGR	456800, 224000 to 458800, 226000
Cartesian grid resolution	m	20
Building effects	-	Processed for energy centre with Building Profile Input Programme (BPIP) module within AERMOD
$NO_x$ to $NO_2$ conversion	-	70% conversion from $NO_x$ to $NO_2$ for annual means and a 35% conversion for short term (hourly) concentrations
Stack location	NGR	Biomass - 457894.4, 224722.3
		CHP 1 - 457897.1, 224736.9
		CHP 2 - 457898.3, 224740.2
Stack height	m	15 (all sources)
Exhaust gas volumetric flow rate	$m^3/s$	Biomass - 1
		CHP 1 - 1.5
		CHP 2 - 0.8
Stack diameter	m	0.25
		0.25
		0.20
$NO_x$ emission rate	g/s	Biomass - 0.30
		CHP 1 - 0.57
		CHP 2 - 0.28
$PM_{10}$ emission rate	g/s	Biomass - 0.15

Dispersion modelling was undertaken using the inputs previously described. Predicted pollutant concentrations at sensitive receptor locations are summarised in Table 9-45.

**Table 9-45 Dispersion Modelling Results**

Receptor		Predicted Pollutant Concentration Inclusive of Background ( $\mu\text{g}/\text{m}^3$ )			
		NO <sub>2</sub> Annual Mean <sup>(1)</sup>	NO <sub>2</sub> 1-hour Mean (99.8%ile) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean <sup>(3)</sup>	PM <sub>10</sub> 24-hour Mean (90.4%ile) <sup>(4)</sup>
E1	Green Acres	12.7	82.1	16.6	18.5
E2	49 Mullen Road	8.6	37.2	15.7	16.2
E3	Nashers Nook	8.8	32.6	15.7	16.2

NOTES: (1) Inclusive of background concentration of  $7.8\mu\text{g}/\text{m}^3$ .  
(2) Inclusive of background concentration of  $15.6\mu\text{g}/\text{m}^3$ .  
(3) Inclusive of background concentration of  $15.5\mu\text{g}/\text{m}^3$ .  
(4) Inclusive of background concentration of  $15.5\mu\text{g}/\text{m}^3$ .

As indicated in Table 9-45, predicted concentrations of NO<sub>2</sub> and PM<sub>10</sub> are below the relevant AQLVs at all sensitive receptor locations.

Reference should be made to Drawing 9-4 to 9-7 for a graphical representation of predicted pollutant concentrations throughout the modelling area. These indicate that predicted concentrations of NO<sub>2</sub> and PM<sub>10</sub> are below the relevant AQLVs throughout the entire assessment extents. As such it is not considered any future receptors on the proposed development site will be exposed to NO<sub>2</sub> or PM<sub>10</sub> concentrations in exceedence of the relevant AQLVs as a result of combustion emissions from the energy centre.

The significance of impacts was predicted based on the stated EPUK methodology. The magnitude of change was initially defined based on the descriptors outlined in Table 9-34. These are summarised in Table 9-46.

**Table 9-46 Predicted Impact Magnitude**

Receptor		Predicted Impact Magnitude	
		NO <sub>2</sub> Annual Mean	PM <sub>10</sub> Annual Mean
E1	Green Acres	Large	Medium
E2	49 Mullen Road	Small	Small
E3	Nashers Nook	Small	Small

As indicated in Table 9-46, the predicted impact magnitude of change in NO<sub>2</sub> concentrations is **large** to **small**. The predicted impact magnitude of change in annual PM<sub>10</sub> concentrations is **medium** to **small**. The predicted impact was subsequently defined based on the magnitude outlined in Table 9-46 and the methodology shown in Table 9-35. These are summarised in Table 9-47.



**Table 9-47 Predicted Impact Significance**

Receptor		Predicted Impact	
		NO <sub>2</sub> Annual Mean	PM <sub>10</sub> Annual Mean
E1	Green Acres	Slight	Negligible
E2	49 Mullen Road	Negligible	Negligible
E3	Nashers Nook	Negligible	Negligible

As indicated in Table 9-47, there is predicted to be a **slight adverse** impact for annual mean NO<sub>2</sub> concentrations at receptor E1 and a **negligible** impact for both NO<sub>2</sub> and PM<sub>10</sub> concentrations at all other sensitive receptor locations as a result of emissions from the proposed energy centre.

Potential energy centre impacts are considered to be probable, long-term, local, continuous, and reversible in nature. They are probable as impacts are likely to occur throughout the operational phase, long-term as impacts will occur throughout the operation of the development, local as impacts are not predicted to occur a significant distance from the site boundary, continuous as impacts are predicted to occur throughout operation, and reversible as pollutant concentrations could be reduced to baseline levels should the energy centre cease operations.

It should be noted that the assessment considered a worst case scenario of both the biomass boiler and gas CHP plants operating at maximum capacity continuously throughout the year and therefore annual mean impacts are likely to be significantly overestimated.

### 9.6.3 Cumulative Effects

There are likely to be cumulative effects of construction dust with the rest of the NW Bicester Eco development and other committed developments within 1km of the site. The most immediate impact will be from further development of NW Bicester Eco development and will include the Exemplar development once built. Before mitigation this will be **moderate adverse** but with the suggested mitigation, this will reduce to **slight adverse**.

During the operational phase, the scale of the NW Bicester Eco development means there is potential for significant traffic generation with associated vehicle exhaust emissions. In combination with the Exemplar, these have the potential to cause **slight adverse cumulative effects** with respect to effects on air quality at sensitive receptor locations.

Similarly, the other developments identified around Bicester also have potential for significant traffic generation with associated vehicle exhaust emissions. However, the assessment in this chapter takes into account future committed developments as these have been included in the growth factors in the Transport Assessment for the Exemplar development. There are considered to be no likely **cumulative effects** with respect to effects on air quality at sensitive receptors locations.

Further assessment work would be needed for both scenarios in order to confirm these cumulative effects once detailed information is available.

## 9.7 Summary

This chapter has assessed the impacts on air quality associated with the NW Bicester Exemplar development. The development has the potential for air quality impacts through construction

and operational (traffic and energy generation) activities. The assessment has identified that there will be a **slight adverse** impact from construction dust during the construction phase. The preliminary conclusions are that there are no permanent residual impacts associated with traffic as the overall rating for the impact of traffic emissions is **negligible**. Verification will be undertaken once complete monitoring data is available to confirm these conclusions. Energy centre emission impacts are predicted to be between **slight adverse** and **negligible** for annual mean NO<sub>2</sub> concentrations and **negligible** for annual mean PM<sub>10</sub> concentrations at sensitive receptor locations. Exceedences of the relevant AQLVs were not predicted at any location within the modelling extents.

# 10 Noise

## 10.1 Introduction

The purpose of the noise and vibration assessment is to identify potential noise and vibration impacts associated with the proposed Exemplar site development and assess the suitability of the site for residential and other use. Operational noise impacts included an assessment of road traffic noise associated with the development and noise from operational plant to be installed on site. Further assessment of noise from operational plant would however be required once detail of the plant to be installed on site is known. A baseline noise and vibration survey has been carried out to establish existing conditions on site.

The vibration baseline considered possible vibration impacts from the Chiltern main railway line. Given the distance from the railway line, this assessment would however be more applicable to the NW Bicester Eco-development site than to the Exemplar site. The assessment has also considered the impact of road traffic noise levels and the effects of construction noise at receptors within the local area.

## 10.2 Regulatory Framework

The noise and vibration assessment has been carried out in accordance with national legislation, policy and guidance as set out in Table 10-48 below.

**Table 10-48 Noise and Vibration Regulatory and Policy Framework**

Policy/Legislation	Requirements	Bicester Eco-development Exemplar Site Response
Planning Policy Guidance Note 24 (PPG24)	PPG 24 gives guidance to local authorities in England on the use of their planning powers to minimise the adverse impact of noise and builds on the advice previously contained in DOE Circular 10/73.	Noise and vibration assessment protocol has been agreed with Environmental Health Officer (EHO) and PPG 24 assessment will inform site layout and location of residential components of the development.
BS5228:1 2009 Code of practice for noise and vibration control on construction and open sites. Noise	BS 5228 gives recommendations for basic methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels, including industry-specific guidance.	A Construction Environmental Management Plan would be developed and agreed with the EHO to ensure that construction noise is controlled using best-practice methodologies.
BS 6472-1:2008: Guide to Evaluation of Human Exposure to Vibration in Buildings	BS 6472 provides guidance on predicting human response to vibration in buildings. Frequency weighting curves for human beings exposed to whole-body vibration are included, together with advice on measurement methods to be employed.	Noise and vibration assessment protocol has been agreed with EHO in accordance with this guide. Potential vibration impacts would inform site layout.
BS8223: 1999: Sound	BS8223 gives recommendations	The suitable design range for good

<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Bicester Eco-development Exemplar Site Response</b>
insulation and noise reduction for buildings –. Code of practice	for the control of noise in and around buildings, and suggests appropriate criteria and limits for different situations. These criteria and limits are primarily intended to guide the design of new or refurbished buildings undergoing a change of use	acoustic performance set out in BS 8233 would inform site layout and building design.
Calculation of Road Traffic Noise 1988 (CRTN - ISBN 0 11 550847 3)	CRTN describes the procedures for calculating noise from road traffic. These procedures are necessary to enable entitlement under the Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning.	Noise and vibration assessment protocol has been agreed with EHO in accordance with this guide. DMRB requires that the CRTN calculation methodology be used.
The Design Manual for Roads and Bridges (DMRB), volume 11, section 3, part 7	Advice Note provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.	Noise and vibration assessment protocol has been agreed with EHO in accordance with this guide. Principles in DMRB have been used to assess road traffic noise impacts associated with the development.
Noise Policy Statement for England (NPSE)	The Noise Policy Statement for England (published on 15 March 2010) sets out the long term vision of Government noise policy, which is to promote good health and a good quality of life through the management of noise within the context of Government policy on sustainable development.	Noise and vibration assessment protocol has been agreed with EHO and the assessment has followed recognised guidance to ensure that good health and quality of life have been promoted.
Control of Pollution Act 1974	The Control of Pollution Act 1974 Section 61 sets out procedures for those undertaking works to obtain 'Prior Consent' for construction works within agreed noise limits.	Section 61 consent applications may be made to the local council to obtain prior consent for construction works and to agree noise limits for construction works.
The Noise Insulation Regulations 1975 (as amended 1988)	Regulation 5 provides relevant authorities with discretionary powers to provide noise insulation at dwellings to reduce	Any requirements for Noise Insulation will be addressed once the detailed construction programme has been finalised.

Policy/Legislation	Requirements	Bicester Eco-development Exemplar Site Response
	the impact of construction noise	

## 10.3 Methodology

### 10.3.1 Introduction

The noise and vibration assessment considers the suitability of the site for residential development in line with Policy Planning Guidance 24 (PPG 24)<sup>1</sup>. The noise assessment also considers both construction and operational noise impacts associated with the proposed Exemplar Site development.

The construction impacts were assessed in accordance with the provisions in BS 5228: 2009<sup>2</sup>.

The operational impacts will arise from increased road traffic and from fixed plant and similar installations to be constructed on site. Operational traffic was assessed using the provisions in the Design Manual for Roads and Bridges (DMRB) Volume 11, Part 7, Section 3 – Noise and Vibration<sup>3</sup>. Noise from operational plant has been considered in accordance with the provisions in BS 4142: 1997 'Method for rating of industrial noise affecting mixed residential and industrial areas' (BS4142)<sup>4</sup>.

A baseline noise survey serves as a basis for the assessment of the suitability of the proposed Exemplar Development site for development and for assessing construction and operational noise impacts.

### 10.3.2 Study Area

In order to establish if the proposed Exemplar Development site would be suitable for residential use the extent of the study area covers all of the land within the boundary of the site. This is to ensure that noise levels across the site would comply with Planning Policy Guidance Note 24: Noise (PPG 24)<sup>1</sup>.

Baseline monitoring locations were agreed with Rob Lowther, the EHO for Cherwell District Council. It was agreed that noise measurements will be taken to reflect noise levels on a typical weekday. The  $L_{Aeq,T}$ ,  $L_{A90}$ ,  $L_{A10}$ ,  $L_{Amin}$  and  $L_{Amax}$  were measured at all locations. Noise related terminology has been set out in the Appendices in Volume 3.

To assess the operational impact due to road traffic noise of the Exemplar Site, the study area has been extended to cover the local road network. The effects of increased traffic flows on roads within this study area have formed the basis for the assessment of noise impact upon existing receptors. In accordance with DMRB, calculations are normally undertaken for road links where traffic flows are predicted to increase by at least 25% or decrease by 20% when the project is completed. An increase in traffic volumes of 25% would equate to a 1dB increase in noise, which is the smallest increase that can be detected by the human ear.

The traffic assessment results, as discussed in Section 10.3.4, indicate that the increase in traffic would be below 25%, and normally assessment would not continue beyond this screening assessment. It was however decided to consider the increase in noise levels at selected receptors situated along the affected road network to clearly demonstrate the change in noise levels, particularly where receptors would be exposed to noise from more than one road, such as the receptors at the junction of Lord's Lane and Banbury Road

To assess the impact from commercial activities (e.g. air conditioning plant) in accordance with BS 4142<sup>4</sup> there would not be a study area as such but rather an assessment of the closest sensitive receptors to the noise sources in question.

### 10.3.3 Establishment of Baseline Conditions

A full noise survey was undertaken at the proposed Exemplar Development Site and at locations representative of the North-West Bicester (NW Bicester) eco-development. Baseline monitoring locations were agreed with Rob Lowther, the EHO for Cherwell District Council. It was agreed that noise measurements would be taken to reflect noise levels on a typical weekday. .

The measurement locations for the whole site are indicated in Drawing 10-1. An assessment of the site indicated that the dominant noise source across the site would be from road traffic noise associated with the A4095 (Howe's Lane and Lord's Lane), B 4300 and B4100. Noise monitoring was carried out at selected locations over a 24 hour period. The unattended (24 hour) monitoring locations were selected at the locations indicated on Drawing 10-1, denoted by the prefix LTN (Long Term Noise).

In addition, short term attended noise measurements (prefix STN) were taken along Bucknell Road and along the M40 motorway. The potential for noise impacts from the M40 were raised as a concern by Rob Lowther of Cherwell District Council. For the attended measurements daytime measurements were taken over a period of 3 hours and at night for 1 hour.

Measurements taken at all locations have been used to generate the contours for the Exemplar Site, but measurement location LTN1 and LTN 2 would be particularly relevant for this site.

### PPG 24

The assessment of whether the proposed site would be suitable for residual use was undertaken in accordance with Planning Policy Guidance Note 24 (PPG 24)<sup>1</sup>.

PPG 24 guides local authorities in England on the use of their planning powers to minimise the adverse impact of noise. It outlines the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities which generate noise.

A recommended range of noise levels for different noise exposure categories (NECs) covering day and night-time periods in relation to road noise are provided in PPG 24. The NECs for road traffic sources are detailed in Table 10-2.**Error! Reference source not found.**

**Table 10-49 Noise levels corresponding to the NEC for new dwellings relating to noise**

	Noise Exposure Category			
	A	B	C	D
Day Time 0700 – 2300	<55 L <sub>Aeq</sub>	55 – 63 L <sub>Aeq</sub>	63 – 72 L <sub>Aeq</sub>	>72 L <sub>Aeq</sub>
Night Time 2300 – 0700*	<45 L <sub>Aeq</sub>	45 – 57 L <sub>Aeq</sub>	57 – 66 L <sub>Aeq</sub>	>66 L <sub>Aeq</sub>

When considering an application in terms of noise, PPG 24 advises that local planning authorities should consider the advice presented in **Error! Reference source not found.**

**Table 10-50 Significance of noise exposure category**

NEC	Advice
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

To establish which relevant NEC the proposed site would fall into, noise monitoring was carried out as described above. The measured noise levels were corrected for distance from source to provide the sound pressure level at source. This data was inserted into IMMI, software for modelling and mapping noise from roads, railways, industrial, construction and other open sites, to produce noise contours for the site for both daytime and night-time that indicate the relevant NEC for various parts of the site.

Trains using the Chiltern main railway line have the potential to generate noise and vibration in the context of the NW Bicester eco development site. The railway line is however approximately 800m from the proposed Exemplar Development Site and the vibration impacts have therefore not been considered further. The vibration measurement locations are indicated as VIB 1 and VIB 2 on Drawing 10-1. The Network Rail Sectional Appendix for this rail route indicated that rail speed limits were uniform across the site.

## 10.3.4 Assessment of Effects

### Traffic Noise Impacts

Traffic noise impacts have been predicted using the technical memorandum issued by the Department of Transport and Welsh Office Calculation of Road Traffic Noise (CRTN)<sup>6</sup>. CRTN was produced in 1975 and updated in 1988 and is still the standard method for calculating noise from a road in the UK. In the UK the standard index used for traffic noise is the  $L_{A10,18\text{-hour}}$  level, which is quoted in decibels dB(A).

CRTN calculates the  $L_{A10, 18\text{-hour}}$  using the following traffic composition:

- 18 hour annual average weekday traffic flow
- Percentage of heavy goods vehicles
- Average speed

To determine which road links will be affected within the study area traffic volumes on the existing roads which will increase by at least 25% or decrease by 20% when the project is completed were selected. This change in traffic volume is equivalent to a 1 dB(A) change in noise level, which is the minimum change that can be detected by the human ear in the short term. Calculations were undertaken at existing sensitive receptors within 600m of these affected routes as recommended in DMRB.

A noise model was created using acoustic modelling software known as "IMMI" which calculated the noise level in terms of dB  $L_{A10 18\text{ hour}}$  at each sensitive receptor at a default height of 1.5m. Noise levels were calculated for each of the receptors for the following scenarios;



- Without the Project in the opening year of the project (do-minimum)
- With the Project in the opening year of the project (do-something)
- Without the Project ten years after the opening year of the project (do-minimum)
- With the Project ten years after the opening year (do-something)

In accordance with DMRB simple assessment a comparison between the following scenarios was undertaken

- Do-minimum condition in the opening year against do-something condition in the opening assessment year.
- Do-minimum condition in the opening year against do-something condition in the future assessment year.

The above comparisons were made in order to evaluate the impact of the project in the short term and the long term.

The magnitude of noise impact from the project was be classified into levels of impact taken from DMRB as presented in Table 10-51 in order to assist with the interpretation of the project.

**Table 10-51 Magnitude of Noise Change and associated Impact**

Noise change, $L_{A10,18\text{hour}}$	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

Interim advice note 126/09<sup>5</sup> which was published by the Highways Agency in 2009 recommends that environmental receptor values are not used for road traffic noise assessments and that only magnitude is reported as currently the methodology has not been developed to assign a significance according to both the value of a resource and the magnitude of impact.

## Operational Plant

British Standard BS 4142:1997 is the standard used to determine the impacts of industrial noise upon residential units. The guidance provided within BS 4142 provides a method whereby the likelihood of complaints due to noise from industrial sources can be assessed.

The standard advises that the existing background noise levels outside noise sensitive premises are compared with the rating noise levels from any nearby industrial activities. The rating noise level should include corrections for any acoustic character to the noise that makes it more readily discernible to a listener (e.g. whines, crashes, bangs etc).

The background noise level ( $L_{A90}$ ) is the noise level that is exceeded for 90% of the monitoring period at the assessment location. For BS 4142 it is usual to measure the background noise level at the nearest noise sensitive receptor to the industrial noise source.

The specific noise level is the  $L_{Aeq}$  produced by the noise source under investigation, measured as close as possible to the source, over a given reference time interval.

The rating noise level is the specific noise level plus any adjustments for the acoustic characteristics of the noise as specified in clause 8.2 of BS4142.

An adjustment of +5dB is applied when the specific noise has a discrete distinguishable tone or distinct impulsive characteristic.

The greater the difference between rating level and background noise level, the greater the likelihood of complaints.

- A difference of around +10 dB or more indicates that complaints are likely.
- A difference of around + 5 dB is of marginal significance.

If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

## Construction Noise

Construction noise impacts have been assessed in accordance with BS 5228: 2009 (*Code of practice for noise and vibration control on open and construction sites*). BS 5228-1 gives recommendations for basic methods of noise control relating to construction and open sites. It applies to work activities and operations that generate significant noise levels. It also includes industry-specific guidance. BS 5228-2 deals with vibration control on construction and open sites. BS5228 also provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.

The assessment of construction noise requires a detailed phasing of activities associated with preparation of the site and construction, including the duration of each phase. A detailed inventory of plant and equipment to be used during site preparation and construction would need to be provided, including plant and equipment used for temporary and permanent haul roads. Construction traffic movements would also need to be provided as well as an indication of likely routes for construction traffic movements. In the absence of the above information, assumptions were made regarding the type of plant that would typically be used for construction of this nature. Based on these assumptions noise impacts with distance from source were predicted in accordance with BS 5228.

There are no legislative criteria for limiting noise levels from construction sites. Traditionally it was stipulated that noise levels between 07.00 and 19.00, outside the nearest window of the occupied room closest to the site boundary should not exceed 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise; and 75 dB(A) in urban areas near main roads in heavy industrial areas.

BS 5228: 2009, Annex E, sets out criteria for significance based upon noise change. The ABC method describes a threshold of significant effect at dwellings when the total noise level, rounded to the nearest decibel, exceeds a listed category value. If the total noise level (construction plus ambient pre-construction) exceeds the appropriate category value, then a significant effect is deemed to occur.

The 2 – 5 dB(A) change method regards construction noise as significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB  $L_{Aeq, Period}$  from construction noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.

Criteria for assessing construction noise impacts have also been set out in the 'Guidelines for Noise Impact Assessment' (IEMA/IOA 2002)<sup>7</sup>.

**Table 10-52 Criteria for the rating of noise impacts during construction**

Significance Criteria	Noise Level dB L <sub>Aeq</sub>
Substantial	Daytime noise levels at houses in excess of 75 dB L <sub>Aeq</sub> (12 hour) or cause statutory nuisance to occur
Moderate	Daytime noise levels at houses in the range between 65 to 75 dB L <sub>Aeq</sub> (12 hour)
Slight	Daytime noise levels at houses in the range between 55 to 65 dB L <sub>Aeq</sub> (12 hour)

The criteria to be used for determining the significance of construction noise impacts will be agreed in consultation with the local EHO for Cherwell District Council once the construction strategy is determined by the contractor.

## 10.4 Baseline Conditions

The assessment of whether the proposed site would be suitable for residual use was undertaken in accordance with Planning Policy Guidance Note 24 (PPG 24).

PPG 24 guides local authorities in England on the use of their planning powers to minimise the adverse impact of noise. It outlines the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities which generate noise.

An aerial overview of the site indicates that road traffic noise from the A4095 and B4100 would be the dominant noise source across the Exemplar Site. There are no dominant sources of industrial noise in close proximity to the site.

The noise survey was carried out between 13<sup>th</sup> and 15<sup>th</sup> October 2010 at monitoring locations shown on Drawing 10-1. The noise measurements are summarised in Table 10-53. During monitoring conditions were cloudy, with light winds at times. At no stage were wind speeds observed to have any influence on the noise measurements. All instruments were calibrated prior to measurement and again at the end of the survey period and zero drift was observed.

**Table 10-53 Noise Survey Measurements**

Date	Location	Period	L <sub>Amax</sub>	L <sub>Aeq,T</sub>	L <sub>A90</sub>	L <sub>A10</sub>
<b>24 Hour Measurements</b>						
13/10 to 14/10	LTN 1	Day 0700-2300	96.9	68.3	52.4	72.6
		Night (2300-0700)	86.6	61.6	39.0	64.9
13/10 to 14/10	LTN 2	Day 0700-2300	76.8	56.6	49.6	59.8
		Night (2300-0700)	67.8	51.6	44.7	54.7
13/10 to 14/10	LTN 3	Day 0700-2300	76.9	50.2	42.1	50.2
		Night (2300-0700)	76.8	46.6	38.3	45.8

Date	Location	Period	L <sub>Amax</sub>	L <sub>Aeq,T</sub>	L <sub>A90</sub>	L <sub>A10</sub>
13/10 to 14/10	LTN 4	Day 0700-2300	93.7	54.7	45.4	49.8
		Night (2300-0700)	90.7	60.9	40.4	46.2
13/10 to 14/10	LTN 5	Day 0700-2300	93.8	65.0	50.4	69.3
		Night (2300-0700)	80.4	56.2	36.6	59.4
13/10 to 14/10	LTN 6	Day 0700-2300	94.6	65.4	53.6	69.0
		Night (2300-0700)	83.8	57.7	47.9	59.4
<b>Short Term Measurements</b>						
13/10/10	STN 1	Day	90.1	84.2	81.5	86.0
14/10/10		Night	86.6	73.6	55.8	78.1
14/10/10	STN 2	Day	78.1	58.8	43.5	63.2
15/10/10		Night	83.0	51.5	36.6	42.6

The noise measurements in Table 10-53 reflect noise levels close to sources such as roads. To accurately represent the noise exposure category (NEC) as set out in PPG 24, the measurements have been corrected for distance to source and IMMI has been used to produce noise contours for the Exemplar Site.

The noise contours in Drawings 10-2 and 10-3 for daytime and night-time respectively indicate that majority of the site falls within NEC A (i.e. noise need not be considered as a determining factor in granting planning permission).

As an initial indication, the noise contours generated for the site have been compared against the criteria in BS 8233. BS 8233 describes a sound reduction of 10 to 15 dB for an open window. Assuming a worst case, with open windows in bedrooms during summer months, a sound reduction (R<sub>w</sub>) of 10dB is likely. At night, noise levels on the majority of the site would be below 45dB. Taking the 10dB reduction into consideration, an indoor noise level of less than 35 dB is likely. According to the criteria in BS 8233, a design range L<sub>Aeq,T</sub> of 35 dB would be regarded as Reasonable and 30 dB as Good.

The fact that the site falls predominantly within NEC A and that the majority of the site is within the design range of Reasonable to Good in BS 8233 indicates that noise will not be considered as a determining factor in granting planning permission.

High noise levels were recorded at short term noise monitoring location STN 1, along the M40 motorway. The noise contours generated in IMMI however indicate that motorway noise will not impact on the site due to distance from the motorway.

## 10.5 Design and Mitigation

### 10.5.1 Construction

Details regarding the construction methodologies are not currently available; therefore assumptions were made regarding typical plant that would be used for construction of this nature. Initial predictions indicate that the noise impact will be substantial adverse without mitigation at the receptors within 50 to 100m from source and moderate adverse for receptors beyond 300m. The following generic noise mitigation measures need to be implemented as appropriate for all works:

- Construction activities would be confined to times of the day when they are least likely to be disturbing.
- Careful selection of plant, construction methods and programming. Only plant conforming with relevant national or international standards, directives and recommendations on noise and vibration emissions would be used.
- Construction plant would be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings where these are located between the plant and the buildings.
- Static and semi-static plant/equipment (e.g. compressors and generators) would be fitted with suitable enclosures where practicable.
- Personnel would be instructed on best practice to reduce noise and vibration as part of their induction training and as required prior to specific work activities.
- When plant is not being used, it would be shut down and not left to idle.
- Vehicles would not wait or queue on the public highway or on the worksite with engines running.
- Methods of work and vehicular routes would be selected with regard to minimising noise and vibration impact.
- Where practicable, all audible warning systems and alarms would be designed to minimise noise. Broadband reverse alarms would be fitted to all vehicles.
- With the phasing of construction, it is possible that certain areas of the development may be occupied while construction is still underway in adjacent areas. Where possible, the occupancy of completed phases of construction would be planned in such a way that there is a buffer between occupied areas and areas where construction is being carried out.
- A noise monitoring programme would also be recommended to ensure that mitigation measures achieve the required results.
- Vibration impacts would be minimised by selecting the most appropriate construction method and plant to be used. Should activities like piling be required, using vibro-piling instead of hammer piling would reduce vibration impacts.

A Construction Environmental Management Plan (CEMP) would be developed to ensure that construction noise impacts are managed and that appropriate mitigation measures are implemented.

## 10.5.2 Operation

The traffic noise assessment has indicated that the increase in road traffic noise will not be significant, with the largest increases at certain receptors predicted to be 1 dB. At most receptor locations the increase in noise are predicted to be less than 1 dB. No mitigation measures are therefore required for road traffic noise.

Details regarding plant to be installed at the Energy Centre are not known but it is likely that plant such as fans, extractors, chiller units and air conditioning units will be installed at the commercial premises. At detailed design stage, further studies would be undertaken to agree noise limits for plant to be installed on site with the local EHO, and ensure that the design meets these limits. The key issue would be to achieve a level below the night-time background ( $L_{A90}$ ) noise level.

There are a number of generic methods that can be used to reduce plant noise on site, which would be utilised as appropriate to ensure that noise limits are met:

- Screening can be an effective method in reducing noise from plant mounted on buildings. Reflective products like concrete have been the traditional material for noise barrier walls and HVAC screens and enclosures. Absorptive materials present a much more effective abatement option. Reflective products like concrete or brick simply bounce sound waves in different directions, while absorptive materials can significantly reducing overall noise.
- Controlling the noise generated by an outdoor air conditioning unit can involve enclosing the unit within a frame and affixing outdoor sound blankets designed to prevent airborne noise from bleeding through. The frame may be constructed using a number of materials, including wood, steel or iron, as long as the structure is capable of supporting the heavyweight sound blankets that will be affixed to it.
- Since air conditioning units cannot be completely enclosed, sound reduction treatments will not result in a complete deadening of the noise. However, such partial enclosure treatments are extremely effective at preventing transmission of a majority of the noise produced by an air conditioning unit. Results will vary depending upon the extent of the enclosure, but such treatments can affect an average 10-12 dB reduction in noise transmission.
- Fan noise can be controlled through use of traditional techniques such as silencers and enclosures.
- Select the appropriate low-noise equipment. In addition to the rational design of the air conditioning system, the use of advanced low-noise equipment, design of air ducts and the flow rate of chilled water is also key to reducing air-conditioning system noise.
- Air conditioning units and ventilation systems can generate unacceptable noise within buildings if installed incorrectly. Air conditioning units can be fitted with damping spring to prevent structure borne noise. Soft connections and joints should be used for fan duct connection and water pipes.
- Air conditioning ducts should be located next to building spaces that are less sensitive such as staircases and storage areas. Duct work is like an open channel to transmit sound. Addition of a baffle box and/or plenum that is lined with absorbing material to both the trunk and return of the HVAC unit would serve to reduce noise levels

## 10.6 Assessment of Effects

### 10.6.1 Construction

As discussed previously, assumptions have been made regarding the plant and equipment to be used during each phase of construction. The assessment has also assumed a free-field for propagation of noise across hard ground, thereby presenting a worst-case.

The noise levels at the selected receptor locations have been predicted using the sound pressure levels for the plant as described in BS 5228: 2009 Part 1. The sound pressure levels in BS 5228 have been presented as a  $L_{Aeq}$  at 10m (Table 10-54). A high percentage on-time has been assumed so as to present a possible worst case.

**Table 10-54 List of construction plant and associated sound pressure level ( $L_{Aeq}$ ) in dB at 10m.**

Plant	BS5228 Table Reference	Percentage On Time	$L_p$ at 10m ( $L_{Aeq}$ dB)
Road Planer	Table C.5 No.7	70	82
Tracked Excavator	Table C.5 No. 18	70	80
Dozer	Table C.5 No. 12	60	77

Plant	BS5228 Table Reference	Percentage On Time	Lp at 10m (L <sub>Aeq</sub> dB)
Dumpers	Table C4 No. 9	60	77
Vibratory Roller (22t)	Table C5 No. 28	60	77
Asphalt Paver	Table C5 No. 33	60	75
Diesel Generator	Table C4 No. 84	100	74
Delivery Lorry	Table C.2 No.35	70	80
Tracked Mobile Crane	Table C4 No.52	60	75
Telescopic Handler	Table C4 No.54	75	79
Wheeled Loader	Table C2 No. 26	75	79
Tower Crane	Table C4 No.49	60	77
Concrete Saw	Table C4 No. 71	10	85
Compressor	Table C5 No.5	80	75
Excavator	Table C5 No.34	75	82
Roller Compactor	Table C.5 No.29	60	76
Water Pump	Table C.2 No.45	75	65
Concrete Pump & Concrete mixer truck discharging	Table C.4 No. 28	80	79
Poker Vibrator	Table C.4 No. 33	80	78
Percussion Drill	Table C4 No. 69	40	85
Circular Saw	Table C4 No.72	40	79
Angle Grinder	Table C4 No.93	40	80
Welder	Table C3 No.31	40	73

The construction noise impacts have been calculated using the following formula as described in BS5228:

$$K_h = 20 \times \log \frac{R}{r}$$

Where:

$K_h$  = the correction for propagation across hard ground

$R$  = the distance to the receptor location

$r$  = the distance of 10 m at which the SPL has been measured

A possible worst case has been presented by considering propagation across hard ground and by not considering screening afforded by topographical features, buildings or other structures. The predictions also assume that all the plant will run simultaneously, which is most unlikely. Once a detailed construction programme is available, the possible overlap of construction activities can be considered.



Construction will commence with mobilisation to site, involving delivery of plant and equipment and the preparation of site compounds. The noise impacts associated with this activity are shown in Table 10-55.

**Table 10-55 Predicted noise levels ( $L_{Aeq,1h}$ ) during mobilisation to site**

Plant	Number	Total SPL @ 10m	Total SPL @ 20m	Total SPL @ 50m	Total SPL @ 100m	Total SPL @ 200m	Total SPL @ 500m
Delivery Lorry	4	84.5	78.5	70.5	64.5	58.5	44.5
Tracked Mobile Crane	1	72.8	66.8	58.8	52.8	46.8	32.8
Telescopic Handler	1	77.8	71.7	63.8	57.8	51.7	37.8
Wheeled Loader	1	77.8	71.7	63.8	57.8	51.7	37.8
Dozer	1	78.8	72.7	64.8	58.8	52.7	38.8
Dumpers	2	77.8	71.8	63.8	57.8	51.8	37.8
Diesel Generator	1	74.0	60.0	60.0	54.0	48.0	26.0
<b>Total</b>		<b>87.6</b>	<b>73.6</b>	<b>73.6</b>	<b>67.6</b>	<b>61.6</b>	<b>39.7</b>

Site clearance would typically involve the use of earth moving equipment and dumpers. The associated noise impacts with distance from source are shown in Table 10-9.

**Table 10-9 Predicted noise levels ( $L_{Aeq,1h}$ ) during site clearance**

Plant	Quantity	Total SPL @ 10m	Total SPL @ 20m	Total SPL @ 50m	Total SPL @ 100m	Total SPL @ 200m	Total SPL @ 500m
Dumpers	2	78.5	72.4	64.5	58.5	52.4	38.5
Tracked Excavator	1	77.5	71.4	63.5	57.5	51.4	37.5
Lorry	1	78.5	72.4	64.5	58.5	52.4	38.5
Tower Crane	1	74.8	68.8	60.8	54.8	48.8	34.8
Dozer	1	74.8	68.8	60.8	54.8	48.8	34.8
Compressor	2	77.0	71.0	63.1	57.0	51.0	37.0
Diesel Generator	1	74.0	68.0	60.0	54.0	48.0	34.0
<b>Total</b>		<b>85.2</b>	<b>79.2</b>	<b>71.2</b>	<b>65.2</b>	<b>59.2</b>	<b>45.2</b>

A number of underground services will be installed on site, requiring excavation and trenching. The associated noise impacts with distance from source are indicated in Table 10-10.

**Table 10-10 Predicted noise levels ( $L_{Aeq,1h}$ ) during installation of underground services**

Plant	Quantity	Total SPL @ 10m	Total SPL @ 20m	Total SPL @ 50m	Total SPL @ 100m	Total SPL @ 200m	Total SPL @ 500m
Excavator	2	83.8	77.7	69.8	63.8	57.7	43.8
Telescopic Handler	1	77.8	71.7	63.8	57.8	51.7	37.8
Dozer	1	78.8	72.7	64.8	58.8	52.7	38.8
Dumpers	2	77.8	71.8	63.8	57.8	51.8	37.8
Delivery Lorry	2	81.5	75.4	67.5	61.5	55.4	41.5
Roller Compactor	1	73.8	67.8	59.8	53.8	47.8	33.8
Water Pump	2	66.8	60.7	52.8	46.8	40.7	26.8
Compressor	2	77.0	71.0	63.1	57.0	51.0	37.0
Generator	1	74.0	68.0	60.0	54.0	48.0	34.0
<b>Total</b>		<b>88.0</b>	<b>81.9</b>	<b>74.0</b>	<b>68.0</b>	<b>61.9</b>	<b>48.0</b>

Plant that would typically be used during construction of roads on the development site and the associated noise level with distance from source is shown in Table 10-11 **Error! Reference source not found..**

**Table 10-11 Predicted noise levels ( $L_{Aeq,1h}$ ) during road construction**

Plant	Number	Total SPL @ 10m	Total SPL @ 20m	Total SPL @ 50m	Total SPL @ 100m	Total SPL @ 200m	Total SPL @ 500m
Road Planer	1	80.5	74.4	66.5	60.5	54.4	40.5
Tracked Excavator	1	78.5	64.5	64.5	58.5	52.4	30.5
Dozer (Spreading fill)	1	74.8	60.8	60.8	54.8	48.8	26.8
Dumpers	2	77.8	63.8	63.8	57.8	51.8	29.8
Vibratory Roller (22t)	1	74.8	60.8	60.8	54.8	48.8	26.8
Asphalt Paver	1	72.8	58.8	58.8	52.8	46.8	24.8
Diesel Generator	1	74.0	60.0	60.0	54.0	48.0	26.0
<b>Total</b>		<b>85.4</b>	<b>71.4</b>	<b>71.4</b>	<b>65.4</b>	<b>59.4</b>	<b>37.4</b>

Noise impacts associated with the construction of buildings and other structures on site are shown in Table 10-.

**Table 10-12 Predicted noise levels ( $L_{Aeq,1h}$ ) during construction of buildings**

Plant	Quantity	Total SPL @ 10m	Total SPL @20m	Total SPL @ 50m	Total SPL @ 100m	Total SPL @ 200m	Total SPL @ 500m
Tracked Excavator	1	77.5	71.4	63.5	57.5	51.4	37.5
Diesel Generator	1	72.0	66.0	58.0	52.0	46.0	32.0
Dumpers	1	74.8	68.8	60.8	54.8	48.8	34.8
Telescopic Handler	1	77.8	71.7	63.8	57.8	51.7	37.8
Concrete Pump & Concrete mixer truck discharging	1	78.0	72.0	64.1	58.0	52.0	38.0
Poker Vibrator	2	80.0	74.0	66.1	60.0	54.0	40.0
Tower Crane	2	77.8	71.8	63.8	57.8	51.8	37.8
Compressor	2	77.0	71.0	63.1	57.0	51.0	37.0
<b>Total</b>		<b>86.4</b>	<b>80.4</b>	<b>72.4</b>	<b>66.4</b>	<b>60.4</b>	<b>46.4</b>

Construction activities produce significantly high noise levels, particularly close to source. Construction noise tends to fluctuate and is usually of fairly short duration. The construction noise impacts will depend on the proximity of construction activities to nearby receptor locations.

The construction noise impacts predicted above indicate that the highest impacts occur within 100m of the works, and these may be substantial adverse. The predicted noise levels are based on a possible worst case scenario. Propagation across hard ground has been assumed and no screening from topographical features or other structures has been assumed. At distances of above 200m the construction noise impacts can be expected to be moderate.

The most likely construction noise impacts are to be experienced at residential receptors at Greenacres, Caversfield and the Lodge on the B4100.

The construction noise impacts can however be largely mitigated through measures such as limiting work hours or using acoustic screening. Considering that construction noise impacts are temporary in nature, with mitigation measures in place no residual impacts are expected.

There is a potential for vibration to be generated during construction. This will depend on the construction method and the type of plant to be used. In the absence of a detailed construction programme predicting vibration impacts will be very difficult. Vibration impacts will also depend on proximity to receptor locations and on local conditions such as ground conditions.

Vibration impacts can be mitigated by selecting plant and equipment that will generate low levels of vibration. It will only be possible to predict vibration impacts once details of the plant to be used and the construction methods to be used have been finalised.

## 10.6.2 Operation

Operational traffic associated with the proposed Exemplar Development site has been assessed in accordance with DMRB, using traffic data for the Opening Year (2016) and the Design Year (2026). Traffic data has been supplied as an 18 hr AAWT on the Links indicated in Table 10-. Table 10-3 also indicates the percentage increase in traffic on the routes considered when comparing the do-minimum scenario 2016 (without the development) with the do-something Scenario 2016 (with the development) and the do-minimum scenario with the do-something scenario 2026.

**Table 10-56 Predicted increase in noise level comparing do-minimum 2016 and do-something 2016 traffic flows**

Road Link	2016 Do-Minimum		2016 Do-Something		% Increase
	Total	%HGVs	Total	%HGVs	
B4030	6889	8%	6895	8%	0%
Howe's Ln	7058	6%	8044	6%	12%
Bucknell Ln (south of A4095)	5417	6%	5645	6%	4%
Banbury Rd (south of A4095)	9787	4%	10374	4%	6%
Lords Lane	11645	5%	12987	5%	10%
B4100	13420	10%	15771	9%	15%
Road Link	2016 Do-Minimum		2026 Do-Something		% Increase
	Total	%HGVs	Total	%HGVs	
B4030	6889	8%	7571	8%	9%
Howe's Ln	7058	6%	8643	6%	18%
Bucknell Ln (south of A4095)	5417	6%	6155	6%	12%
Banbury Rd (south of A4095)	9787	4%	11280	4%	13%
Lords Lane	11645	5%	14002	5%	17%
B4100	13420	10%	17865	9%	20%

As can be seen from Table 10-3, the largest increase in traffic would be 20% on the B4100 when comparing the do-minimum 2016 with the do-something 2026. DMRB indicates that an increase of 25% would equate to a 1 dB change in noise level. Based on this, an assessment of traffic noise levels has been carried at selected receptors on the affected routes.

In Table 10-574 the increase in noise level with the development in 2016 (do-something 2016) as compared to without the development (do-minimum 2016) is shown. The noise levels are predicted as a  $L_{A10, 18hr}$ . Typically road traffic noise levels in the United Kingdom are expressed as an 18 hour noise level, reflecting the time period between 06.00 and 24.00,

**Table 10-574 Predicted increase in noise level comparing the do-minimum 2016 and the do-something 2016 traffic flows**

Receptor Location	Do-Minimum 2016	Do-Something 2016	Difference (Increase)
Greenacres	70.5	71.2	0.7
Lodge on B4100	72.9	73.6	0.7
Caversfield	68.1	68.8	0.7
55 Juniper Gardens	67.4	67.9	0.5
30 Southwold Ln	65.9	66.4	0.5
94 to 104 Mullein Rd	66.6	67.1	0.5
78 to 80 Mullein Rd	65.9	66.4	0.5
67 Germander Way	66.6	67.1	0.5
1 Germander Way	67.2	67.7	0.5
31 Saffron Close	66.4	66.9	0.5
1 Trefoil Drive	67.7	68.2	0.5
3A Couper Close	66.6	67.2	0.6
15 Derwent Rd	65.5	66.1	0.6
20 Wensum Crescent	68.6	69.2	0.6
78 Isis Avenue	67.4	68.0	0.6
98 Isis Avenue	64.5	64.5	0.0
25 Hambleside	63.1	63.1	0.0
63 Shannon	66.9	66.9	0.0
Himley Farm House	61.4	61.4	0.0
Lovelynych House	65.6	65.6	0.0
Linkslade	63.1	63.1	0.0
Hawkwell Farm	66.7	66.7	0.0
1 Lodge Close	66.7	67.1	0.4

The increase in noise level with the development is shown to be less than 1.0 dB in all cases. According to the criteria in DMRB, an increase of less than 1dB is regarded as Negligible.

The increase in noise level at selected receptor locations when comparing the do-minimum 2016 with the do-something 2026 is shown in Table 10-5.

**Table 10-5 Predicted increase in noise level at selected receptor locations when comparing the do-minimum 2016 with the do-something 2026**

Receptor Location	Do-Minimum 2016	Do-Something 2026	Difference
Greenacres	70.5	71.5	1.0
Lodge on B4100	72.9	73.8	0.9

Receptor Location	Do-Minimum 2016	Do-Something 2026	Difference
Caversfield	68.1	69.0	0.9
55 Juniper Gardens	67.4	68.2	0.8
30 Southwold Ln	65.9	66.7	0.8
94 to 104 Mullein Rd	66.6	67.4	0.8
78 to 80 Mullein Rd	65.9	66.7	0.8
67 Germander Way	66.6	67.4	0.8
1 Germander Way	67.2	68.0	0.8
31 Saffron Close	66.4	67.2	0.8
1 Trefoil Drive	67.7	68.5	0.9
3A Couper Close	66.6	67.5	0.9
15 Derwent Rd	65.5	66.4	0.9
20 Wensum Crescent	68.6	69.5	0.9
78 Isis Avenue	67.4	68.3	0.9
98 Isis Avenue	64.5	64.9	0.4
25 Hambleside	63.1	63.5	0.4
63 Shannon	66.9	67.3	0.4
Himley Farm House	61.4	61.8	0.4
Lovelynych House	65.6	66.0	0.4
Linkslade	63.1	63.5	0.4
Hawkwell Farm	66.7	67.2	0.5
1 Lodge Close	66.7	67.4	0.7

On the B4100 at Greenacres, the Lodge and Caversfield, an increase of 1dB is predicted. At all other receptor locations the increase in noise level will be less than 1 dB. In terms of the criteria set out in DMRB, an increase of 1 to 2.9 dB is regarded as Minor and an increase of less than 1dB is regarded as Negligible.

From Table 10-574 and Table 10-5 it can be seen that the increase on traffic on the local road network as a result of the Exemplar Site development will not result in a significant increase in traffic noise.

### 10.6.3 Cumulative Effects

This section considers the potential for cumulative noise effects from other consented developments in the area. The consented developments are detailed in Table 18.1 in Chapter 18 (Cumulative Effects Chapter).

There is potential for **minor adverse cumulative effects** associated with construction noise from the development of the NW Bicester eco development alongside the Exemplar should the phasing for their construction overlap.

At the operational phase, there is likely to be significant traffic generation as a result of the combined eco-developments, although there is no traffic data available as NW Bicester eco development is not currently a committed development. Due to the limited information available at this stage, it is anticipated that the key locations would potentially include A4100 Banbury Road, Bucknell Road and the corridor through Bicester town centre. This will however depend on the final Bicester eco development layout and the access routes to the site and the route options available. In these locations there may be potential for adverse cumulative traffic effects, therefore there is potential for **adverse cumulative effects** with regards to noise effects at some sensitive receptor locations. This would however only be established once a traffic assessment has been carried out for the Bicester eco development.

There are other committed developments in the immediate vicinity of the Exemplar Site, but it is unlikely that cumulative construction noise impacts would be of concern. There may be cumulative effects to the ambient noise climate during construction, which is the combined effect of construction vehicles on the local road network and the operation of machinery. Cumulative operational noise impacts have been included in the noise assessment for the Exemplar, as the traffic data growth factors incorporate predicted traffic generated by other developments outlined in Table 18-1. No likely **cumulative effects** are anticipated as a result of these other developments.

## 10.7 Summary

The noise and vibration assessment was carried out to identify and assess the suitability of the ambient noise and vibration levels across the proposed development for residential use and also assess the impact upon road traffic noise levels and the effects of construction noise at existing receptors within the local area.

The noise and vibration assessment considers the suitability of the site for residential development in line with Policy Planning Guidance 24 (PPG 24). The noise assessment also considers both construction and operational noise impacts associated with the proposed development.

A baseline noise survey serves as a basis for the assessment of the suitability of the site for development and for assessing construction and operational noise impacts. The noise baseline noise measurements indicate that the majority of the site falls within NEC A, which means that noise need not be considered as a determining factor in granting planning permission.

The construction impacts were assessed in accordance with the provisions in BS 5228: 2009. Assumptions have been made regarding the construction plant that would typically be used for developments of this nature. The construction noise impacts will depend on proximity of the construction works to receptors, the nature or intensity of the construction, the type of plant being used and the time of day. Construction noise impacts are generally of fairly short duration and can be mitigated against.

The operational impacts will arise from increased road traffic and from fixed plant and similar installations to be constructed on site. Operational traffic was assessed using the provisions in the Design Manual for Roads and Bridges (DMRB) Volume 11, Part 7, Section 3 – Noise and Vibration. Operational traffic noise impacts have been shown to be negligible when assessed against the criteria in DMRB and no mitigation measures will be required for road traffic noise.

Noise from operational plant was assessed according to the provisions in BS 4142: 1997 'Method for rating of industrial noise affecting mixed residential and industrial areas' (BS4142).



Once details of the operational plant to be installed on site are confirmed, a more detailed assessment can be carried out in accordance with BS 4142. Operational noise limits will need to be agreed with the local EHO.

# 11 Built Heritage and Archaeology

## 11.1 Introduction

The objective of this chapter is to identify and assess the likely significant effects of the proposed Exemplar development at NW Bicester Eco Development on the archaeological, built heritage and historic landscape resource, collectively referred to as cultural heritage assets.

Cultural heritage assets are defined by Planning Policy Statement 5 as “A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage Assets are the valued components of the historic environment they include Designated Heritage Assets (as defined in this PPS) and assets identified by the Local Planning Authority during the process of decision-making or through the plan-making process (including local listing).” World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, registered parks and gardens, registered battlefields and conservation areas are all designated assets. The cultural heritage resource considered in this assessment comprises the totality of archaeological remains, historic buildings and historic landscapes.

Archaeological remains are the materials created or modified by past human activities that contribute to the study and understanding of past human societies and behaviour – archaeology. Archaeology can include the study of a wide range of artefacts, field monuments, structures and landscape features, both visible and buried.

Historic buildings are architectural or designed or other structures with a significant historical value. These may include structures that have no aesthetic appeal.

Historic Landscape is defined by the European Landscape Convention defines landscape as “an area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.” This chapter firstly describes the regulatory framework that the assessment will be produced within, it then details the methodologies used to assess the potential significant effects of the development during the construction and operation phases. Details of consultations undertaken are also provided. Baseline conditions are then explained. Design, mitigation and enhancement measures are then described, followed by an assessment of significant residual effects. A summary of the assessment is then provided, together with relevant conclusions. A list of references, appendices, abbreviations and a glossary completes the chapter.

There is potential for considerable overlap with other chapters within this Environmental Statement and reference to the appropriate chapter is made where required. In this respect, information on landscape and visual impacts is provided in Chapter 6.

## 11.2 Regulatory Framework

This assessment has been undertaken in accordance with current legislation, national, regional and local plans and policies. Outlined below are those elements of current legislation, policy and guidance relevant to archaeology in the context of the proposed Exemplar Site development. A summary of the relevant legislation and policies, the requirements of these policies and Eco Development response is provided in Table 11-58 below.

**Table 11-58 Summary of Relevant Legislation and Policies**

<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Bicester Ecotown Exemplar Site Response</b>
Ancient Monuments and Archaeological Areas Act 1979	The Ancient Monuments and Archaeological Areas Act 1979 gives statutory protection to any structure building or work which is considered to be of particular historic or archaeological interest and regulates any activities which may affect such areas. Under the Act any work that is carried out on a Scheduled Ancient Monument must first obtain Scheduled Monument consent.	The nearest Scheduled Ancient Monuments to the site are at RAF Bicester and are not anticipated to experience significant impacts. Scheduled Monument Consent will not be required for any element of the Ecotown development
Planning Policy Statement 5: Planning for the Historic Environment	<p>PPS5 sets out the Government's planning policies on the conservation of the historic environment. The policies in PPS5 are a material consideration which must be taken into account in development management decisions, where relevant.</p> <p>Policy HE6: <i>'Information requirements for applications for consent affecting heritage assets'</i> deals with the requirement for applicants to provide descriptions of the significance of any heritage assets that may be affected by a proposal, along with a description of the contribution of the setting of the heritage asset to that significance. Where a proposal includes, or is considered to have the potential to include, heritage assets with archaeological interest the LPA should require developers to submit an appropriate desk-based assessment and where desk-based research is insufficient to properly assess the interest, a field evaluation (para HE6.1). The policy also states that LPAs should not validate applications where the extent of the impact of the proposal on the significance of the heritage assets affects cannot adequately be understood from the application and supporting documents (para HE6.3).</p> <p>Policy HE7: <i>'Policy principals guiding the determination of applications for consent relating to all heritage assets'</i> deals with the factors LPAs must take</p>	The Cultural Heritage assessment will be produced in accordance with PPS5. In order to comply with policy HE6 it is likely that an archaeological field evaluation will need to be carried out at the site prior to the completion of the EIA in order to fully determine the potential of the site.

Policy/Legislation	Requirements	Bicester Ecotown Exemplar Site Response
	<p>into account when considering applications for developments. It stresses the need to consider the significance of the heritage assets that may be affected and its value for future generations. The policy states that this understanding should be used by the LPA to avoid or minimise conflict between the heritage assets conservation and any aspect of the proposals (para HE7.3).</p> <p>Policies HE8 and HE9 deal with the additional policy principals guiding the consideration of applications for consent relating to heritage assets. The policies state that the effects of a development proposal are a material consideration in determining planning applications. The policies indicate that there is a general presumption that any previously unidentified heritage assets will be identified during the pre-application stage (para HE8.1). The policies also state that there should be a presumption in favour of the conservation of designated heritage assets and the more significant the heritage asset is, the greater the presumption in favour of its conservation should be (para HE9.1). The policy explains that significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting (para HE9.1). Where a proposal has a harmful impact on the significance of a designated asset which is less than substantial harm, the policy directs the LPA to consider the public benefit of the proposal (para HE9.4).</p> <p>Policy HE10: <i>'Additional policy principles guiding the consideration of applications for development affecting the setting of a designated heritage asset'</i> states that when considering applications for development that affect the setting of a heritage asset, LPAs should treat favourably applications that preserve those elements of the setting that make a</p>	

Policy/Legislation	Requirements	Bicester Ecotown Exemplar Site Response
	<p>positive contribution to or better reveal the significance of the asset (para HE10.1). LPAs are also directed by the policy to identify opportunities for changes in the setting to enhance or better reveal the significance of a heritage asset and that these opportunities should be seen as a public benefit (para HE10.2).</p> <p>Policy HE12: <i>'Policy principles guiding the recording of information relating to heritage assets'</i> recognises that a documentary record of a heritage asset is not as valuable as the retaining the heritage asset. However it does state that where the loss of the whole or a material part of a heritage assets significance is justified, LPAs should require developers to record and advance understanding of the heritage asset before it is lost using planning conditions or obligations as appropriate (para HE12.3).</p> <p>Developers are required by the policy to publish the information gained and deposit copies of the report with the relevant Historic Environment Record (HER). The policy also requires that an archive is generated and deposited with an appropriate depository (para HE 12.3).</p>	
Planning Policy Statement: Eco-towns	<p>The PPS sets out a range of Ecotown targets. ET15 deals with landscape and historic environment. It states:</p> <p>"Planning applications for eco-towns should demonstrate that they have adequately considered the implications for the local landscape and historic environment. This evidence, in particular that gained from landscape character assessments and historic landscape characterisation should be used to ensure that development complements and enhances the existing landscape character. Furthermore, evidence contained in relevant Historic Environment Records, should be used to assess the extent, significance and condition of known heritage assets (and the</p>	<p>The ES chapter will have a section which considers the effect of the development on the historic environment and will make recommendations to lesson that impact. Aside from a small Pilot study in 1993 there is no Historic Landscape Characterisation for Oxfordshire therefore the assessment will concentrate on other sources such as the Oxfordshire HER and cartographic sources.</p>

Policy/Legislation	Requirements	Bicester Ecotown Exemplar Site Response
	potential for the discovery of unknown heritage assets) and the contribution that they may make to the eco-town and surrounding area. Eco-town proposals should set out measures to conserve and, where appropriate, enhance heritage both assets and their settings through the proposed development.”	
South East Plan	<p>The South East Plan was published in May 2009 and sets out a vision for the future of the South East region to 2026. It covers the areas of Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex. The South East Plan is a full revision of Regional Planning Guidance 9 (RPG9 - the current Regional Spatial Strategy for the South East) to cover the period to 2026. It is not considered a minor amendment of RPG9.</p> <p>Section D8 of the Plan deals with management of the built and historic environment. Within this section Policy BE7: Management of the Historic Environment states:</p> <p>“In developing and implementing plans and strategies, local authorities and other bodies should adopt policies and proposals which support the conservation and, where appropriate, the enhancement of the historic environment and the contribution it makes to local and regional distinctiveness and sense of place. Proposals that make sensitive use of historic assets through regeneration, particularly where these bring redundant or under-used buildings and areas into appropriate use, should be encouraged.”</p>	The assessment will make recommendations on how the Ecotown can conserve and enhance the historic environment through sensitive development, preserving key sightlines and sympathetic design of key structures within the development.
Cherwell Local Plan	The Cherwell Local Plan was adopted in 1996 and is due to be replaced by the Local Development Framework which will establish planning policy for the district up to 2026. In the meantime existing planning policy	The assessment will consider all heritage assets and their settings which are located within the Study Area and consider all appropriate protection, enhancement and conservation measures. There are no

Policy/Legislation	Requirements	Bicester Ecotown Exemplar Site Response
	<p>for the district is contained in the saved policies of the Cherwell Local Plan, adopted 1996. These are the policies used when making planning decisions.</p> <p>Of the Saved policies the only one which may apply to the development is policy C25 which states:</p> <p>"In considering proposals for development which would affect the site or setting of a Scheduled Ancient Monument, other nationally important archaeological sites and monuments of special local importance, the council will have regard to the desirability of maintaining overall historic character, including its protection, enhancement and preservation where appropriate."</p> <p>The Plan goes on to say that it must be acknowledged that the character and setting of an archaeological site or monument which may include historic landscapes, parks and gardens may be damaged or even destroyed by certain forms of development. In such cases policy C25 will apply.</p>	Scheduled Ancient Monuments or nationally important remains within the study area.

## 11.3 Methodology

### 11.3.1 Introduction

The approach this study took was to assess the archaeological, built heritage and historic landscape resource within the proposed Exemplar Site development and the surrounding study area through the collation of existing written, cartographic and electronic information in order to identify the likely character, extent, quality and significance of the known or potential heritage resource. This chapter incorporates the findings of the desk-based assessment, a walkover survey, the field evaluation and an analysis of aerial photographs.



The specific aims of the assessment were:

- To assess the potential for the survival of buried archaeological remains within the study area, the significance of such remains and the likely impact of the development
- To assess the impact that former intrusive activities have had on the archaeological remains
- To assess the significance of the built heritage and the potential impact of the development on it
- To assess the significance of the historic landscape resource within the study area.

The study was undertaken in accordance with the '*Code of Conduct*<sup>2</sup> and '*Standards and Guidance for Archaeological Desk-based Assessments*<sup>3</sup> of the Institute for Archaeologists (IfA 2008a; IfA 2008b). The field evaluation was undertaken in accordance with the IfA's *Standards and Guidance for Field Evaluation* (IfA 2008).

### 11.3.2 Study Area

The study area was defined by a 500m radius from the site boundary (Drawing 11-1) as set out in the scoping report (Appendix 1A). For the Historic Landscape assessment a wider study area influenced by the zone of visual influence was used where appropriate.

### 11.3.3 Establishment of Baseline Conditions

The baseline conditions described below have been established through a search of the Oxfordshire Historic Environment Record (HER) and the National Monuments Record (NMR) for archaeological assets within the study area. Records of Listed Buildings within the study area were also obtained from the NMR. A selection of historic maps was also obtained from the Oxfordshire record office and Landmark Information Group. These included the 1853 Caversfield Tithe map and Ordnance Survey editions. Online sources were also consulted. The research was carried out in July 2010.

A site walkover survey has been carried out for the proposed Exemplar Site development to assess the current ground condition and archaeological potential of the site. The walkover was undertaken on the 23<sup>rd</sup> July 2010.

An analysis of aerial photographs has been undertaken in order to identify areas of archaeological potential. In order to fully determine the archaeological potential of the site archaeological evaluation was also undertaken in September 2010.

The baseline conditions will be based on a combination of the data gathering exercise, cartographic analysis, aerial photograph analysis and the field evaluation.

### 11.3.4 Consultation

The Planning Archaeologist for Oxfordshire Richard Oram and the Conservation Officer at Cherwell District Council Claire Sutton were consulted during the preparation of this document. The Planning Archaeologist for Oxfordshire was also consulted during the archaeological field evaluation carried out at the site.

### 11.3.5 Assessment of Effects

In the absence of any set guidelines the methodology used to assess the significance of the assets is based on the criteria set out in DMRB Volume 11, Section 3, Part 2 (Highways Agency

et al, 2007)<sup>1</sup>. In assessing the impacts of the proposals upon cultural heritage assets, it is necessary to consider the value of the resources, as well as the magnitude of impact. Professional judgement and a degree of flexibility are often required. In carrying out the assessment of effects in accordance with the criteria set out in DMRB the following tables will be used.

## Estimation of Value

Assessments of value considered how far the asset(s) contributes to an understanding of the past, through their individual or group qualities, either directly or potentially. These are professional judgements, but they were guided by legislation, national policies, acknowledged standards, designations, criteria and priorities. Table 11.2 presents the scale of values that was assigned to archaeological remains.

**Table 11-59 Scale of values that were assigned to Archaeological Remains**

Value	Example
Very High	<ul style="list-style-type: none"> <li>World Heritage Sites (including nominated sites)</li> <li>Assets of acknowledged international importance</li> <li>Assets that can contribute significantly to acknowledged international research objectives</li> </ul>
High	<ul style="list-style-type: none"> <li>Scheduled Monuments (including proposed sites)</li> <li>Undesignated assets of Schedulable quality and importance</li> <li>Assets that can contribute significantly to acknowledged national research objectives</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Designated or undesignated assets that contribute to regional research objectives</li> </ul>
Low	<ul style="list-style-type: none"> <li>Designated and undesignated assets of local importance</li> <li>Assets compromised by poor preservation and/or poor survival of contextual associations</li> <li>Assets of limited value, but with potential to contribute to local research objectives</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>Assets with very little or no surviving archaeological interest</li> </ul>
Unknown	<ul style="list-style-type: none"> <li>The importance of the resource has not been ascertained</li> </ul>

**Table 11-60 Scale of values that were assigned to historic buildings.**

Value	Example
Very High	<ul style="list-style-type: none"> <li>Structures inscribed as of universal importance as World Heritage Sites</li> <li>Other buildings of recognised international importance</li> </ul>
High	<ul style="list-style-type: none"> <li>Scheduled Monuments with standing remains</li> <li>Grade I and Grade II* Listed Buildings</li> <li>Other Listed Buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade</li> <li>Conservation Areas containing very important buildings</li> <li>Undesignated structures of clear national importance</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Grade II Listed Buildings</li> <li>Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations</li> </ul>

Value	Example
	<ul style="list-style-type: none"> <li>Conservation Areas containing buildings that contribute significantly to its historic character</li> <li>Historic townscape or built up areas with important historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)</li> </ul>
Low	<ul style="list-style-type: none"> <li>'Locally Listed' buildings</li> <li>Historic (unlisted) buildings of modest quality in their fabric or historical association</li> <li>Historic townscape or built up areas of limited historic integrity in their buildings or built settings (e.g. including street furniture and other structures)</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>Buildings of no architectural or historical note; buildings of intrusive character</li> </ul>
Unknown	<ul style="list-style-type: none"> <li>Buildings with some hidden (i.e. inaccessible) potential for historic significance</li> </ul>

**Table 11-61 Scale of values that were assigned to historic landscapes.**

Value	Example
Very High	<ul style="list-style-type: none"> <li>World Heritage Sites inscribed for their historic landscape qualities</li> <li>Historic landscapes of international value, whether designated or not</li> <li>Extremely well preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s)</li> </ul>
High	<ul style="list-style-type: none"> <li>Designated historic landscapes of outstanding interest</li> <li>Registered battlefieldsRegistered parks and gardens</li> <li>Undesignated landscapes of outstanding interest</li> <li>Undesignated landscapes of high quality and importance, and of demonstrable national value</li> <li>Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s)</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Designated special historic landscapes</li> <li>Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value</li> <li>Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical factor(s)</li> </ul>
Low	<ul style="list-style-type: none"> <li>Robust undesignated historic landscapes</li> <li>Historic landscapes with importance to local interest groups</li> <li>Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>Landscapes with little or no significant historical interest</li> </ul>

## Magnitude of Impact

The determination of magnitude of impact was based on the vulnerability of the study area, its current state of survival/condition and the nature of the impact upon it. The survival and extent of archaeological deposits is often uncertain and consequently, the magnitude of change can be difficult to predict with any certainty.

**Table 11-62 Magnitude of impact criteria related to archaeological remains**

<b>Magnitude of Impact</b>	<b>Example</b>
Major	Change to most or all key archaeological materials, such that the resource is totally altered Comprehensive changes to setting
Moderate	Changes to many key archaeological materials, such that the resource is clearly modified Considerable changes to setting that affect the character of the asset
Minor	Changes to key archaeological materials, such that the asset is slightly altered Slight change to setting
Negligible	Very minor changes to archaeological materials, or setting
No Change	No change

**Table 11-63 Magnitude of impact criteria related to historic buildings**

<b>Magnitude of Impact</b>	<b>Example</b>
Major	Change to key historic building elements, such that the resource is totally altered Comprehensive changes to the setting
Moderate	Change to many key historic building elements, such that the resource is significantly modified Changes to the setting of an historic building, such that it is significantly modified
Minor	Change to key historic building elements, such that the asset is slightly different Change to setting of an historic building, such that it is noticeably changed
Negligible	Slight changes to historic building elements or setting that hardly affect it
No Change	No change to fabric or setting

**Table 11-64 Magnitude of impact criteria related to historic landscapes**

<b>Magnitude of Impact</b>	<b>Example</b>
Major	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit.
Moderate	Changes to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, noticeable differences in noise or sound quality, considerable changes to use or access; resulting in moderate changes to historic landscape character.
Minor	Changes to few key historic landscape elements, parcels or components, slight visual changes to few key aspects of historic landscape, limited changes to noise levels or sound quality; slight changes to use or access: resulting in limited changes to historic landscape character.

Magnitude of Impact	Example
Negligible	Very minor changes to key historic landscape elements, parcels or components, virtually unchanged visual effects, very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to historic landscape character.
No Change	No change to elements, parcels or components; no visual or audible changes; no changes arising from in amenity or community factors.

## Significance of Effects

Table 11-65 illustrates how information on the value of the asset and the magnitude of impact was combined to arrive at an assessment of the significance of effect. The matrix is not intended to 'mechanise' judgement of the significance of effect but to act as a check to ensure that judgements regarding value, magnitude of impact and significance of effect are reasonable and balanced. Where a combination of significance descriptors allowed for a choice of significance of effects professional judgement was applied on case by case basis in order to determine which is the most appropriate significance of effects.

**Table 11-65 Criteria for Determining the Significance of Effect on Archaeology, Built Heritage and Historic Landscape**

		Magnitude of Impact				
		No Change	Negligible	Minor	Moderate	Major
Value	Very High	Neutral	Slight	Moderate/Large	Large or Very Large	Very Large
	High	Neutral	Slight	Moderate/Slight	Moderate/Large	Large/Very Large
	Medium	Neutral	Neutral/Slight	Slight	Moderate	Moderate/Large
	Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/Moderate
	Negligible	Neutral	Neutral	Neutral/Slight	Neutral/Slight	Slight

## 11.4 Baseline Conditions

### 11.4.1 Archaeology

An archaeological and historical Desk-based assessment has been produced as part of this assessment (Appendix 11A) which contains a full baseline detailing the known archaeological resource within the proposed Exemplar Site development and the surrounding study area. The desk-based assessment concluded that the archaeological potential of the Proposed Exemplar Site development based on the known resource was **negligible**. For a detailed assessment of how this conclusion was reached please refer to Appendix 11A.

Following on from the Desk-based assessment and consultations with the Planning Archaeologist for Oxfordshire two further archaeological investigation were carried out at the proposed Exemplar Site development. These further investigations were an aerial photograph analysis (Appendix 11B) and an archaeological field evaluation (Appendix 11C).

Interpretation of aerial photograph data was undertaken in order to further define the potential for the proposed development to impact upon potential cultural heritage assets. The object of

the aerial photograph interpretation was to provide information on the location and nature of any archaeological features or areas of archaeological potential visible on existing aerial photographs within the proposed Exemplar Site development or the surrounding study area. The work was carried out by Air Photo Services. The full report of the aerial photograph interpretation can be found in Appendix 11B.

Evidence for fragmentary ditches and possible ditched enclosures was observed in the aerial photograph analysis. These features are located in the central and one of the northern fields of the proposed Exemplar Site development (Figure 11-2). These features are heavily masked by natural geological features and show as marks in crops on vertical aerial photographs. Immediately to the south of the proposed Exemplar Site development, outside of the site boundary, is a buried ditched sub rectangular enclosure. These features are all eroded and buried and are visible only via marks in crops where the plants grow more vigorously over the buried ditches in times of drought (Cox, 2010).

Also outside of the proposed Exemplar Site development boundary is a sub-rectangular area of deeper soil which may be a place where local quarrying has been undertaken for stone extraction, then filled in when worked out. The majority of the proposed Exemplar Site development contains no further visible archaeological features (Cox 2010).

Following on from the aerial photograph analysis a programme of archaeological field evaluation was carried out at the proposed Exemplar Site development in September 2010. A total of 70 trenches measuring 50m x 2m were excavated across the site, representing a 4% sample of the total area. The aim of the evaluation was to establish the presence/absence, extent, character, quality and date of any archaeological remains present. A full report including figures of the evaluation has been produced and is included in Appendix 11C (Dean 2010).

Six of the seventy trenches contained features worthy of further investigation. These were trenches 1 and 30, located in the two northern most fields of the Proposed Exemplar Site development and trenches 47, 52, 53 and 54 located in the two southern-most fields. Each of the trenches contained one feature which required investigation. Five of the features were linear in nature and the other was most likely a natural hollow. All of the linear features appeared to be of no archaeological significance and could have been the result of natural activity such as water runoff or geological formation. However the location of two of the features in a relatively flat area of the site means that it cannot be ruled out that it is possible that they may be the result of human activity, rather than natural processes (Dean 2010). The evaluation also demonstrated that the features identified during the aerial photograph analysis were not archaeological in nature.

The only artefacts recovered from the investigations were two fragments of animal bone from the linear feature in trench 52. These fragments were recovered from the top of the fill of the feature and are likely to be intrusive resulting from ploughing activity (Dean 2010).

The results of the evaluation suggest that there is very little potential for archaeological activity within the proposed Exemplar Site development. No evidence was recovered to link the features found during the evaluation to any other known archaeological activity within the study area such as the field systems and enclosures to the south west or the Deserted Medieval Village to the north east which were recorded in the Desk-based assessment. This suggests that activity within the proposed Exemplar Site development was limited to agrarian practices and did not result in partitioning the land. The nature of the geology in the area also indicates that there would have been no need for any drainage construction either.

## 11.4.2 Built Heritage

The following section sets out the built heritage baseline conditions for the study area. It identifies designated and undesignated buildings and structures within the study area and provides an assessment of them.

### Listed Buildings

There are two Listed Buildings within the study area (Drawing 11-1). One is Grade II\* listed and the other is Grade II listed.

#### **St Lawrence's Church (Grade II\* listed) (BH1)**

St Lawrence's Church is located in the grounds of Caversfield House and has a Norman nave with later aisles, an Early English chancel with a north chapel and a gabled west tower. The earliest part of St Lawrence's Church is the Anglo-Saxon tower which is built of courses rag-stone with dressed quoins. In the north and south faces of the tower are round-headed double-splayed windows of late Saxon date. The upper portion of the tower is modern. The rest of the church dates to the 10<sup>th</sup>, 11<sup>th</sup>, late 12<sup>th</sup> and 13<sup>th</sup> centuries and was restored and partially rebuilt in 1874 by Henry Woodyer. The church is located within well-defined grounds surrounded by mature planting. The tower of the church is visible from certain key vantage points in the surrounding area. The setting of St Lawrence's Church is defined by its immediate environs and is characterised by its relationship with Caversfield House. The only point where the tower is visible from the exemplar is along the sightline stretching from the church to the south west corner of the site. This asset is considered to be of **high** value.

#### **Home Farmhouse (Grade II listed) (BH4)**

Home Farmhouse is located in a rural setting, but close to the urban development of Bicester. It is adjacent to the B4100. The farmhouse dates to the early/mid 17<sup>th</sup> century and was extended in the 18<sup>th</sup> or 19<sup>th</sup> century. The farmhouse is two storeys constructed of coursed squared limestone with ashlar dressings. It has an old plain-tiled roof with rebuilt brick gable stacks. This asset is considered to be of **medium** value. The farmhouse is surrounded by a number of non-listed buildings which make up the farm complex and are now used for a variety of functions including office space and light industry. These assets are considered to be of **low** value.

The setting of the farmhouse is defined by its function as a working farmhouse within a mainly rural location, however the setting of the farmhouse is significantly characterised by its proximity to the urban development of Bicester. The Farmhouse is partially screened from the proposed Exemplar Site development by the high hedges which form the field boundaries on the south eastern boundary of the site.

### Non-listed buildings

There is one other non listed building of historical interest within the study area. It is recorded on the NMR.

#### **Caversfield House (BH6)**

Caversfield House was built in 1842 by CR Cockerall on the site of a former manor house. The House is located adjacent to the B4100 within a secluded area of mature planting and separated from the road by a wall. There is a large fish pond to the south of the house which separates it from the area to the south. The setting of the house is defined by its immediate environs and its relationship with St Lawrence's Church. There are no apparent views between



the house and the proposed Exemplar Site development. This asset is considered to be of **low** value.

### 11.4.3 Historic Landscape

There has been no Historic Landscape Characterisation produced for Oxfordshire therefore this assessment of the historic landscape within the study area is based on an analysis of cartographic sources and available documentary sources.

The 1853 tithe map shows the proposed Exemplar Site development as open fields under either arable or grassland with a small coppice in the south west corner. The field boundaries are the same as the modern boundaries. There are some fieldnames recorded on the tithe award which indicate former activity within the site. For example the field to the north east of the area of woodland is named The Limekiln Ground which may indicate there once was a limekiln in the vicinity. The small narrow field to the east of the woodland is named Stone Pit Pieces which could suggest quarrying activity in the area.

The 1881 1:2,500 scale Ordnance Survey (OS) map shows there has been no change from the tithe map.

The 1885 1:10,560 scale OS map shows the proposed Exemplar Site development as open fields set in a rural landscape and displays no real changes from the tithe map. Home farm is marked as is St Lawrence's Church and Caversfield House, both of which are surrounded by woodland. The B4100 which forms the eastern boundary of the proposed Exemplar Site development is marked.

The 1899 1:2,500 scale OS maps shows evidence of water management along the stream next to Home Farm with a sluice marked close to the farm buildings.

The 1900 1:10,560 scale OS map shows little change. The site is still open fields although the area of woodland is now shown as being much less dense. The U shaped area of water to the south of Caversfield House is marked on this map as a fish pond. An old quarry is also marked just to the south of the fish pond.

The 1022 1:2,500 scales OS map and the 1923 1:10,560 scale OS map shows the site remained relatively unchanged; however a filter bed is now marked to the north of Home Farm, just outside the site boundary. Further afield the expansion of Bicester is now visible with housing plots marked along the roads to the south of the site.

There is no change on the 1938-1952 1:10,560 scale OS map, the 1955 1:10,000 scale OS map or the 1968 – 1976 1:2,500 scale OS map. By the time of the 1970 1:10,000 scale OS map the development of Bicester has spread up along Srimmingdish Lane to the Old Vicarage south of Home Farm.

The 1999 1:10,000 scale OS map shows the proposed Exemplar Site development in its modern state and also demonstrates how Bicester has by this time expanded almost up to Caversfield House. There is no change up to the 2010 1:10,000 scale OS map.

The cartographic sequence for the proposed Exemplar Site development indicated that it is an enclosed landscape of arable and pasture land with some small scale industry in the form of quarrying. There is also evidence for earlier landscape features in the area with the A421 following the route of the Roman Akeman Street. The nearest settlement to the proposed Exemplar Site development is Caversfield to the east which is likely to have originated as a nucleated settlement as indicated by the presence of the Anglo-Saxon church and the Deserted Medieval Village to the east. After the abandonment of the village to the east of the site

Caversfield developed into a more dispersed settlement with comprising a church and manor house serving number of scattered farmsteads with the church possibly also serving the northern areas of Bicester as it expanded. The change in the nature of the settlement of Caversfield reflects what was happening across the Cherwell District around the same time with economic and social change leading to widespread desertion and contraction of late medieval villages. The south of the Cherwell district was particularly affected in this way with a third of villages disappearing and a further third exhibiting sign of shrinkage (Cherwell District Landscape Assessment, 1995).

The Cherwell and District Landscape Assessment (1995) places the landscape around the Proposed Exemplar Site development within the Oxfordshire Estate Farmlands character area. This area runs from Bletchington in the south, around the north of Bicester and up to the county boundary with Northamptonshire and is characterised by a rolling landform and a pattern of woodland and mixed farmland. Much of the landscape in this character area is associated with estates linked to the extensive areas of remaining 18<sup>th</sup> century parkland and this is one of the special features of the character area. However there is no real evidence for parkland in the landscape around the Proposed Exemplar Site development where the local landscape has a much more agricultural quality. The Landscape Assessment characterises the local landscape around the Proposed Exemplar Site development as a rolling arable landscape with strong field patterns, copses and trees. The patchwork of arable and pasture is given definition by well maintained hedges.

The Landscape Assessment draws out some of the key landscape elements of the area surrounding the Proposed Exemplar Site development but does not designate it as an area of high landscape value. As with other parts of Cherwell the area to the north of Bicester has been considerably affected by military development. Military airfields such as RAF Bicester are dominant features in the landscape when they occur.

Other key features in the landscape of the Cherwell district are the small settlements. Many of these date to the Early Medieval and Medieval periods and a significant number of these settlements experienced abandonment or shrinkage as a result of social and economic change in the post-medieval period. Of the two closest villages to the Proposed Exemplar Site development, Caversfield has a church which dates to the Anglo Saxon Period and Bucknall is likely to have medieval or earlier origins. Both the villages experienced shrinkage in the post-medieval period with little remaining of Caversfield except for the church and the manor house. The predominant architecture in both Caversfield and Bucknall is of the vernacular style which is typical for the district.

The Oxfordshire Wildlife and Landscape Study has characterised the landscape around the Proposed Exemplar Site development as Wooded Estate. The study states that this landscape type is characterised by arable farming and small villages with a strong vernacular character. The key characteristics of this landscape type are a rolling topography, large blocks of ancient woodland and mixed plantations, large parkland and mansion houses, regular field pattern dominated by arable fields and small villages with strong vernacular character (<http://www.owls.oxfordshire.gov.uk/wps/wcm/connect/occ/OWLS>). The landscape which the proposed Exemplar Site development is situated in contains many of these characteristics including the arable fields and the small villages such as Bucknall to the north and Caversfield to the east.

Overall the historic landscape which the proposed Exemplar Site development is located within can be described as fairly typical for the area. It is of a predominantly rural nature characterised by late 18<sup>th</sup> and early 19<sup>th</sup> century arable fields. The settlements close to the proposed Exemplar Site development are also typical of the area. Overall the value of the historic landscape has been assessed as **low**.

## 11.5 Design and Mitigation

### 11.5.1 Construction

#### Archaeology

The investigations carried out as part of this assessment have demonstrated that there is little potential for archaeological remains to exist within the proposed Exemplar Site development and therefore it was not necessary to recommend any changes to the design to reflect archaeological considerations. Consultation carried out with Richard Oram, Planning Archaeologist for Oxfordshire County Council after the conclusion of the field evaluation confirmed that, based on the results of the field evaluation no further archaeological investigations will be required at the proposed Exemplar Site development, therefore no mitigation is required during the construction phase.

#### Built Heritage

This assessment has demonstrated that there are no Listed Buildings, or non-listed buildings within the boundaries of the proposed Exemplar Site development itself. There will be a small visual impact upon the setting of the built heritage assets around the proposed Exemplar Site development once the construction activity begins and the site is no longer arable farmland. However as this will be a temporary impact and the built heritage assets are at least partially shielded from the site by walls and hedgerows, it is not considered that there are any practical mitigation measures that can be implemented at this stage.

#### Historic Landscape

During the construction of the proposed Exemplar Site development any construction activity in the vicinity of hedgerows to be retained would be managed to avoid causing damage to or removing the existing hedgerows as they contribute to the historic character of the field boundaries which are a key element of the Historic landscape in this area. Where practicable exclusion zones should be set up around the hedgerows to avoid accidental damage. Where removal of hedgerows is unavoidable then these would be translocated to as close to the original line as possible in order to preserve the line of the historic boundary.

### 11.5.2 Operation

#### Archaeology

As the investigations carried out as part of this investigation have shown that there is little potential for archaeological remains to survive within the proposed Exemplar Site development no mitigation measures are recommended during the operation phase.

#### Built Heritage

As part of the design stage of this project a number of measures have been put in place in order to minimise any adverse impacts of the development on the built heritage assets in the vicinity of the proposed Exemplar Site development. The Grade II\* listed St Lawrence's Church currently commands views looking south west across the proposed Exemplar Site development towards a small wooded area. By designing a gap in the centre development along the sightline from the church to the wood this view has been preserved within the development.

The other built heritage assets within the study area, the listed and non-listed buildings at Home Farm and the non-listed Caversfield House are all separated from the Proposed Exemplar Site development. In the case of Caversfield House the B4100 runs between the Proposed

Exemplar Site development and the house and on the proposed Exemplar Site development side it is bounded by high hedgerows which are to be retained as part of the development and on the opposite side of the road there is a high wall forming a boundary between the house and the area to west, which includes the proposed Exemplar Site development.

The boundary of the proposed Exemplar Site development stops a field's length away from Home Farm so the setting of the built heritage assets at the farm are preserved by a buffer of open fields between them and the development. The retention of hedgerows along the boundary of the proposed Exemplar Site development is another design measure that will help to reduce any adverse impacts upon these built heritage assets.

## Historic Landscape

The design of the layout of the proposed Exemplar Site development has sought to preserve the lines of the existing historic field boundaries where possible and the layout of the development is contained within the areas defined within these boundaries. In many places across the proposed Exemplar Site development the existing hedgerows are also preserved in whole or in part. In addition two of the existing farm tracks leading from Home Farm have been preserved in the design ensuring the continuation of historic routeways. This design has ensured that the historic landscape of the area remains visible despite the change in the character of the area from farmland to a residential and mixed use development.

During the operation phase efforts would be made to maintain the hedgerows and preserve the lines of the historic boundaries when redevelopment proposals are considered.

## 11.6 Assessment of Effects

### 11.6.1 Construction

#### Archaeology

The investigations carried out as part of this assessment have determined that there is little to no potential for archaeological remains to be present within the proposed Exemplar Site development and therefore the archaeology at the proposed Exemplar Site development is of **negligible** value. Therefore no mitigation measures have been proposed. This will result in a magnitude of impact during the construction phase of **no change** leading to a significance of effect of **neutral**.

#### Built Heritage

This assessment has concluded that the built heritage resource within the study area contains one asset of **high** value, St Lawrence's Church, one asset of **medium** value, the listed buildings at Home Farm, and two assets of **low** value, Caversfield House and the non-listed buildings at Home Farm. All of the built heritage assets are outside the proposed Exemplar Site development and are at least partially shielded from it. St Lawrence's Church and Caversfield house are both on the opposite side of the B4100 to the site and are set back from the road and shielded by a high wall. Home Farm is separated from the site by an area of open fields and is shielded by hedgerows. Therefore it has been concluded that there will only be a **negligible** impact upon the setting of the built heritage assets. This conclusion has been reached because although the construction activity will change the site from a rural landscape to construction site, because of the separation between the site and the built heritage assets this activity will only cause a slight change to setting of the assets and will not affect the understanding of the significance of the assets. This magnitude of impact will lead to a significance of effects for the **high** and **medium** value assets of **slight adverse** and for the **low** value assets of **neutral**.

## Historic Landscape

This assessment has concluded that the proposed Exemplar Site development is located within a historic landscape which is of **low** value. The key element of the historic landscape in this area has been identified as the historic boundaries as they inform the area's historic use as farmland. The design and mitigation measures outlined in this assessment will ensure that either the field boundaries themselves or the line of them will be protected and retained during the construction of the proposed Exemplar Site development. However the construction of the development will result in considerable changes to the use of the area and there will be visual changes within the landscape and changes in noise levels due to construction activity. This will result in a magnitude of impact during the construction phase of **moderate** leading to a significance of effects of **slight adverse**.

### 11.6.2 Operation

#### Archaeology

Given that there is little or no potential for archaeological remains to be present at the proposed Exemplar Site development and no mitigation measures have been proposed the magnitude of impact of the operation stage has been assessed as **no change** leading to a significance of effects of **neutral**.

#### Built Heritage

This assessment has concluded that the built heritage resource within the study area contains one asset of **high** value, one asset of **medium** value, and two assets of **low** value. There are no built heritage assets within the Proposed Exemplar Site development itself and therefore there will be no direct physical impacts on any built heritage assets from the operation phase of the development. Any impacts which will occur will be on the setting of the assets within the study area.

The proposed Exemplar Site development is situated on the periphery of the setting of St Lawrence's Church, a **high** value asset and Caversfield House, a **low** value asset. Both of these assets are located to the east of the B4100, set back from the road and separated from the proposed Exemplar Site development by a high wall. One element of the setting of St Lawrence's Church that the development had the potential to impact upon was the views from the church tower across the Proposed Exemplar Site development and beyond, however design measures have been put in place to neutralise that impact by preserving this sightline.

The buildings within the proposed Exemplar Site development are to be constructed in various styles and with a variety of finishes including stone, brick, timber and render. The closest buildings within the proposed Exemplar Site development to St Lawrence's Church and Caversfield House, are to be constructed in styles which is likely to blend in well with the local buildings and they are to be finished with either brick or stone. The use of stone will help to connect the new development to the existing historic buildings and will allow for the creation of a coherent sense of place due to the similarity in building material and colour between the historic buildings and the new development. This effect is lessened slightly by the use of building design elsewhere in the proposed Exemplar Site development which is very different to the local style and the red brick finish of some of the buildings thus weakening the connection between the historic buildings and the new development. However these buildings are unlikely to be visible from either Caversfield House or St Lawrence's Church.

The current setting of the listed and non-listed buildings at Home Farm is informed by its location within a rural farmed landscape. However the buildings are also located close to a reasonable busy road (the B4100) and are only a short distance from Bicester therefore does

have urbane elements which contribute to their wider setting. The proposed Exemplar Site development is situated one fields length from Home Farm therefore some open space will be retained around the buildings. This will help to prevent the loss of understanding of the significance of these buildings which would have come about had they been completely surrounded by urban development. As the hedgerows along the edge of the proposed Exemplar Site development which faces Home Farm are going to be retained this will act as a barrier between the built heritage assets and the development and restrict views between the assets and the development. In addition to this the buildings closest to farm will be finished with stone which will allow them to blend in with the nearby historic buildings and help create a coherent sense of place linking the new development with the nearby important historic buildings.

As a result of these design measures it has been concluded that the operation phase of the development will have a **negligible** impact upon the setting of the **high** value built heritage assets within the study area. This will lead to a significance of effects of **slight adverse**. It has been concluded that the development will have a **minor** impact upon the asset of **medium** value leading to a significance of effects of **slight adverse**. Finally it has been concluded that the development will have a **negligible** impact upon the **low** value asset of Caversfield House and a **minor** impact upon the **low** value assets of the non-listed buildings at Home Farm. This would lead to a significance of effects of **slight adverse** in both cases.

## Historic Landscape

This assessment has concluded that the proposed Exemplar Site development is located within a historic landscape which is of **low** value. The key element of the historic landscape in this area has been identified as the historic boundaries as they inform the area's historic use as farmland. The design and mitigation measures outlined in this assessment will ensure that either the field boundaries themselves or the line of them will be protected and retained once the proposed Exemplar Site development is in operation. However the development will result in considerable changes to the use of the area and there will be visual changes within the landscape and changes in noise levels as it will have been transformed from a rural to an urban landscape. This will result in a magnitude of impact of **moderate** leading to a significance of effects of **slight adverse**.

## 11.7 Cumulative Effects

The other developments of relevance to this assessment are detailed in Table 18-2. The cumulative effects in relation to cultural heritage are detailed below.

### Archaeology

This assessment has concluded that there is no potential for archaeological remains to occur within the proposed Exemplar development and the significance of effects of the development on the archaeological resource in the study area has been assessed as **neutral**. There is no potential for archaeological remains to occur within the Exemplar development, therefore there are no cumulative effects associated with either the NW Bicester Eco Development or other developments with regard to the archaeological resource.

### Built Heritage

The built heritage resource within the study area comprises two listed buildings and a small number of non-listed buildings. Overall the effect of the proposed Exemplar development will be **slight adverse** on the setting of listed buildings and **neutral** for the non-listed buildings. Of the developments relevant to this assessment only two, the NW Bicester Eco-town and Dymock's Farm have the potential to impact upon the settings of built heritage assets that will be impacted



upon by the Exemplar Site. All of the other developments are at too great a distance and are shielded from the built heritage assets within the study area by the town of Bicester.

For the listed and non-listed buildings at Home Farm the cumulative effects of the proposed Exemplar development and the NW Bicester Eco Development would increase the impact on the setting of these buildings as they would become more removed from their original rural setting and will be placed within an urban context. This could serve to reduce understanding of the significance of these assets. Efforts made within the masterplan for the NW Bicester Eco Development to retain the rural character of Home Farm will help to mitigate any impact upon the built heritage assets at Home Farm.

The combination of the Exemplar Site with the NW Bicester Eco Development could result in a **minor adverse cumulative effect** on the setting of listed buildings and non-listed buildings within the vicinity of the Eco Development. The design of the proposed developments would be in sympathy with the adjacent built heritage assets to minimise these adverse effects.

## Historic Landscape

The historic landscape within the study has been assessed as being of **low** value and will experience a **slight adverse** effect from the proposed Exemplar Site development. As with the built heritage resource the only two developments which will contribute to cumulative effect on the historic landscape resource are the NW Bicester Eco Development and Dymock's farm. Both of these developments are going to create further changes to the historic landscape in this area altering it from a rural to an urban landscape. However in the wider landscape there are still large tracts of land of the same character and it is still possible to discern the key features of the landscape. In addition it would be possible for the masterplan for the NW Bicester Eco Development to retain key landscape features such as the line of field boundaries. There is likely to be a **minor adverse cumulative effect** on historic landscape as a result of the Exemplar Site and NW Bicester Eco Development. There would be **no cumulative effects** on historic landscape associated with other developments, due to their distance from the Exemplar Site.

## 11.8 Summary

This chapter contains an assessment of the cultural heritage asset within the proposed Exemplar Site development and the surrounding study area. The assessment has been carried out using a combination of desk-based work, aerial photograph analysis and archaeological field evaluation.

This assessment has shown that there is a **low** potential for archaeological remains to exist within the proposed Exemplar Site development. This conclusion has been reached as a result of the archaeological investigations carried out at the proposed Exemplar Site development as part of this assessment. The aerial photograph analysis recorded evidence for fragmentary linear features within the site. However the archaeological field evaluation carried out at the site uncovered no evidence for any archaeological remains. Following consulting with the Planning Archaeologist for Oxfordshire it was concluded that no further archaeological investigations were required at the site and therefore nor further mitigation has been recommended for either the construction or mitigation stage. Therefore the impact on the archaeological resource from the development will be **no change** with a significance of effects of **neutral** for both the construction and operation phase.

With regard to built heritage there are no buildings of historic value within the proposed Exemplar Site development itself therefore the development will have no direct physical impacts upon any built heritage assets. There are however a number of built heritage assets within the study area. These are the **high** value Grade II\* listed St Lawrence's Church, the **medium** value



Grade II listed Home Farmhouse and the **low** value non-listed Caversfield House and the other buildings at Home Farm. The development will have an impact on the setting of all of these assets. As part of the design process measures have been put in place in order to reduce this impact including maintaining a sightline from St Lawrence's Church, retaining hedgerows around the boundary of the proposed Exemplar Site development which will shield the historic buildings from the proposed development and the use of building style and materials which will blend in with the historic buildings. The impacts on the setting of the built heritage assets in the construction period has been assessed as **negligible** leading to a significance of effects of **slight adverse** for the **high** and **medium** value assets and **neutral** for the **low** value assets.

The proposed Exemplar Site development lies within the Oxfordshire Estate Farmlands character area. This is a rural landscape characterised by 18<sup>th</sup> and early 19<sup>th</sup> century arable fields. This is fairly typical for the area. The field pattern of the Proposed Exemplar Site development reflects this 18<sup>th</sup> and 19<sup>th</sup> century field pattern. One of the key features of the historic landscape in this part of Oxfordshire is the settlement pattern of small Early Medieval and Medieval villages, many of which experienced shrinkage or abandonment in the post-medieval period. This pattern is reflected in the settlements in the vicinity of the proposed Exemplar Site development as both Caversfield and Bucknall experienced shrinkage in the post-medieval period. The historic landscape within the study area has been assessed as **low** value. As the hedgerows which make up the field boundaries within the proposed Exemplar Site development are a key element in helping to preserve the significance of the historic landscape as they retain the line of the 18<sup>th</sup> and 19<sup>th</sup> century field patterns mitigation measures have been put in place to ensure they are retained within the proposed development. Where possible the hedgerows themselves will be retained and in other places the line of the hedgerows will be preserved within the design. Measures will also be put in place during the construction phase in order to prevent accidental damage of the hedgerows which are to be preserved. However overall the development is going to change the landscape from rural to urban. Therefore this assessment has concluded that the proposed development will have a **moderate** impact on this **low** value asset leading to a significance of effect of **slight adverse**.

# 12 Contaminated Land

## 12.1 Introduction

This chapter relates to the proposed development on the Exemplar part of the NW Bicester eco-development site and considers the potential associated risks to human health and controlled waters that development of the site may represent. This chapter also describes:

- The current baseline conditions at the Exemplar Site
- Any potential impacts and the mitigation measures required to prevent, reduce or offset any potentially significant adverse effects
- The likely residual effects after these measures have been implemented

To assist the understanding of the principles of this subject and their particular application within the context of the proposed development, it is recommended that the reader refers to the associated Hyder Consulting (UK) Ltd. (HCL) Desk Study Report<sup>1</sup>, a copy of which is included within Appendix 12A.

## 12.2 Regulatory and Policy Context

### National

#### **Environmental Protection Act**

Government policy in relation to land contamination is outlined in Defra Circular 01/2006 'Contaminated Land'. The policy aims to both prevent new contamination and to address the inherited legacy of contaminated land. The primary legislation that covers historic land contamination is Part 2A of the Environmental Protection Act 1990, which was inserted by section 57 of the Environment Act 1995. Part 2A provides a definition of contaminated land, focussing on risks in the context of the current use and circumstances of the land. It places specific duties on local authorities to inspect their areas to identify land falling within this definition and, where they do, to require its remediation in line with the 'suitable for use' approach.

Local authorities are the main regulator and are required to publish a strategy for inspecting their areas. The Environment Agency is responsible for dealing with defined 'special sites' and monitoring and reporting on progress made. Both local authorities and the Environment Agency record certain prescribed information about their regulatory actions on a public register and local authorities maintain databases about potentially contaminated sites within their area.

Part 2A of the Environmental Protection Act 1990 defines contaminated land as 'Any land which appears to be in such a condition, by reason of substances in, on or under the land that: Significant Harm is being caused or there is a Significant Possibility of such harm being caused; or Pollution of Controlled Water is being, or is likely to be, caused'.

The identification of contaminated land on the basis that there is a significant possibility of significant harm (SPOSH) being caused is set out in Defra Circular 01/2006.

The identification of contaminated land, as defined in Part 2A of the Environmental Protection Act 1990, comprises a risk-based approach. For harm to the non-aquatic environment or pollution of controlled waters to occur, there must be a 'pollutant linkage'. This linkage is based on the following being present:

- Source of contamination (hazard);
- Pathway for the contaminant to move from source to receptor;
- Receptor (target), which is affected by the contaminant. This includes humans, ecosystems, controlled waters, physical systems and built structures, which could be affected by the hazard.

### **Waste Management Regulations**

The Waste Management (England and Wales) Regulations 2006 states that excavated material generated by the development of land maybe subject to waste regulatory controls to ensure that waste does not harm human health or the environment.

Waste disposal, deposit, recovery & recycling in England, Wales and Scotland is regulated primarily through Part 2 of the Environmental Protection Act and the Waste Management Licensing Regulations 1994. Under the legislation all controlled waste must be deposited, disposed of, recycled or recovered at a suitably licensed site, or a site that is registered as exempt from waste management licensing. In addition, controlled waste must be transported to a licensed (or exempt) site by an authorised waste carrier. It is an offence to deposit waste on land that does not have a waste management licence (or exemption) in force.

Licensing of waste disposal and treatment facilities, waste carriers and brokers and the monitoring of waste management activities is the responsibility of the Environment Agency in England and Wales.

### **Planning Policy Statement: Eco-towns - A supplement to Planning Policy Statement 1**

Land at NW Bicester is identified in the Supplement to PPS1 entitled 'Eco-towns' (July 2009) as a potential location for an Eco-town. The Supplement sets out a range of criteria against which Eco Town proposals should be assessed.

The PPS1 supplement advises that it is for local planning authorities to decide whether it wishes to meet its strategic housing requirements by way of an Eco-town or alternative means (para ET3.1). Proposals for Eco-towns are to be brought forward through the preparation of the Core Strategy and related DPDs (para ET4.1). However, where proposals are submitted in advance of the Core Strategy, the policies set out in the Supplement are material (para ET5.1).

Cherwell District Council endorses the identification of land at NW Bicester as an Eco-town and the emerging Core Strategy (Policy NWB1) proposes the development of some 3200 in the plan period to 2026 with a total of 5000 dwellings being provided in the longer term.

The Supplement also seeks the early submission of an exemplar scheme, which to all intents is a first phase of the development. The expectation is that an application for planning permission is made in 2010 with implementation commencing in 2011.

### **Planning Policy Statement 23**

Planning Policy Statement 23 'Planning and Pollution Control' (PPS23) highlights the potential for adverse effects to arise from the presence of land contamination on both human health and the environment and places the responsibility on the developer to determine whether land is suitable for a particular development or can be made so by remedial action.

Developers are required to determine to an adequate level:

- Whether the land in question is already affected by contamination through source-pathway-receptor pollutant linkages;

- Whether the proposed development will create new linkages;
- Determine what action is needed to break linkages (and avoid the creation of new pollution linkages), deal with any unacceptable risks and enable safe development and future occupancy of the site and neighbouring land.

### **Water Resources Act**

The Water Resources Act 1991 provides regulation of contamination potentially impacting controlled waters and is enforced by the Environment Agency. This provides regulation separate from that within the planning framework.

### **Control of Substances Hazardous to Health**

The Control of Substances Hazardous to Health (COSHH) Regulations, 2002, and subsequent amendments and the Construction and Design Management (CDM) Regulations, 2007, require the developer to ensure that risks to the public and site workers, in relation to the likely presence of contaminated land, are minimised.

Additional guidance is provided by DEFRA in their series of Contaminated Land Reports (CLR 1-CLR 11).

## **Regional**

### **The Regional Spatial Strategy for the South East (The South East Plan)**

The South East Plan was prepared by the South East of England Regional Assembly (SEERA) and published in May 2009. The plan sets out a vision for the future of the South East region to 2026 and covers the areas of Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex. The South East Plan is a full revision of Regional Planning Guidance 9 (RPG9 - the current Regional Spatial Strategy for the South East) to cover the period to 2026. It is not considered a minor amendment of RPG9.

The plan provides the statutory regional framework that forms the context within which Local Development Documents and Local Transport Plans need to be prepared, as well as other regional and sub-regional strategies and programmes that have a bearing on land use activities. These include the regional economic and housing strategies as well as strategies and programmes that address air quality, biodiversity, climate change, education, energy, environment, health and sustainable development.

Contained within the South East Plan is the Regional Policy Framework, which states:

“The principal objective of the Plan shall be to achieve and to maintain sustainable development in the region.” (SEERA, 2006)

This will be achieved through the adoption of policies designed to:

- Achieve a sustainable economy;
- Promote good governance;
- Use of sound science responsibly;
- Live within environmental limits;
- Ensure a strong, healthy and just society.

The framework also sets out the policies for specific topic areas, including emerging policies on 'Housing' and 'Sustainable Natural Resource Management' which will impact on the management of contaminated land:

"Within the region as a whole, over the 2006-2026 period, at least 60% of additional housing should be provided on previously developed (brownfield) land and through conversions of existing buildings." Section D3 'Housing' p.84.

"We must ensure the quality of the environment is maintained and enhanced for future generations while enabling continued sustainable growth and development." Section D5 'Sustainable Natural Resource Management' p.104.

Greater efficiency in our use of natural resources combined with the reduction of pollution and waste, and ensuring that features of importance are protected and enhanced, including wildlife and landscapes, are emphasised in ensuring the delivery of the plan. Water resources face increasing demand arising from existing and new development and given that over 70% of the region's public water supply comes from groundwater, protection of aquifers from over-abstraction and pollution will be of particular importance.

## Local

### **Cherwell Local Development Framework**

Under the requirements of the Planning and Compulsory Purchase Act 2004 (the Act) the Council is required to prepare a Local Development Framework (LDF) to replace the existing Cherwell Local Plan adopted in 1996. The Council's LDF will comprise a portfolio of documents that together will form the planning policy framework for Cherwell to 2026. On adoption the documents will seek to address the issues surrounding contaminated land through planning policy contained within the following documents:

#### *Core Strategy Development Plan Document*

The Council's Core Strategy will set out the overarching strategic planning policy framework for the District to 2026 and identified 5 Key Spatial Issues within its Issues and Options Paper (February 2006) to be addressed by the LDF. With regard to contaminated land, Key Spatial Issue 2 seeks to protect and enhance Cherwell's built and natural environment, in particular the need to protect, enhance and restore sites of ecological value. The emerging Core Strategy seeks to achieve this through the following objectives:

- To improve the quality of the built environment and increase the use of previously developed land through regeneration of vacant and underused land; and
- To incorporate the principles of sustainable development in managing climate change including minimising environmental pollution, promoting renewable energy were appropriate and ensuring that the risk of flooding is not increased.

#### *The Banbury & North Cherwell and The Bicester & Central Oxfordshire Site Allocations Development Plan Documents (DPD)*

The Council is preparing two site allocation DPDs which will identify land for development for a range of uses. Each DPD will seek to identify where development will require contaminated land to be remediated or mitigation provided.

#### *Development Control Policies DPD*

This will contain a suite of development control policies which seek to ensure that all development proposals contribute to sustainable development, ensuring that appropriate consideration is given to sites where contamination is, or likely to be present.

## 12.3 Methodology

### 12.3.1 Study Area

The study area for the contaminated land assessment is defined by the Exemplar Site boundary, as shown on Drawing 3-1. The assessment addresses the potential risks to human health and controlled waters that the development of the site may represent.

### 12.3.2 Establishment of Baseline Conditions

The baseline conditions for the Exemplar site and vicinity have been determined based on the Phase 1 Desk Study Report (Appendix 12A) and from laboratory testing results obtained from a follow-up preliminary intrusive ground investigation undertaken on site in August 2010.

### 12.3.3 Assessment of Effects

The potential effects on the identified receptors from contaminants at baseline conditions at the Exemplar site have been assessed under the headings 'Human Health Risk Assessment', 'Ground Gas Risk Assessment' and 'Controlled Waters Risk Assessment'.

#### Human Health Risk Assessment

The Statutory Guidance on Part IIA of the Environmental Protection Act 1990, as set out in DEFRA Circular 01/2006, and Contaminated Land Report 11 (CLR 11) form the basis on which this contaminated land assessment has been undertaken.

Current legislation and guidance on the assessment of potentially contaminated sites acknowledges the need for a tiered risk based approach comprising:

- Tier 1 Assessment: Comparison of site contaminant levels against generic standards and compliance criteria including an assessment of risk using a source-pathway-receptor model.
- Tier 2 Assessment: Derivation of site-specific risk assessment criteria and calculation of site-specific clean-up goals.

The assessment has therefore been undertaken in a phased approach, focussing initially on the Tier 1 Assessment. The Tier 1 assessment includes the following stages, which were completed where applicable:

- Zoning of data/site averaging areas;
- Maximum Concentration Assessment - comparison of maximum detected concentrations against relevant Generic Assessment Criteria (GAC);
- Mean and Maximum Value Statistical Analysis – consideration of statistical outliers and 95% Upper Confidence Levels (UCLs) against relevant GAC;
- Risk Evaluation/Assessment of Significant Results; and
- Identification of the need for Tier 2 Assessment and derivation of Site Specific Assessment Criteria (SSAC).

The current philosophy in the assessment and remediation of contaminated land in the UK is to adopt an 'end use' approach whereby the significance of contamination at a site is evaluated according to either the existing use or to a proposed development.

For the Tier 1 Assessment, Environment Agency published generic Soil Guideline Values (SGVs) derived using the Agency's CLEA model, was used. Where these are not available, GAC published by LQM/CIEH were utilised<sup>2</sup>.

The assessment criteria relevant to the standard sensitive receptor setting within the CLEA model has been used i.e. a female receptor aged 1 to 6 years, a residential building (small terraced house) and a sandy loam soil with a pH7 and SOM 1%. Given the proposed site end use, the stringent "residential with plant uptake" land use scenario has been adopted.

## Zoning of Data/Site Averaging Areas

The development is expected to comprise predominantly residential properties, therefore the site has been considered to comprise one zone and averaging area for the purposes of this assessment.

## Tier 1 Assessment

In order to focus on the contaminants of potential concern (COPC), the laboratory testing results have been compared with the respective SGVs/GAC. The results and respective screening criteria are presented in the associated interpretative report<sup>3</sup> a copy of which is included within Appendix 12B..

Any contaminants that exceed the SGVs/GAC are considered to be COPC. Those that do not exceed the respective SGVs/GAC are not considered to be COPC and do not require further assessment in relation to the proposed development of the site.

## Contaminants of Potential Concern

There are no contaminants that exceed the respective SGVs/GAC.

## Human Health Risk Assessment Conclusions

None of the contaminants tested returned values greater than the respective SGVs/GAC, therefore the soil that has been tested is deemed suitable for use in gardens (including growing edible plants) without the need for treatment or other remedial action.

During site construction works, site workers should remain vigilant to the possible risk of encountering isolated areas of contaminated material. Should potentially contaminated material be encountered, further testing will be required to assess the risks to the health and safety of site workers and the environment. All persons engaged in site construction works should be made aware of the findings of the intrusive investigation and the hazards associated with handling potentially contaminated materials. It is recommended that all works are conducted in accordance with the Health and Safety Executive publication entitled "Protection of Workers and the General Public during the Development of Contaminated Land"<sup>4</sup>.

## Ground Gas Risk Assessment

It should be noted that, in accordance with current best practice and guidance, the number and frequency of ground gas monitoring rounds is dependent on the sensitivity of the development and the generation potential of any ground gas source. In this case, the ground gas monitoring programme has been devised in order to establish a preliminary indication of the ground gas regime at the site.



Monitoring of the ground gas regime has been undertaken on 4 occasions between August and November 2010 with the results included in the associated interpretative report<sup>3</sup>

The results of monitoring have been assessed using the current guidance document: CIRIA C665 “Assessing Risks Posed by Hazardous Ground Gases to Buildings”<sup>5</sup> and BS8485:2007 “Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments”<sup>6</sup>.

Gas Screening Values (GSV)/hazardous gas flow rates for methane and carbon dioxide have been calculated and the maximum values are shown in Table 12-66. The corresponding Characteristic Gas Situation (CGS) is also presented in this table. It is understood that the proposed development is to comprise mainly residential houses and therefore the CGS for ‘Situation A’, defined in the guidance as ‘*all development types except those in Situation B*’ has been considered (Situation B is defined as ‘*low rise housing with a ventilated underfloor void*’).

**Table 12-66 Maximum Gas Concentrations (Borehole 5) and GSVs**

Max. CH <sub>4</sub> (v/v %)	Max. CO <sub>2</sub> (v/v %)	Max. Flow Rate (l/h)	Max. CH <sub>4</sub> GSV (l/h)	Max. CO <sub>2</sub> GSV (l/h)	Characteristic Gas Situation A
0	3.6	0.3	0	0.0108	1

## Radon Gas

The above situation does not account for radon. As such, as part of the Desk Study Report, a detailed BR 211 Radon Report was obtained from the British Geological Survey (BGS), which states that basic radon protection measures are required for the site area. This is because the estimated probability of a property being above the Action Level for radon is 3-5%.

Details on the technical specifications for basic radon protection measures are given in document BRE Report BR211: Radon – Guidance on Protective Measures for New Buildings<sup>7</sup>.

## Ground Gas Risk Assessment Conclusions

The results of the gas monitoring indicate a very low risk classification for the proposed development from methane and carbon dioxide. However, basic radon protection measures will be necessary in the construction of all new dwellings or extensions on site.

## Controlled Waters Risk Assessment

The Controlled Waters Risk Assessment (CWRA) has been undertaken in accordance with the guidance suggested in the Model Procedures for the Management of Land Contamination (Contaminated Land Report 11, CLR 11) and comprised a staged approach (referred to as ‘Levels’). A Level 2 Assessment has been undertaken for the purposes of this CWRA. For information, all Levels (1 to 4) are summarised in

Table 12-67 below.

**Table 12-67 Quantitative Risk Assessment Levels**

Level	Soil	Groundwater
1	Pore water contamination compared directly to receptor target concentration	Not applicable
2	Attenuation in unsaturated zone and dilution at the water table	Groundwater below source - groundwater data is compared directly to target concentrations
3	Attenuation in the aquifer	Attenuation and down gradient receptor or compliance point – groundwater concentration at the receptor/compliance point is predicted using numerical modelling
4	Dilution in the receptor	Dilution in the receptor - dilution in a receiving watercourse or pumping abstraction borehole (only with approval of EA)

The basis for the screening criteria is to ensure that the selected screening values are protective of the identified receptor. For groundwater the general approach is to use an environmental standard as experience shows that remediation of contaminated groundwater to background quality is not achievable. The standard should be relevant to the current and future receptors and the standards compliance criteria should be considered.

Standards that are applicable to this study are:

- UK Environmental Quality Standards (EQS) for the protection of aquatic life (in both freshwater and saline environments);
- UK Water Supply (Water Quality) Regulations, 2000 and 1989.

The groundwater beneath the site is considered to be the receptor in the first instance and therefore the UK Drinking Water Standards (UKDWS) have been selected as the appropriate screening criteria for the Level 2 Assessment. The results and respective screening criteria are presented in the associated interpretative report (Appendix 12B).

## Level 2 Assessment

The Level 2 Assessment has been undertaken assuming that there is one hydrogeological unit underlying the site (groundwater within the Cornbrash Formation Secondary 'A' Aquifer).

Three groundwater samples were collected from borehole BH1, BH5 and the waster abstraction point located on Mr Malin's land and was analysed for inorganic and organic determinands, as shown in Table 12-68 and discussed below.

**Table 12-68 Summary of Analytical Chemical Testing Results for Water (Inorganics)**

Contaminant	BH1 Concentration (mg/l)	BH5 Concentration (mg/l)	Abstraction Point Concentration (mg/l)	WQS (mg/l)	No. of Exceedances
Nickel	0.018	0.002	<0.001	0.05* <sup>1</sup>	0
Chromium	0.006	0.001	<0.001	0.05* <sup>1</sup>	0
Cadmium	0.0002	<0.001	<0.001	0.005* <sup>1</sup>	0

Contaminant	BH1 Concentration (mg/l)	BH5 Concentration (mg/l)	Abstraction Point Concentration (mg/l)	WQS (mg/l)	No. of Exceedances
Copper	0.013	0.002	<0.001	2* <sup>1</sup>	0
Lead	0.013	<0.001	<0.001	10* <sup>1</sup>	0
Zinc	0.029	0.005	0.003	5* <sup>1</sup>	0
Arsenic	0.007	<0.001	<0.001	0.01* <sup>1</sup>	0
Mercury	<0.0001	<0.0001	<0.0001	0.001* <sup>1</sup>	0
Selenium	<0.001	<0.001	<0.001	0.01* <sup>1</sup>	0

\*1 UK Drinking Water Standards (DWS)

For PAH compounds, the most stringent value for benzo(a)pyrene has been used, which has a DWS of 0.01µg/l. All PAHs recorded values below the laboratory detection limit of 0.01µg/l. Likewise, for TPHs, the DWS of 10µg/l for hydrocarbons has been applied to all fractions, with none recorded above this limit.

In summary, there are no contaminants in the three water samples tested which exceed the respective UKDWS.

## Controlled Waters Risk Assessment Conclusions

None of the water samples analysed contained contaminant concentrations above the relevant, corresponding screening values. As such, the risks posed to human health, Long-term implications to site end users and the environment are considered to be very low and no remedial action is required.

## Assessment Criteria

In the assessment criteria used to define the significance of the effects, both adverse and beneficial, are:

- Large Adverse/Beneficial – where the development would cause a large change to the existing environment
- Moderate Adverse/Beneficial – where the development would cause a noticeable change to the existing environment
- Slight Adverse/ Beneficial – where the development would cause a small change to the existing environment
- Neutral – where no impact will occur on the environment

## 12.4 Description of Existing Baseline Conditions

The Phase 1 Desk Study Report<sup>1</sup> was undertaken by Hyder Consulting Ltd for the entire NW Bicester eco development site (which encompassed the Exemplar site) to determine likely soil, groundwater and contamination conditions.

A summary of the findings from the Desk Study Report and ground investigation, as relevant to the Exemplar site, is as follows:

- Since the earliest available historical map of 1881 to the present day, the site has been dominated by agricultural activity.
- There are two streams on site; one minor, unnamed stream (flowing in a north-west to south-east direction), which feeds the north to south flowing River Bure in the southern part of the site.
- Geologically, the site is summarised as follows:
  - 0-0.2m thickness of Topsoil;
  - 0.2-0.6m (up to 0.8m deep in places) of Subsoil, comprising an orange/brown gravelly/sandy Clay or sandy clayey Gravel;
  - 0.6m to 1.9m (up to 2.9m deep in places) of yellow sandy Gravel and in places yellow/grey Clay, grading to completely weathered Limestone (Cornbrash Formation);
  - From 1.9 to 7m depth, alternating Limestone and Clay bands of the Cornbrash Formation are represented.
- Groundwater is standing at approximately 3.1m depth in BH1 and 6.3m depth in BH5 on average. During trial pitting, a water strike was recorded in TP1 at 2.9m depth at the top of the Cornbrash Formation, which agrees well with the standing water level in BH1.
- There are no historic or current sources of industrial activity; farming being the only use of the land. If contamination is present on site, it is not expected to be widespread or significant. However, naturally occurring radon is present and basic radon protection measures will be required for the construction of new dwellings and extensions.

The intrusive ground investigation undertaken on site confirms that there are no contaminants present above the relevant human health and controlled waters assessment criteria, therefore the baseline conditions on site are such that remedial action in terms of contamination is not necessary prior to redevelopment.

## 12.5 Design and Mitigation

### 12.5.1 Construction

A Construction Environmental Management Plan, CEMP will be prepared and implemented by the contractor during the construction phase of the Exemplar Site. Mitigation measures will be implemented during the construction phase to minimise potential effects associated with airborne dust. These include damping down, covering of stockpiles, use of wheel washes and covering of lorries during transportation.

Other mitigation measures during construction include:

Dust mitigation measures such as damping down, covering of stockpiles, use of wheel washes and covering of lorries during transportation. will be implemented as part of a general good site management plan to ensure that the potential effects associated with airborne dust are minimised.

Water mitigation measure - as previously stated, very low contaminant concentrations in the soil and groundwater have been measured in the explored areas of the site, therefore it is considered unlikely that the construction works will introduce new contamination from the shallow soil to the underlying Secondary 'A' Aquifer (Cornbrash Formation) and the two on-site streams.

Waste mitigation to minimise the impacts associated with waste arising from the site is discussed within Chapter 16.

Spillage mitigation measures will include the storage of chemicals and contaminative material in accordance with the Environment Agency guidance; regular servicing and inspection of vehicles used on-site; restriction of refuelling of vehicles to bunded areas underlain by hard standing, or other impermeable materials and the restriction of vehicle movements within close proximity of the surface watercourses.

## 12.5.2 Operation

No mitigation measures are proposed for the operational phase of the Exemplar Site.

## 12.6 Assessment of Effects

In the event that construction activities are undertaken in areas where previously unknown contamination is encountered during construction, a management strategy would be devised to ensure that any risks associated with its mobilisation are minimised. If required, suitable arrangements for stockpiling will be implemented to minimise the potential for the leaching of contaminated liquids and runoff of sediment through loading and exposure to rainwater. Mitigation measures will include stockpiling in bunded areas underlain by impermeable material away from watercourses. Stockpiles will be covered to prevent leaching of the material.

If excavation works are undertaken in areas where locally contamination water is identified, water may enter the excavations and lead to contaminants migrating vertically and horizontally. Abstraction of potentially contaminated water from excavations will need to be controlled to prevent cross contamination of soils and potential impact upon the Secondary 'A' Aquifer. Mitigation could include the abstraction and disposal of water to a foul sewer or to surface water following appropriate treatment (and with the appropriate consent in place).

It is prudent in unexplored areas for a suitably qualified Geoenvironmental Engineer to be present during the construction works tasked with a watching brief, in order to ensure that correct measures are taken if unexpected contamination is encountered.

### 12.6.1 Construction

Effects likely to arise on-site through construction activities are outlined below. All construction works have the potential to generate the following potential effects relevant to this assessment:

- Creation of areas of contamination e.g. through spillage
- Waste generation
- Dust generation
- Risk to contamination of workers
- Mobilisation of contamination and migration into controlled waters

As the contamination testing has not identified any COPC, it is not considered that construction work will lead to exposure of construction workers and members of the public to any existing contamination present within soils, nor is it expected that the work will mobilise existing contaminants into ground or controlled water (surface water and groundwater). However, the scale of the site is such that complete coverage of all land area during the ground investigation was uneconomical and impractical, and as such, there is always a possibility that contaminants may be present in previously unexplored areas. These possibilities are discussed below in the context of existing site conditions i.e. pre-remediation:

## Dust

Whilst likely not contaminated, dust and silt can result from ground disturbance during construction, which can lead to accidental ingestion, dermal contact or inhalation of particles by site workers and possibly the general public. In some cases, generation of dust and silt may also lead to deposition on nearby surface waters. These risks would be most severe in the event that construction works were to take place on contaminated land, however, as previously stated it is considered unlikely that the site is contaminated.

As no significant contamination sources have been identified, **the impact is assessed to be neutral to minor adverse.**

## Water

Construction activities can result in the mobilisation of contaminants within the soil and the creation of a pathway for contaminants to migrate to underlying groundwater. Pathways can also be created for the transport of contaminants to surface water via airborne dust and through overland flow from poorly managed stockpiles. **The impact is assessed to be neutral.**

## Work in Previously Unexplored Areas

### Waste

The geology identified at the site indicates that shallow spread foundations may be suitable for all anticipated low-load structures; therefore, the generation of spoil is expected to be minimal. It is anticipated that any spoil generated may be reused on site for landscaping or other purposes, therefore it is expected that only minimal volumes of material may require disposal off-site e.g. if contaminated. **The impact is assessed as neutral to minor adverse** depending on the final destination of the material i.e. reuse or disposal.

## Accidental Spillage of Construction Related Material

During any construction work, there always some potential for accidental spillage of contaminated materials. The main source of spillages is considered to be from construction plant and materials stored on site, particularly fuel and lubricating hydrocarbons. **The impact is assessed as neutral to minor adverse** depending on the nature, frequency and volume of the spillage, as defined within the water quality section and CEMP. **Overall, it is considered that the effect during construction will be neutral to minor adverse.**

## 12.6.2 Operation

For the proposed primarily housing end use, it is expected that receptors will come into regular contact with the soil, therefore potential for accidental ingestion, dermal contact or inhalation of dust particles exists. However, as no contaminant sources have been identified from the historical or current use of the site (confirmed by laboratory testing of the soil and groundwater) **the impact is assessed as neutral.** If contaminated material were discovered in previously unexplored areas of the site, remedial measures would be implemented where a complete pollution linkage would be possible, e.g. if contaminated soil were discovered in an area earmarked for residential gardens, then appropriate remedial action would occur, such as excavating the soil and replacement by clean material. Alternatively, a cover system could be employed.

It is anticipated that a small proportion of the site may contain retail/leisure facilities. During operation, there may be limited potential for accidental spillage of potentially contaminating materials from delivery locations and plant operational locations. Due to the expected hard



standing in these areas with appropriate drainage infrastructure and the adoption of standard materials handling and storage procedures, **the impact is assessed as neutral.**

**Overall, it is considered that the effect during operation would be neutral.**

The potential for impacts on ecology, hydrology and air quality are discussed separately in Chapters 7, 8 and 9 respectively.

### 12.6.3 Cumulative Effects

There are no cumulative effects associated with the development of the Exemplar site with NW Bicester Eco-development or with other developments.

## 12.7 Summary

The contaminated land assessment has been undertaken following the local and regional regulatory planning and policy guidelines set out to address the potential risks to human health and controlled waters that the development of the proposed Exemplar site may present. The baseline conditions for the Exemplar site and vicinity have been determined based on the Desk Study Report and from laboratory testing results obtained from a follow-up preliminary intrusive ground investigation undertaken on site in August 2010.

In those areas of the site covered by the intrusive ground investigation, no contaminated soil or groundwater was discovered. In those unexplored areas of the site, it cannot be conclusively stated that there are no contaminants present. However, should localised contaminated areas be encountered, the degree of contamination is not expected to be significant, and it is considered that the previously described mitigation measures would significantly reduced or completely mitigated any potential impacts. No residual effects are identified.

Construction impacts are considered to be neutral to minor adverse and will be mitigated thorough the use of appropriate PPE and good site management practices.

Operational impacts are considered to be neutral and therefore require no mitigation measures.

Overall, the contamination risks associated with the Exemplar site are considered to be very low, though the risks from naturally occurring radon gas require basic radon protection measures to be incorporated in the construction of new dwellings and extensions.

# 13 Agriculture and Land Use

## 13.1 Introduction

This assessment reviews the information currently available in relation to agriculture and soils (including the infrastructure utilised for agricultural purposes and the structure of the businesses engaged in farming and related activities) in relation to the proposals. The methodology used to identify the key receptors is described, followed by details of these receptors.

Both the construction phase and operational phase impacts of the proposals are identified with detailed measures to mitigate these impacts, such that the residual effects of the proposals would not be significant, are presented.

The baseline against which the likely significant effects have been assessed are the environmental conditions at, and surrounding, the site in October 2010.

## 13.2 Regulatory Framework

Apart from the EIA Regulations, there are no legislative requirements governing the assessment of agricultural matters, and the framework of any assessment is derived from a combination of EU and national agricultural and land use policies and measures. The key elements of these can be summarised as:

- The conservation of the best and most versatile (BMV) resources of agricultural land
- Retention of a competitive and sustainable agricultural industry
- The diversification of individual farm businesses into supplementary non-agricultural activities
- The more positive engagement of individual farm businesses with the delivery of environmental benefits

A summary of the policy and legislation relevant to this assessment is set out in the following table:

**Table 13-69 Land Use and Agriculture Regulatory and Policy Framework**

<b>Policy/ Legislation</b>	<b>Requirements</b>	<b>Proposed Eco Development Exemplar Response</b>
The Soil Strategy for England (Defra, 2009)	<p>The Soil Strategy for England (Defra, 2009) sets out the Governments aims in relation to protecting agricultural soils and in relation to protecting the soil resource during construction and development. There is a commitment to review the weight given to protecting BMV land and review the need for any change to policy; no change has currently been advised.</p> <p>Within the Strategy there is an aim of encouraging better management of soils during the construction process. As part of this, a Code of Practice for the sustainable re-use of soils on construction sites has been published by Defra (2009) to protect soil resources disturbed on construction sites. Whilst the Code is not</p>	<p>An assessment has been made of the agricultural land grade and the potential impacts on this resource.</p> <p>Recommendations have been provided detailing appropriate soil handling methodologies in line with the Defra Code of Practice.</p>

Policy/ Legislation	Requirements	Proposed Eco Development Exemplar Response
	legislatively binding, the wider benefits of following the guidance (in terms of sustainability, cost savings and waste controls) are clearly set out.	
Planning Policy Statement 7 (PPS7 – Sustainable Development in Rural Areas)	<p>Planning Policy regarding agricultural land is set out in Planning Policy Statement 7 (PPS7 – Sustainable Development in Rural Areas). This states that:</p> <p><i>The presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification), should be taken into account alongside other sustainability considerations (e.g. biodiversity; the quality and character of the landscape; its amenity value or heritage interest; accessibility to infrastructure, workforce and markets; maintaining viable communities; and the protection of natural resources, including soil quality) when determining planning applications. Where significant development of agricultural land is unavoidable, local planning authorities should seek to use areas of poorer quality land (grades 3b, 4 and 5) in preference to that of a higher quality, except where this would be inconsistent with other sustainability considerations. Little weight in agricultural terms should be given to the loss of agricultural land in grades 3b, 4 and 5, except in areas (such as uplands) where particular agricultural practices may themselves contribute in some special way to the quality and character of the environment or the local economy. If any undeveloped agricultural land needs to be developed, any adverse effects on the environment should be minimised.</i></p>	An assessment has been made of the agricultural land grade and the potential impacts on this resource.
Planning Policy Statement - Eco-towns	<p>ET14.2: Particular attention should be given to land to allow the local production of food from community, allotment and/or commercial gardens</p> <p>ET 17.4 Planning applications for all eco-towns should include a strategy for the long term maintenance, management and adoption of the Sustainable Drainage Systems (SuDS).</p>	<p>The protection and potential enhancement of soil health and soil quality in relation to food production has been addressed.</p> <p>The ability of the soils present to provide filtration and attenuation as part of a SuDS has been assessed.</p>
Cherwell Local Plan	EN16: development on Greenfield land including the Best and Most Versatile (Grades 1, 2 and 3a) agricultural land will not be permitted unless there is an overriding need for the development and opportunities have been assessed to accommodate the development on previously developed sites and land within the built-up limits	<p>An assessment has been made of the agricultural land grade and the potential impacts on this resource.</p> <p>Where possible, development has been restricted to the</p>

Policy/ Legislation	Requirements	Proposed Eco Development Exemplar Response
	of settlements.	lower land grades, and any areas of BMV land has been prioritised for food production.

## 13.2.1 Consultations

As no detailed published Agricultural Land Classification (ALC) information was available for the site, which separates Grade 3 land into Grades 3a and 3b, Natural England was consulted on the requirements for further surveys. Their response stated that:

*“An agricultural land classification and soil survey of the land should be undertaken at a detailed level, e.g. 1 auger boring per hectare, supported by pits dug in each main soil type to confirm the soil physical characteristics of the full depth of soil resource, to determine the impact of the development on ‘best and most versatile’ agricultural land and on soil resources.”*

In addition, the landowner was interviewed (as detailed below) to gather information on the existing farm business.

## 13.3 Methodology

### 13.3.1 Introduction

The principal agricultural and related resources are the quality of the agricultural land and items of fixed farm and farm-related capital, as well as other items of capital associated with diversified activities on farms. Soil and ALC surveys have been undertaken in accordance with published guidelines (MAFF 1988).

As noted above, there are no legislative requirements governing the assessment of agricultural matters, and the framework of any assessment is derived from a combination of EU and national agricultural and land use policies and measures, combined with expert judgement.

### 13.3.2 Study Area

The Study Area for the proposed Exemplar site development includes the land within the red line boundary, as well as adjacent land under the same ownership, such that a full assessment of the potential impact on farm viability could be undertaken.

### 13.3.3 Establishment of Baseline Conditions

The baseline conditions comprise an assessment of the quality of the agricultural land, items of fixed farm and farm-related capital, as well as the agricultural practices used on the land.

A range of information has been reviewed in order to assess the character of the site in terms of land use and soils. This has included:

- Published geological maps
- Published soil maps
- Published ALC maps and more detailed survey information held by Natural England

- LandIS Soils Site Report (NSRI, 2010)

In addition, the landowner was interviewed on the 12<sup>th</sup> August 2010. As detailed above, as no published ALC information was available for the site separating Grade 3 land into Grades 3a and 3b, Natural England was consulted on the requirements for further surveys. Following their response, an ALC survey was undertaken, in accordance with MAFF (1988), on 28<sup>th</sup> September 2010.

### 13.3.4 Assessment of Effects

An assessment has been carried out of the likely effects of the proposals, both during the construction phase and in the longer-term. Where required, effects have been quantified and assessed in the wider context to evaluate the degree to which they may be considered significant. Effects have been based on the assumption that agricultural circumstances prevailing in October 2010 would continue to prevail.

Current best practice and professional judgement are used to define significance criteria in relation to both agricultural land and to farming businesses. Significance criteria in relation to agricultural land and farm viability are shown below in Table 13-70 and Table 13-71.

**Table 13-70 Significance Criteria for Assessing the Effect of the proposals on the National Agricultural Resource**

<b>Magnitude of Impact</b>	<b>Land resources</b>
<b>Large Adverse</b>	The loss of more than 20ha of Best and Most Versatile (BMV) agricultural land. In some areas where BMV land is rare and of particular importance, lesser amounts might be classed as a large adverse impact.
<b>Moderate Adverse</b>	The loss of between 5ha and 20ha of BMV land, depending on the quantum and quality and its relative availability in a locality.
<b>Slight Adverse</b>	The loss of small areas (under 5ha) of BMV land. The loss of lower quality land where it is identified as having special agricultural significance in the locality.
<b>Neutral</b>	Where there is no net loss of agricultural land.

**Table 13-71 Significance Criteria for Assessing the Effect of the Scheme on Farm Viability**

<b>Magnitude of Impact</b>	<b>Farm Businesses</b>
<b>Large adverse</b>	Renders an existing full-time farm business (including any diversification enterprises) unviable.
<b>Moderate adverse</b>	A significant effect on the workability of a full time farm business (including any diversification enterprises) but where the continued viability is not prejudiced.
<b>Slight adverse</b>	Limited effects on workability and the economic performance of a farm unit (including any diversification enterprises) or the loss or a significant effect on the viability of a part-time farm business.
<b>Neutral</b>	Where there would be no negative impact on the farm business (including any diversification enterprises).

## 13.4 Baseline Conditions

### Soils

A Soils Site Report has been obtained for a 4km x 4km study area centred on the site (NGR SP56366 24621). The soils are mapped as belonging to the Aberford Series across the whole site. These are described as shallow, locally brashy well drained calcareous fine loamy soils over limestone. These soils are relatively freely draining, but are identified as having a high leaching potential and thus little ability to retain non-adsorbed pesticides, which may therefore leach out of the soils and into surface or groundwater. It is not considered that the soils present any significant constraints with the exception of the high leaching potential and thus the need to ensure the protection of any groundwater resources.

The land is shown as all falling within Grade 3 (under the Agricultural Land Classification scheme) from available published sources. No more detailed published information has been available for this site to determine whether this relates to Grade 3a (which forms part of BMV land) or Grade 3b. The ALC survey undertaken as part of this assessment has shown the land to predominantly fall within Grade 3b, with a small area (approximately 1ha, 4.9% of the site area) classed as Grade 3a. The major limitation on the Grade attributed to this land is soil depth, which is <30cm in total depth in all locations mapped as Grade 3b on Drawing 13-1. In the area shown as Grade 3a on Drawing 13-1 the soil is up to 1m in depth. This area lies in the small floodplain of the stream which runs through the site, and thus these soils are likely to have been built up from alluvium.

### Land Use

The land within the red line boundary is all within a single ownership. The proposed Exemplar Site development, at approximately 21ha, comprises approximately 46% of the farm land holding. There are a number of farm buildings used by the business; however, none of these would be affected by the proposals.

The agricultural business is centred on beef suckler cows. There is some cereal crop grown on rotation, with the field then returned to grass to generate big bale silage. The farm rents one field which lies immediately to the east on the opposite side of the B4100. This has not been used for grazing as it has been considered not possible to move the herd safely across the road. It has been used for cereal production but may be put to grass in order to generate more silage in a move to cope with the future reduction in grazing area.

The herd is currently disease free. The cows and calves are turned out in March, and they are generally visited daily by the farmer, and there is a water pipe running from the farm buildings along the farm track and then along the southern boundary of the two most northerly fields within the site. This supplies drinking troughs which have been set to allow access to livestock from both sides of the hedgerow.

## 13.5 Design and Mitigation

### 13.5.1 Construction

#### Soils

The sustainable re-use of the soil resource affected by the proposals would be undertaken in line with the Code of Practice for the sustainable re-use of soil on construction sites (Defra 2009). This would be achieved by the development of a Soil Resources Plan (SRP) identifying

the soils present, proposed storage locations and handling methods and locations for re-use where possible. Measures which would be implemented include (but are not limited to):

- Completion of a Soil Resources Survey and incorporate results into a SRP
- Link SRP to the Site Waste Management Plan (SWMP)
- Ensure soils are stripped and handled in the driest condition possible
- Confine vehicle movements to defined haul routes until all the soil resource has been stripped
- Protect stockpiles from erosion and tracking over
- Ensure physical condition of the entire replaced soil profile is sufficient for the vegetation requirements

Approximately 9.7ha will be set aside as green space (to include SuDS, hedgerows, a village green, allotments, community garden and the green link). Implementation of such control measures would ensure that the soils used across the site in these areas would be of the required characteristics and in the required condition to support a variety of specified activities. For example, surplus nutrient-poor soils (topsoils or subsoils) will be re-used in areas of habitat creation whilst surplus nutrient-rich soils will be prioritised for areas designated for food production or in areas of landscape planting. A limitation of these soils, identified above, is that they have little ability to retain non-adsorbed pesticides, and thus may also have a limited ability to retain other pollutants. This is, in part, due to the shallow nature of these soils and thus this will be taken into account in the creation of soil profiles within the SuDS to ensure they can provide the required functions.

## Land Use

A considerate construction approach would be used to minimise potential impacts on the agricultural enterprise. The potential impacts on the farm business, in particular the risks of disturbance to livestock and the risks of livestock getting out into adjacent areas, will be clearly highlighted to all construction staff during Toolbox Talks provided by the Environmental Coordinator or their recognised deputy. If there are likely to be periods of significant construction activity close to the boundary with the undeveloped fields, the option to use temporary screening will be reviewed.

A suitable handling pen will be built either side of the crossing point of the 'neck' of the proposed development, to allow livestock to be moved between the two parcels of land which will continue under agricultural production. A system will be devised to allow the farmer priority access across this point.

All fencing around the proposed development will be sufficient to resist damage by livestock, and will be regularly checked and maintained in a suitable condition. Any damage to boundary fencing will be repaired immediately.

During construction of the link between the two main areas of the proposed development the water pipe feeding the drinking troughs on the field margins to the north-west will be protected from damage. Should it be damaged the pipe will be repaired immediately to ensure no disruption to drinking water supplies for livestock.

## 13.5.2 Operation

There is provision, within the proposed development, for local food production from allotments, and additional potential for local food production from private or commercial gardens (approximately 9.7ha will be set aside as green space). The appropriate construction techniques outlined above in relation to soil handling during the construction phase will ensure that the soils in those areas set aside for food production will be in a suitable condition to support this activity.



It is also proposed that there will be advice provided locally to individuals or firms on soil management in order to maximise both productivity and sustainability.

## 13.6 Assessment of Effects

### 13.6.1 Construction

The proposals for this site would result in the loss of approximately 21ha of land from primary agricultural productivity. Of this, approximately 1ha (4.9%) falls within Grade 3a, i.e. BMV land. It is considered that these proposals would have no more than a Slight Adverse impact on agricultural land, given the minimal area of BMV land affected.

During construction, there would be impacts on the agricultural enterprise. Land would be lost to the business as each field was brought into the proposed development, reducing the area available for grazing and fodder production. The farmer has already started to adjust production practices to reduce the inputs required to the business to cope with this. This has included reviewing the need to buy in cereal seed with a view to reverting all the land to grazing in order to maximise the area available. The rented field will also be reverted to grass in the near future. There has also been a scaling back of fertilizer inputs as the long-term benefits of additions now would not be realised.

However, a number of potential impacts have been identified, as detailed below:

- Difficulties in moving livestock to the western-most fields across the 'neck' of the proposed development during construction.
- A lack of crush and handling facilities either side of the 'neck' to facilitate the movement of livestock across this point.
- Disruption to existing fencing and/or lack of sufficiently robust replacement fencing resulting in livestock escaping into adjacent fields or working areas.
- Gates being left open, resulting in livestock escaping into adjacent fields or working areas.
- Severance of the water pipe feeding the drinking troughs.
- Shortfall of straw produced on-farm and a loss of the sale value of surplus grain.
- Disturbance to livestock through construction worker access into fields in use by livestock.

However, it is considered that, with the sensitive construction measures described above, there would be no more than a Slight Adverse impact on farm viability during the construction period.

### 13.6.2 Operation

During operation there would be potential impacts on the farm business. The key potential impact relates to disturbance to the livestock (by people and/or dogs) once houses are occupied. As such, it is considered that this impact will start to be felt from the end of 2012, up to 2 years before the construction phase of the proposed development is complete.

Suckler cows are very sensitive to the presence of unknown people close to or within the fields they are occupying. Once houses become occupied the land adjacent to the proposed development which is currently used for grazing will become unfavourable, and thus the viability of the farm business will be severely impacted. It is considered that there will be a Large Adverse impact on the farm business as a result.

Adverse effects are likely to be temporary as the progression of the NW Bicester eco-development would result in the remaining parts of the landholding, outside the Exemplar development boundary, being bought from the farmer prior to occupation of houses. This would enable the farmer to purchase a new farm holding and allow all the livestock to be relocated away from the proposed development. If this were to occur, there would be a Neutral Impact on the farm business..

### 13.6.3 Cumulative effects

The other developments of relevance to this assessment are detailed in Table 18-2. The cumulative effects in relation to agriculture and land use are detailed below.

#### Soils

The proposed Exemplar Site development will result in the loss of a small (approximately 1ha) area of BMV land. This is considered to be a Slight Adverse impact. In relation to the whole NW Bicester eco-development there are likely to be further areas of BMV land identified. However, as the soils are mapped as being uniform across the entire area, it is considered that the majority of the land across the wider area will fall within Grade 3b, rather than 3a. Similar mitigation will be proposed for the Masterplan Site, and as such it is not considered that there would be in combination effects.

The other developments are more limited in extent and, again, as the impact of the proposed development on BMV land is limited it is not considered that there would be in combination effects.

#### Land Use

The NW Bicester eco-development will affect the remainder of the landholding which will be affected by the proposed development. At this point, the current land owner will have relocated the entire business to alternative premises, and as such there would be no in combination effects on the agricultural enterprise.

The other developments listed will not affect this enterprise, and as such no in combination effects are identified.

## 13.7 Summary

The soils across the site are fairly uniform, with approximately 95.1% being classed as Grade 3b land, with the remainder (4.9%) classed as Grade 3a. The main limitation on land productivity relates to soil depth, and only where deeper alluvial soils are present can the land be classed as 'Best and Most Versatile' (BMV). Given the minimal area (approx 1ha) of BMV land affected, it is considered that the proposals would have no more than a Slight Adverse impact on agricultural land. The proposal to include areas for local food production, and provide advisory support for residents in relation to soil management, will further mitigate the loss of this land.

During construction, appropriate soil handling methodologies will be used, in line with current guidance, to ensure the sustainable re-use of soils and maximise the value of the soil resource within the proposed design. This will ensure the use of soils with the optimum characteristics are allocated for the given end use, such as food production, habitat creation of SuDS. In addition, a considerate construction approach would be used to minimise potential impacts on the agricultural enterprise, a beef sucker cow farm. This will focus on limiting disturbance to livestock and ensuring no restrictions on the farmer to access and move livestock across the remaining areas of the landholding outside the site boundary.

The key potential impact identified relates to increasing disturbance to livestock once the homes become occupied. This impact could start to be felt up to 2 years before the construction phase is complete. However, the rest of the landholding would form part of the NW Bicester eco-development, and subject to this proceeding this land would be purchased from the current landowner allowing the transfer of all the livestock to an alternative landholding.

# 14 Human Health

## 14.1 Introduction

This chapter provides an assessment of the likely significant effects of the proposed Exemplar development on human health. The World Health Organisation states that 'health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. This definition highlights that health status is affected by a wide-range of factors and this is reflected in the range of issues considered within this assessment. The cross-cutting nature of the human health assessment requires the use of results in other chapters of this Environmental Statement (ES) including: Air Quality; Noise and Vibration; Landscape and Visual; Traffic and Transport; Contaminated Land; and Socio-Economic and Community Effects.

## 14.2 Regulatory Framework

Table 14-1 presents the key regulatory and policy framework relevant to the assessment of human health effects. The regulatory and policy framework review provided in the Air Quality; Noise and Vibration; Landscape and Visual; Traffic and Transport; Contaminated Land; and Socio-Economic and Community Effects assessments are also relevant to consideration of human health effects.

**Table 14-1 Human Health Regulatory and Policy Framework**

<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Bicester Eco development Exemplar Response</b>
UK Government Sustainable Development Strategy	The strategy identifies the five main priorities for delivering sustainable development: living within environmental limits; ensuring a strong healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly. All of these factors are inherent to securing good levels of health and well-being for the UK population.	The design of the proposed Exemplar development includes provision for open space, accessibility, walking and cycling, thereby seeking to provide the infrastructure necessary to support the community and the pursuit of healthy lifestyles.
Planning Policy Statement: Ecotowns – A Supplement to Planning Policy Statement (PPS) 1.	The PPS identifies that the built and natural environment is an important component of health and well-being. Good urban design can help to support the pursuit of healthier and more active lifestyles and contribute to reducing health inequalities.	The design of the proposed Exemplar development has considered the need to provide the infrastructure and environment to enable residents to pursue healthy lifestyles. This has been considered through the provision of green infrastructure, community facilities and the appropriate mix of housing.
PPS 3: Housing	The PPS highlights that high quality design is important as it contributes to the creation of sustainable communities. New housing developments should have layouts that meet the needs of residents,	Quality and housing mix are fundamental components of the proposed Exemplar development.

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
	are visually attractive and make the most sustainable and efficient use of the land. The need for an appropriate mix of housing is also highlighted, as well as the provision of appropriate services and infrastructure.	
Planning Policy Guidance Note (PPG) 13: Transport	PPG 13 identifies the need for urban growth to be managed such that public transport options can be maximised. The siting of facilities needed on a day to day basis (shops, health centres, schools etc) to ensure easy access by modes other than the private car is also highlighted.	The ability of future residents to utilise more active modes of travel is considered in the assessment, as well as the accessibility to facilities needed on a day to day basis. Accessibility has been considered in the design of the proposed Exemplar development.
PPG 17: Planning for Open Space, Sport and Recreation	<p>The needs of local communities must be understood to ensure that sufficient open space, that meets local needs is provided.</p> <p>When local authorities are deciding where to provide new recreational facilities consideration should be given to the accessibility to such developments by walking and cycling. The potential effects of such development on vibrancy and vitality and the wider effects of such development, for example on the existing built and natural environment and local residents must be considered.</p>	As part of the design of the proposed Exemplar development the capacity of existing sport and recreation facilities has been considered and the provision of open space and green infrastructure is a fundamental component of the design. Provision for open space exceeds the 40% Eco-town requirement. Public transport and active travel options have been designed into the proposal.
Eco-Bicester – One Shared Vision Draft for Consultation, August 2010	The Vision highlights that NW Bicester will be designed to support healthy and sustainable environments and provide opportunities for residents to make healthy choices easily.	Providing opportunities to pursue healthy lifestyles has been an integral component of the proposed Exemplar development design.
Regional Spatial Strategy (RSS) for the South East of England 2009	The vision of RSS9 is to achieve ‘a <i>socially and economically strong, healthy and just South East that respects the limits of the global environment</i> ’.	Providing opportunities to pursue healthy lifestyles has been an integral component of the proposed Exemplar development design.
Cherwell Local Plan (1996) Saved Policies	Policy R12 – Provision of Open Space in association with New Residential Development requires that at least 2.43 hectares of public open space per 1,000 people should be provided within all new	Provision of open space and green infrastructure has been an integral part of the proposed Exemplar development design.

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
	housing developments.	
Non-Statutory Cherwell Local Plan 2011	Chapter six of the Local Plan includes a number of policies that are relevant to the human health assessment. Policies TR8 and TR9 relate specifically to walking and cycling.	The ability of future residents to utilise more active modes of travel is considered in the assessment, as well as the accessibility to facilities needed on a day to day basis. This has also been an integral component of the design of the proposed Exemplar development.
	Chapter seven addresses recreation and community facilities. This section of the plan highlights the need for improvements to facilities and accessibility to them. The poor distribution of open space throughout Bicester town is identified.	Provision of open space and green infrastructure has been an integral part of the proposed Exemplar development design. Accessibility to recreation facilities has also been an integral component of the assessment.
Cherwell Core Strategy – Draft	Strategic Objective 9 - To seek a balance between economic growth, the development of new homes and the provision of sufficient, good quality services, facilities and infrastructure including green infrastructure, to meet health, education, transport, open space, sport, recreation and other community needs.  Policy NWB1 – Strategic Allocation 1: NW Bicester Eco development outlines what the proposals will be expected to achieve.	The proposed Exemplar development is being designed in line with the Core Strategy requirements and has, therefore, considered potential for residents to be able to pursue healthy lifestyles and the requirement for new health facilities.

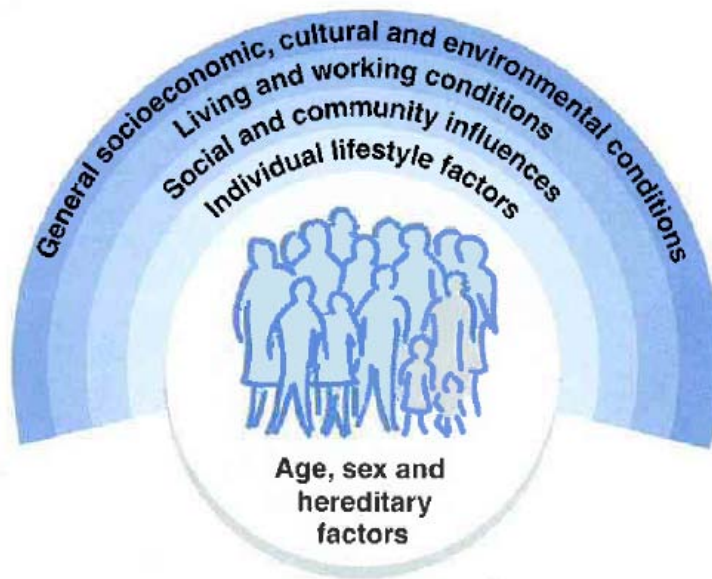
## 14.3 Methodology

### 14.3.1 Introduction

Health Impact Assessment (HIA) is a tool that can be used to assess the health impact of policies, plans and projects. A stand alone HIA is not being undertaken for the proposed Exemplar development, rather the assessment of effects on human health is being integrated into the ES to ensure that the interrelationships between health and other environmental topics are holistically considered rather than being assessed in isolation.

The methods proposed within the Merseyside Guidelines for HIA<sup>1</sup> have been used to guide the assessment of effects on human health although they have been adapted to reflect the integration of human health considerations into the ES. The assessment uses a broad definition of health which recognises that health is affected by more than simply the presence or absence of disease and is influenced by a range of health determinants as illustrated in Figure 14-1.

Figure 14-1 Main Determinants of Health (Source: European Policy Health Impact Assessment A Guide, 2004<sup>2</sup>)



The assessment of effects on human health considers how the health determinants will be affected by the proposed Exemplar development which could result in a change in health outcomes. The following health determinants were considered in the assessment:

- Employment and Economy
- Safety and Security
- Air quality
- Noise and Vibration
- Physical Environment (focussing on built form and urban design)
- Transport and Access
- Waste Management and Contamination
- Community and Social Infrastructure
- Community Spirit and Engagement
- Access and provision of healthcare and facilities and services

The cross-cutting nature of the human health assessment requires the use of results presented in other ES chapters to determine the potential effects of the proposed Exemplar development on health outcomes. The results presented in other assessments are cross-referenced where appropriate.

### 14.3.2 Study Area

The study area for human health covered Cherwell District as well as considering the wards in which the eco development (both the proposed Exemplar development and the whole site) are to be located and those within the immediate vicinity (Caversfield, Ambrosden and Chesterton, Launton, Fringford, Bicester West, Bicester North, Bicester East, Bicester South and Bicester Town). Drawing 14-1 shows the indicative boundary of these wards and the boundary of the proposed Exemplar development. This study area was selected to enable an understanding to be obtained of the existing health characteristics of the communities surrounding the site, as



well as service and facilities provision. Reference was also made to the health status trends reported for Oxfordshire to provide appropriate contextual information and comparative statistics for the assessment.

The assessment of human health effects has also utilised the results of other chapters in this ES. Some of these topics have used slightly different study areas to that defined above and this has been acknowledged in the assessment. Therefore, the study area has varied depending upon the health determinants being considered as part of the assessment.

### 14.3.3 Establishment of Baseline Conditions

The baseline conditions have been established through desk –based research. Key data sources have included Neighbourhood Statistics, the Association of Public Health Observatories and the Clinical and Health Outcomes Knowledge Base. Reference has also been made to the Annual Public Health Report 2010 published by the Director of Public Health for Oxfordshire<sup>3</sup> and the Joint Strategic Needs Assessment 2009<sup>4</sup>. Reference has been made to Ordnance Survey mapping where relevant. Trends have been identified where historical data is available.

No specific sites surveys have been undertaken for the assessment of human health effects.

In parallel to the preparation of the ES and the proposed Exemplar development Masterplan, a Community Facilities Audit<sup>5</sup> has been undertaken and reference has been made to this audit in this ES chapter.

### 14.3.4 Assessment of Effects

There is no widely accepted significance criteria used in the assessment of health effects and, therefore, the assessment determines whether the aspects of the proposed Exemplar development are likely to result in positive or negative effects on health outcomes and the likelihood of such effects being realised. This is an approach typically adopted for HIAs. The level of detail presented in this assessment reflects the level of detail available about the proposed Exemplar development and its potential future population.

The assessment identifies the effects that will be realised during the construction and the operational phases of the development. The health impacts are grouped by health determinant and the assessment identifies whether the health impact is positive or negative i.e. a health gain or a potential health loss, the likely geographical scale of the impact i.e. whether the impacts are likely to be local to the proposed Exemplar development or could potentially affect wider communities and the likelihood of the health impact occurring based upon the evidence available (both information about the proposed Exemplar development design and evidence in health literature about potential health cause and effect relationships).

Tables 14-2 present the notation and definitions that used in the assessment.

**Table 14-2 Notation Used in the Matrix**

Notation	Definition
<b>Direction of Impact</b>	
Positive Impact (+)	Aspect of the scheme is likely to result in a positive influence upon health determinants potentially resulting in long-term gains for health status or the scheme creates conditions that enable the pursuit of healthy lifestyles.
Neutral (0)	No potential change to health status likely.
Negative Impact (-)	This aspect of the scheme is likely to result in adverse effects on health determinants through health losses or creating conditions that do not

Notation	Definition
	enable the pursuit of healthy lifestyles.
<b>Likelihood of Impact Occurring (for positive and negative impacts)</b>	
Speculative	Considered unlikely to occur – limited supporting evidence available.
Possible	Likely to occur on the basis of evidence from a range of sources.
Probable	Very likely to happen with strong evidence from a range of sources.

The assessment was desk-based and primarily qualitative, although where modelling has been undertaken for other environmental topics, for example the noise and vibration assessment, the results have been used in the assessment.

### Limitations

The assessment analyses whether the new development could potentially affect the health status of the existing population of Bicester and whether the design of the proposed Exemplar development will enable new residents to pursue healthy lifestyles. It is not known at this stage who will live at the proposed Exemplar development, nor the existing health status of these individuals and this, therefore, affects the level of detail presented in the assessment.

## 14.3.5 Consultation

Consultation has occurred with the Primary Care Trust to obtain details of existing health facilities in Bicester and their capacity to accommodate future growth. Consultation has also been undertaken with Oxfordshire County Council regarding the location of Public Rights of Way (PRoW), the availability of data about the use of PRoW and to obtain ward level health statistics used to inform the preparation of the Joint Strategic Needs Assessment.

External consultation utilising focus groups and workshops specific to human health issues did not form a specific part of the methodology. However, stakeholder events have been undertaken as part of the proposed Exemplar development design process and the information from these events has been used to inform the assessment where appropriate.

## 14.4 Baseline Conditions

The purpose of the baseline data gathering is to understand the existing health status of the population living in the vicinity of the proposed Exemplar development and Cherwell Borough as a whole. The coverage of the issues considered as part of the baseline is wider than just the existing health status of the population. Overall health and well-being, as demonstrated in Diagram 14-1 is influenced by a range of factors and this is reiterated in the Director of Public Health for Oxfordshire Annual Report IV<sup>3</sup>. The baseline description provides details about:

- The health status of the population including life expectancy, mortality rates for leading causes of death and incidence of lifestyle related conditions such as obesity and type II diabetes.
- Existing levels of deprivation across Cherwell district which can affect overall health status and life chances.
- The location and provision of existing health care facilities servicing the population of Bicester and the capacity of these services to accommodate future growth, as well as their accessibility by walking, cycling and public transport.

The baseline data collated in other ES chapters is also of relevance to the assessment of effects on human health. When reading this chapter of the ES, consideration should also be given to the baseline data presented in the following chapters: Landscape and Visual Amenity (Chapter 6), Air Quality (Chapter 9), Noise and Vibration (Chapter 10), Contaminated Land (Chapter 12), Socio-Economic and Community Effects (Chapter 15) and Traffic and Transport (Chapter 17) as they are of relevance to effects on human health.

## 14.4.1 Health Status

The Cherwell health profile published in 2009<sup>6</sup> identifies that health in the district is generally better than the England average for a number of health indicators.

### Life Expectancy at Birth

Life expectancy at birth is an estimate of the number of years a new born baby would be expected to live, if they were to experience, throughout their lifetime, an area's age specific mortality rates. Figures 14-2 and 14-3 present the trends for life expectancy at birth for males and females for districts across Oxfordshire compared to the England average. Both graphs indicate a positive upward trend for life expectancy that is above the England average. Between 2005 and 2007, female life expectancy at birth within Cherwell District was slightly higher than that in South Oxfordshire and Oxford, and lower than in the Vale of White Horse and West Oxfordshire. Male life expectancy in Cherwell District was higher than in Oxford, but lower than the other districts within Oxfordshire.

**Figure 14-2 Life Expectancy at Birth for Females (Source: Joint Strategic Needs Assessment 2009)<sup>4</sup>**

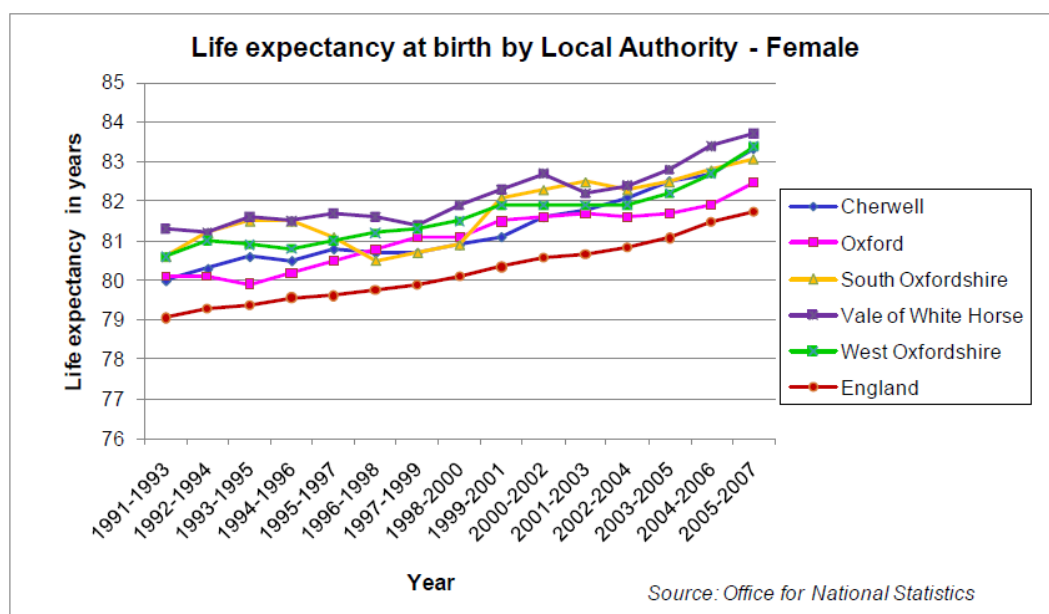


Figure 14-3 Life Expectancy at Birth for Males (Source: Joint Strategic Needs Assessment 2009)<sup>4</sup>

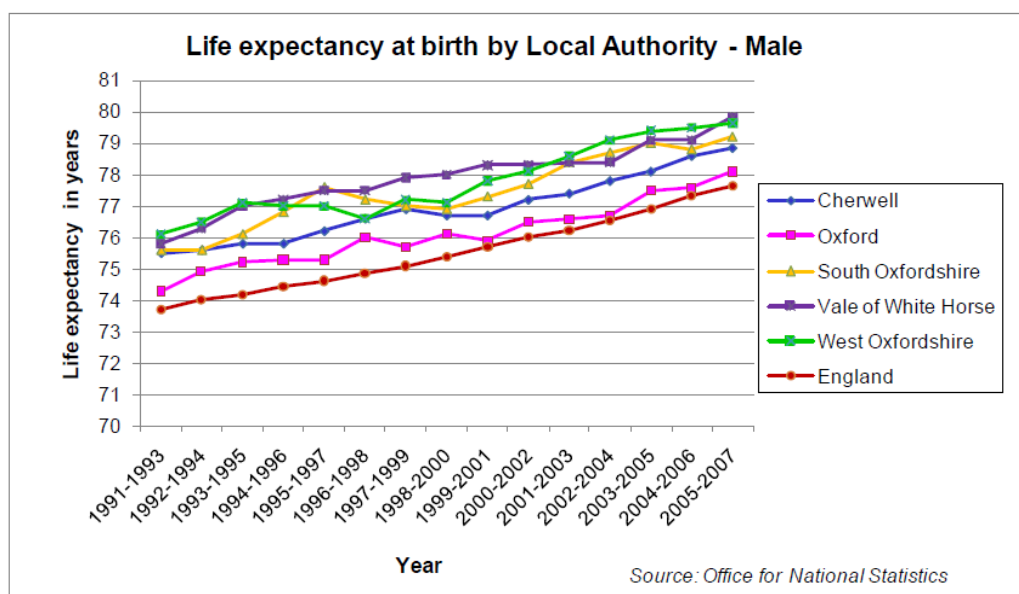


Table 14-3 supplements both figures 14-2 and 14-3 with the latest life expectancy at birth statistics for the period January 2006 to December 2008 which again indicates positive results for Cherwell.

Table 14-3 Life Expectancy at Birth 2006 - 2008 (Source: Neighbourhood Statistics)<sup>7</sup>

Area	Life Expectancy At Birth (Females)	Life Expectancy at Birth (Males)
Cherwell District	83.5	78.7
Oxfordshire CC	83.6	79.2
South East	82.9	79.2
England	82.0	77.9

Whilst the results indicate that life expectancy is good across Cherwell District as a whole, there are disparities within the district. The Cherwell District Health Profile for 2010 states that life expectancy is seven years lower for men from the most deprived parts of the district compared to those from the least deprived with the difference for women being approximately four years. Within the study area, life expectancy for the period 2003 to 2005 varied from 79 years to 87 years. More recent ward level data was not available.

Population projections for Cherwell District indicate that the number of older people is expected to increase significantly (refer to Chapter 15: Socio Economics and Community for further details). This will have associated demands on healthcare provision and also the facilities and amenities that need to be provided within new developments.

## General Health Status

Table 14-4 presents data about the percentage of the population in each ward reporting their health status as good. Whilst this data is quite dated, as it was obtained during the last census, it provides further context for the assessment. It is evident that self-reported health status is above the England average in all wards with the exception of Bicester Town. In addition, the population was asked whether they had a long-term limiting illness, health problem or disability which restricted their daily activities or the work they are able to do. Table 14-4 demonstrates

that health status is again better than the England and South East average for all wards, although there are disparities between the wards.

**Table 14-4 Standard of Reported Health (Source: Neighbourhood Statistics)<sup>7</sup>**

<b>Ward</b>	<b>Percentage of population that considered themselves to be in good health (2001)</b>	<b>Percentage of Population with a Long-Term Limiting Illness (2001)</b>
Caversfield	79.8	12.5
Ambrosden and Chesterton	80.4	9.4
Bicester East	74.9	11.4
Bicester North	82.8	6.9
Bicester West	74.2	11.7
Bicester South	84.0	5.7
Bicester Town	65.6	18.3
Launton	71.5	15.5
Fringford	76.8	10.6
<b>Cherwell Average</b>	<b>73</b>	<b>13.3</b>
<b>South East Average</b>	<b>71.5</b>	<b>15.5</b>
<b>England Average</b>	<b>68.8</b>	<b>19.9</b>

Incapacity benefit is paid to people who have been medically certified as physically or mentally unable to work. Severe Disablement Allowance (SDA) is a benefit for people who are unable to work as a result of a long term severe illness or disability and who have not paid sufficient National Insurance contributions to qualify for Incapacity Benefit. Within Oxfordshire and Cherwell the percentage of the population claiming health related benefits was 4.29% and 4.71% respectively. All wards within the study area are lower than these figures apart from Bicester East and Bicester Town which stand at 5.17% and 6.01% (refer to Table 14-5). A review of data produced by the Department for Work and Pensions regarding the number of claimants in each ward reveals that between 2007 and 2010 there has not been a significant change in the number of claimants in each ward, with the numbers remaining broadly similar, with only minor increases or decreases in some wards.

**Table 14-5 Dependency on health-related benefits (Incapacity benefit or severe disablement allowance claimants) (May 2007) (Source: Oxfordshire County Council)**

<b>Ward</b>	<b>Dependency on health-related benefits (Total Number of Incapacity benefit or severe disablement allowance claimants) (May 2007) (%)</b>
<b>Oxfordshire</b>	4.29
<b>Cherwell District</b>	4.71
Ambrosden and Chesterton	2.53
Bicester East	5.17

Ward	Dependency on health-related benefits (Total Number of Incapacity benefit or severe disablement allowance claimants) (May 2007) (%)
Bicester North	2.91
Bicester South	2.50
Bicester Town	6.01
Bicester West	4.25
Caversfield	3.04
Launton	3.17
Fringford	Data not available.

## Mortality

Figure 14-4 demonstrates that since 1998 there has been a steady decrease in the age-standardised rate of all age, all cause mortality for both males and females within Cherwell District, with the rate also being lower than the rate for England.

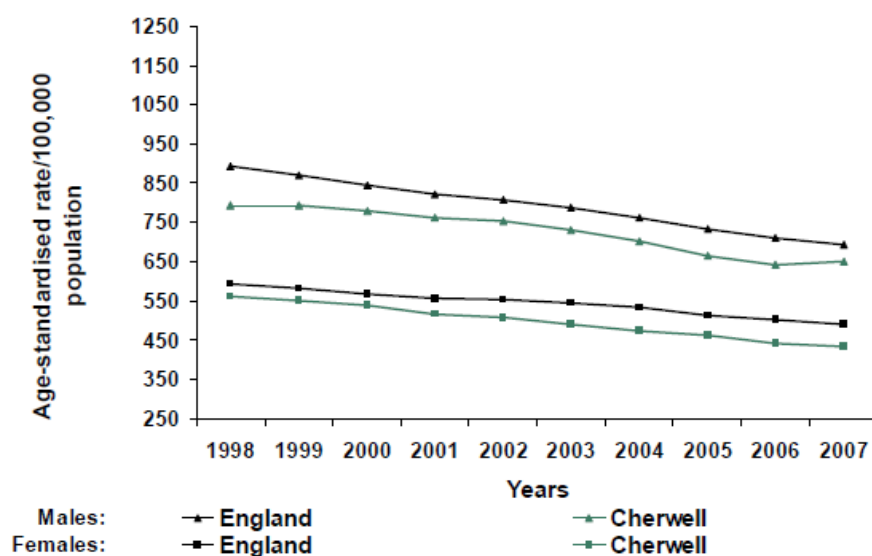
The age standardised mortality rate for an area is the number of deaths, expressed per 100,000, that would occur in that area if it had the same age structure as the standard population and the local age-specific rates of the area applied<sup>2</sup>. The rate is usually expressed per 100,000. Data sourced from Oxfordshire County Council demonstrates that there is a wide range in the age-standardised mortality rates for all ages for the wards within the study area. The data has not been reproduced in this chapter as it is understood that this data is no longer publicly available and so has not been reproduced in detail for confidentiality reasons.

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<sup>2</sup> The standardised mortality rate is calculated by dividing the number of deaths by the actual local population in a particular age group multiplied by the standard population for that particular age group and summing across the relevant age groups.

Figure 14-4 Mortality Rates for Males and Females (Health Profile for Cherwell, 2010)<sup>6</sup>

### All age, all cause mortality



The pattern for early deaths from heart disease and stroke are similar to those presented in the graph above with them being lower than the England average in Cherwell and falling year on year between 1998 and 2007.<sup>6</sup>

### Prevalence of and Mortality from Cancer

The prevalence of cancer in Cherwell is the second lowest of all Oxfordshire's districts as demonstrated in Figure 14-5

Figure 14-5 Prevalence of All Cancers (Source: Joint Strategic Needs Assessment, 2009).

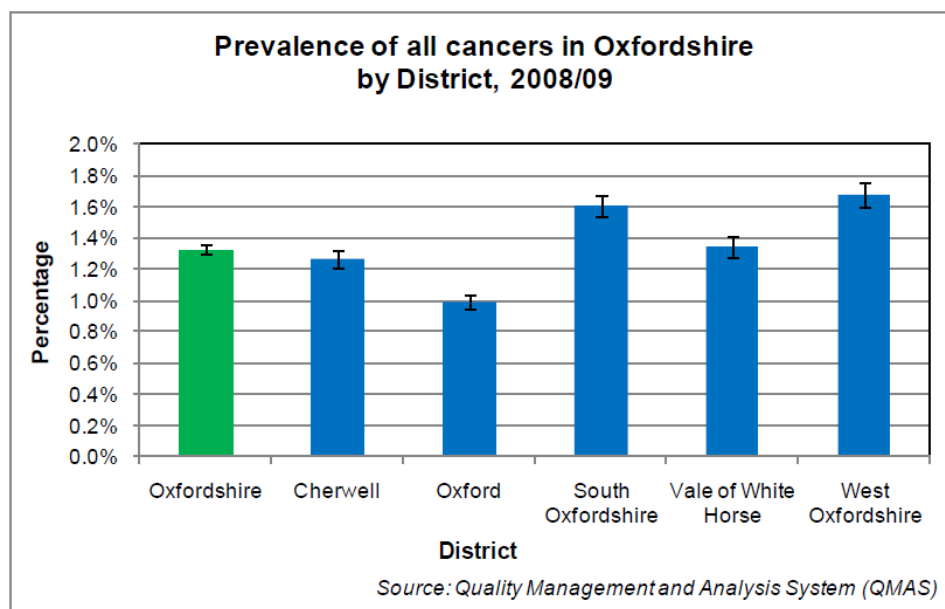


Table 14-6 presents the directly age-standardised rates of mortality from all cancers per 100,000 population for the period 2006 to 2008 for Cherwell District compared to the South East and the England average. The data indicates that mortality from cancer in Cherwell District is slightly lower than for England but higher than for the South East.



**Table 14-6 Directly Age Standardised Rate of Mortality from Cancer (Source: National Centre for Health Outcomes Development)**

Authority	Directly Age Standardised Rate per 100,000 population (2006 – 2008)	95% Confidence Limit	
		Lower	Upper
Cherwell	172.88	161.50	184.25
South East	163.10	161.74	164.47
England	173.90	173.32	174.47

#### Physical Activity and Lifestyle Habits

The Chief Medical Officer's report<sup>3</sup> states that physical activity is essential for good health and contributes to overall wellbeing. Physical activity has significant benefits in reducing coronary heart disease and in reducing other health impacts including diabetes, cancer and osteoporosis and, therefore, new developments should be well located in relation to public transport connections and provide opportunities for healthy lifestyles to be pursued where possible. If a more active population helps to reduce the number of people with poor health status this will also positively impact the local economy, helping to reduce the number of individuals claiming incapacity benefits. The following sections provide some details about mortality from diseases that are associated with lifestyle habits and levels of physical activity.

#### Physical Activity

Table 14-7 presents data showing levels of physical activity within Cherwell District (the percentage of the adult population participating in at least 30 minutes of sport and active recreation of at least moderate intensity at least three times per week). The data demonstrates that activity levels in Cherwell are below the England average for the year 2008/2009 and are lower than in some other parts of Oxfordshire. Ward specific data is not available for this indicator.

**Table 14-7 Physical Activity Levels (Source: Living in Cherwell 2010)**

Area	2005/06 (Percentage)	2007/08 (Percentage)	2008/09 (Percentage)
<b>Cherwell</b>	<b>17.1</b>	<b>16.8</b>	<b>15.9</b>
South Oxfordshire	13.8	19.9	21.4
Vale of White Horse	17.0	20.5	18.4
West Oxfordshire	18.4	19.7	17.5
Oxfordshire	16.6	19.2	18.4
South East	16.4	17.1	17.1
England	15.5	16.4	16.6

<sup>3</sup> Department of Health (2004) At least five a week. Evidence on the impact of physical activity and its relationship to health. A Report from the Chief Medical Officer. London.

The 2010 Director of Public Health Annual Report for Oxfordshire<sup>3</sup>, reports that almost three quarters of Oxfordshire's population does not participate in enough physical activity. Since 2006, there has been a reported increase in activity levels although a lot more work needs to be done to improve activity levels further.

### **People Diagnosed with Diabetes**

The number of people diagnosed with Type 2 diabetes is increasing and the main contributory factor is increasing rates of obesity. Since 1996 the number of people diagnosed with diabetes in the UK has increased from 1.4 million to 2.6 million. By 2025 it is estimated that 4 million people will be living with diabetes in the UK<sup>8</sup>. Modifying lifestyle behaviours and increasing levels of physical activity will therefore be very important to prevent this as it is recognised that the risk of developing Type 2 diabetes can be reduced by making lifestyle changes. The Department of Health Strategy 'Be Active: Be Healthy' states that physically active people have a 33-50% lower risk of developing Type 2 diabetes compared with inactive people<sup>9</sup>.

According to the Association of Public Health Observatories between 2008 and 2009, 3.76% of the Cherwell population had been diagnosed with diabetes, which was below the England average of 4.3% but higher than the Oxfordshire average of 3.47%. This has increased over time from 3.1% in 2005/2006. A review of the ward level diabetes prevalence data (provided by Oxfordshire County Council) indicates that prevalence of diabetes is similar across the wards within the study area, with obesity prevalence being highest in Bicester Town and lowest in Bicester South but the difference between the prevalence statistics is very similar for each ward.

### **Obesity**

In 2008/9, 7.9% of children of school ages 4-5 within Cherwell District were considered to be obese, which is below the Oxfordshire County Council average of 8.6% and the England average of 9.6% (Association of Public Health Observatories). This has increased since 2006/2007, when the figure was 7.4% (and below the national average).

Between 2006 and 2008, 26.2% of Cherwell District's population was classed as obese, in comparison to 21.8% in Oxfordshire County Council and 24.2% of the England population. This has gradually risen since 2000/2002, when the figure was 22.44% (Association of Public Health Observatories, 2010).

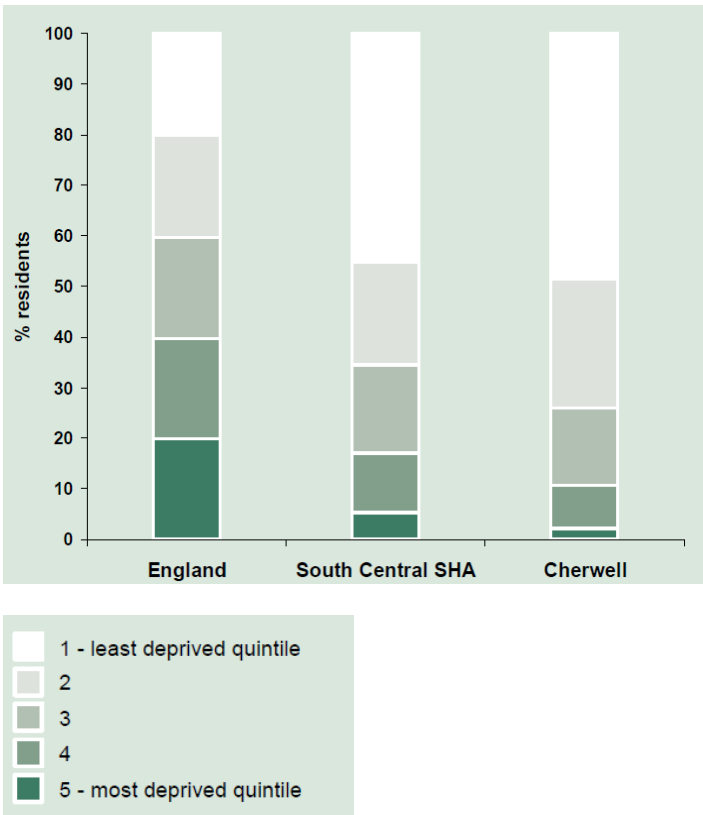
The 2010 Director of Public Health Annual Report for Oxfordshire<sup>3</sup> states that approximately 116,600 adults in Oxfordshire (almost one quarter of all adults) are obese, and is an issue across the whole county (although more prevalent in areas with high levels of deprivation). By 2020 obesity could lead to an additional 6,900 cases of diabetes in Oxfordshire alone. Increasing levels of activity and promoting opportunities for the pursuit of healthier lifestyles could help to reduce this issue in the long-term.

### **Deprivation**

The Index of Multiple Deprivation (IMD) 2007 is a measure of multiple deprivation experienced by individuals living in a particular area. The IMD combines indicators covering income, employment, health and disability, education, skills and training, barriers to housing and services, living environment and crime and weights them to create a combined IMD score. Figure 14-6 taken from the Cherwell District Health Profile 2010<sup>6</sup> presents the proportion of residents within England, the region and Cherwell District living in neighbourhoods belonging to each of the five national deprivation quintiles. The quintiles were derived by ranking all the Lower Super Output Areas (LSOA) in England in order of their deprivation scores and dividing them into five equal groupings. The graph demonstrates that only 2.1% of the population of

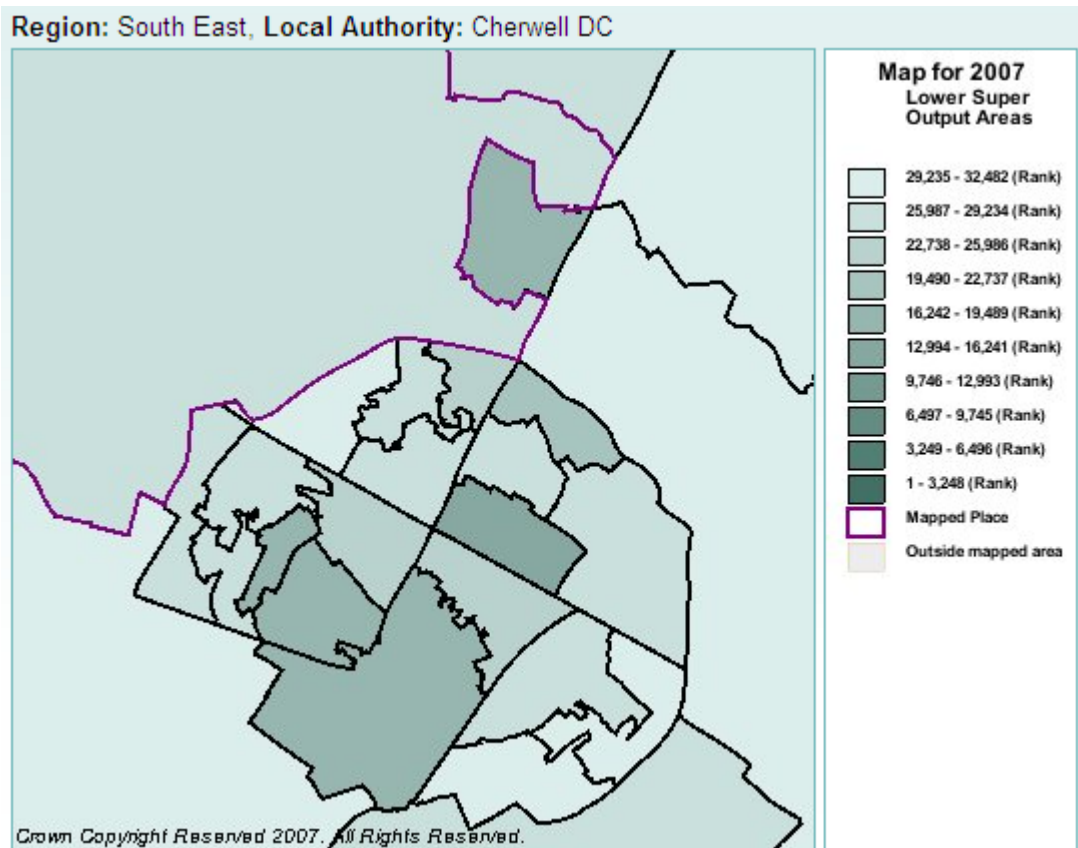
Cherwell District lives in an LSOA in the 20% most deprived in England. Almost half of the population live in an LSOA in the least deprived quintile.

**Figure 14-6 IMD Results for Cherwell (Source: Department of communities and Local Government Indices of Deprivation, 2007) <sup>10</sup>**



The IMD includes the Health Deprivation and Disability Domain. A review of the results for each LSOA within the wards in the study area demonstrates that there are no significant health deprivation issues within these wards i.e. none of the LSOAs lie within the top 20% most deprived nationally. Figure 14-7 presents the IMD Data for the Health Deprivation and Disability Domain within LSOAs in Bicester.

Figure 14-7 IMD Results for Bicester and surrounding LSOAs (Source: <http://www.imd.communities.gov.uk>)<sup>10</sup>



The district of Cherwell ranks 28,714 for the IMD Health Deprivation and Disability Domain (32,482 indicates the least deprived and 1 the most deprived).

## 14.4.2 Accidents

Chapter 17 (Traffic and Transport) presents details of Personal Injury Accidents recorded between 01/01/2005 and 31/05/2010 for the B4100 Banbury Road, the A4095 Lord's Lane, Bucknell Road, the A4095 Howes Lane and the B4030 Middleton Stoney Road.

## 14.4.3 Location of Key Health Facilities

The location of existing health facilities including doctor's surgeries, hospitals and dentists in the vicinity of the proposed Exemplar development are shown on Drawing 14-2. The closest GP Practice to the site is the North Bicester surgery. The GP surgeries in Bicester are currently accepting new NHS patients and the average list size for the five GP surgeries in Bicester is 1,230 patients per GP which is in line with the average list size for the Oxfordshire Primary Care Trust (1,284 patients per GP). The dental practises, opticians and pharmacies are primarily located in the town centre as shown on Drawing 14-2.

The Bicester Community Hospital has only 12 beds and provides intermediate care and GP admissions. It also provides an out of hours service in a minor injuries unit.

The Department for Transport Core Accessibility Indicators provide a number of measures of accessibility by public transport, walking and (where appropriate) cycling to different services types including GPs and hospitals. The purpose of the indicators is to assist Local Authorities develop their evidence base for their accessibility strategies. The data for Cherwell District for

2009 demonstrates that access to GPs is good for people living in Cherwell with individuals able to access more than one GP/health care centre within 15 minutes by either public transport, walking or cycling. Accessibility data by modes of transport is provided in Table 14-8.

**Table 14-8 Accessibility to Health Facilities (Source: Department of Transport, 2009)<sup>11</sup>**

Indicator	Results
Travel time to nearest GP by public transport/walk	14 minutes
Travel time to nearest GP by cycle	8 minutes
Travel time to nearest GP by car	5 minutes
Number of GPs within 15 minutes by public transport/walk	2
Number of GPs with 15 minutes by cycle	4
Number of GPs within 15 minutes by car	5

The closest ambulance station to the proposed Exemplar development lies approximately 12km to the north in Brackley. Both a fire station and police station are situated in Bicester.

#### 14.4.4 Accessibility to Recreation and Amenity Facilities

Chapter 15 (Socio Economics and Community) of this ES presents details of the PRoW surrounding the proposed Exemplar development with key routes shown on Drawing 15-3. Information regarding the levels of use of the PRoWs surrounding the proposed Exemplar development is not currently held by Oxfordshire County Council and no specific surveys have been commissioned for this assessment.

Walking as a low impact form of exercise can reduce the risk of strokes, osteoporosis, high blood pressure, bowel cancer, Alzheimer's disease, arthritis, anxiety and stress. In addition regular walking can improve a person's mental health and well-being by increasing confidence, stamina, energy, weight control and life expectancy (Walking the Way to Health Initiative, 2004). Oxfordshire County Council has produced a Rights of Way Improvement Plan (RoWIP) which sets out their ambitions for the improvement of PRoW within the county in order to meet the Government's aim of better provision for walkers, cyclists, equestrians and people with mobility problems. There is scope for good connections to the PRoW to be provided to enable future residents of the proposed Exemplar development to pursue healthy lifestyles.

The 'Health Walks' initiative is a national initiative that encourages individuals to improve their fitness by using their local countryside for walking. This initiative is run in Cherwell District and walks are regularly held in Bicester.

The location of sports and recreation venues is shown on Drawing 15-3. Further discussion is also included in Chapter 15 (Socio Economics and Community) about the sports and recreation

provision, play areas, community centres and open spaces in the vicinity of the proposed Exemplar development.

The quality and availability of pedestrian and cycle facilities in the vicinity of the proposed Exemplar development and issues of severance are discussed in Chapter 17 (Traffic and Transport). At present there are limited opportunities for local journeys to/from the proposed Exemplar development to be undertaken by bicycle.

As identified in the Cherwell Green Spaces Strategy<sup>12</sup>, there is a need for more and better green spaces to be provided within both the urban and rural areas of Cherwell to accommodate the growing population.

## 14.5 Design and Mitigation

A number of mitigation measures have been incorporated into the design process to reduce the potential adverse health effects and to maximise potential health gains offered by the proposed Exemplar development. Mitigation measures relevant to the construction and operational phases are provided in the following sections.

### 14.5.1 Construction

Construction best practice should be employed to minimise potential adverse health effects and maximise potential health benefits for the nearby community as well as those individuals undertaking the construction works. Measures that must be implemented comprise:

- Traffic movements should be carefully phased and abnormal loads accompanied by the Police where necessary, to minimise any possible delays and disruption to regular road users, public access, community facilities, residences and businesses, particularly those used by vulnerable groups such as children.
- Construction site compounds and areas for material/plant storage should be positioned away from sensitive views, wherever possible.
- Careful management of retained vegetation at the site periphery, to provide visual screening.
- All construction works should be undertaken in accordance with the health and safety legislation prevailing at the time of construction to ensure that all works are executed safely and to minimise risk of accidents.
- The mitigation measures recommended in Chapter 9 (Air Quality) to control dust and air quality during construction.
- Monitoring of depositional and suspended dust during construction in order that trigger levels may be set where mitigation must be increased to protect the health and amenity of local residents. These monitoring requirements should be agreed in advance with the Environmental Health Officer (EHO) at Cherwell District Council.
- The mitigation measures recommended in Chapter 10 (Noise) to control construction noise and vibration. The use of a Section 61 consent should ensure that noise levels at the site are effectively controlled.
- The mitigation measures recommended in Chapter 17 (Traffic and Transport).
- Ensure regular dialogue and information provision to nearby residents who could potentially be affected by the construction works.
- Encourage the contractors appointed for the construction works to register with the Considerate Constructors scheme.

In addition to the above, during the preparation of the Masterplan for the proposed Exemplar development, work has already been undertaken to engage with local companies to secure maximum benefits for local residents and employees.

## 14.5.2 Operation

The proposed Exemplar development has been designed in line with key project objectives, principally, in relation to human health, to provide green infrastructure, to ensure the appropriate provision of social and community facilities, to provide access to employment opportunities and to provide the necessary design and infrastructure to promote the use of walking, cycling and public transport use rather than the private car. The following mitigation measures have been included within the design as a result of the iterative design process and recommendations from the design and assessment teams:

- Secured by design principles have been used to minimise the risk of crime occurring and the local constabulary has had the opportunity to comment on the design proposals.
- The requirements of all sectors of the society have been considered to ensure the correct balance of services and amenities to serve the proposed Exemplar development. This has been informed by a Community Facilities Audit.
- A Travel Plan has been developed for the proposed Exemplar development which includes a number of measures to promote sustainable travel. They are outlined in further detail in Chapter 9 (Air Quality).
- The detailed design and operation of the Energy Centre must be discussed with the EHO at Cherwell District Council to agree appropriate noise limits and an Environmental Permit will be obtained from the Environment Agency. The Environment Agency will be required to review the health effects of the proposals as part of the permitting process.
- The provision of community facilities that will promote community interaction, empowerment and community development. Provision has also been informed by a Community Facilities Audit.
- Providing appropriate infrastructure to enable home-working (appropriate broadband speeds).
- The proposed Exemplar development has been designed to facilitate easy movement by foot and cycle, thereby supporting the use of active modes of travel and the pursuit of healthy lifestyles. The objective is to provide a principal network of segregated footways and cycleways, some of these alongside roads or shared with vehicles. Traffic speeds within the development will be controlled accordingly in order to provide a safe environment for pedestrians and cyclists. A segregated walking and cycling shared route is to be provided adjacent to the west side of the Banbury road between the southern site access and the ring road. A toucan crossing will also be provided on the ring road that will connect with the cycle network into Bicester. Further details about the operational design of the scheme from this perspective is provided in Chapter 17 (Traffic and Transport).
- The provision of secure cycle parking and storage facilities will be incorporated into the residential areas, local centre and employment areas. Cycle parking and storage is to be provided in accordance with Cherwell District Council cycle parking standards.
- The 'centre' of the proposed Exemplar development providing the community facilities has been located to ensure that it is highly accessible by foot and cycle to all areas of the site. For example, access to the primary school by foot has been a key consideration.
- The development of a comprehensive green infrastructure strategy for the site that includes areas of public and private green space. The green infrastructure is 46%, with public exceeding 35% (these figures exclude back gardens) of the total site. The green



infrastructure provides opportunity for interaction between children and young people and with their environment.

- A new bus service is to be provided through the site and will enable all residents and occupiers of the site to be within 400m of a bus stop.
- Allotments are included within the site to enable local food production, as well as local orchards.
- Incorporation of radon protection measures into new dwellings.

Other mitigation measures that should be implemented to reduce potential adverse human health effects and to maximise potential health gains are:

- Ensure ownership and responsibility for maintenance of external spaces and buildings are clearly defined. High levels of maintenance of, for example, areas of greenspace will encourage more active use which should help to reduce incidence of crime and associated perceptions of fear of crime.
- Further consideration should be given to delivering improved walking and cycling routes in conjunction with Oxfordshire County Council in the vicinity of the proposed Exemplar development to provide good connections with Bicester town centre. Consideration should also be given to the objectives of the RoWIP and how footpath strategies and improvements delivered as part of the future development of NW Bicester can complement these objectives.
- A road safety audit must be undertaken to ensure that accidents do not increase in number or severity.
- Ensure provision of effective signage throughout the proposed Exemplar development to encourage walking and cycling to key facilities.
- In the long-term, the 'Health Walks' initiative should be extended to include the proposed Exemplar development to further encourage the pursuit of healthy lifestyles amongst the new residents.
- Develop opportunities to include public art within the proposed Exemplar development to provide a means of engaging with the community and to create a 'sense of place' and 'ownership'.
- As the design process continues, opportunities for engagement and collaboration with nearby residents should be developed further.
- As a result of our policy of connecting the site to the rest of Bicester by other means other than by road, a walking survey has been carried out in Bicester to identify the weaknesses in the current footpaths and cycle ways but also to establish the distances and realistic times to travel the distances to the various destinations in the town not only for the able bodied but also the disabled. This information will be used to deliver wider off-site improvements.

## 14.6 Assessment of Effects

The assessment of effects of the proposed Exemplar development on human health is presented in the sections below. The effects have been separated into construction and operational phase effects and have been grouped by health determinants.

## 14.6.1 Construction Phase Effects

### Employment and Economy

During the construction phase, employment opportunities will be created and there will be potential indirect economic benefits for local businesses, for example, local accommodation providers, as a result of spending by the construction workforce (refer to Chapter 15, Socio-Economics and Community for further details). There are also opportunities for upskilling of the existing workforce as a result of the design specification for the proposed Exemplar development. There is strong evidence documenting the health benefits of being in employment and the associated health benefits (mental and physical)<sup>13</sup>. For this reason, health effects are assessed as **positive**. The likelihood of this impact occurring is considered **possible** as the health effects will depend upon a number of factors including: the types of jobs created, the status of those who will take the construction phase employment opportunities i.e. will they be those who are currently unemployed?, the income offered by the employment opportunities, the types of jobs that will be created and the types of contracts that employees will have - these are all factors that can ultimately influence the likely health benefits realised. To secure maximum health benefits as a result of the construction works, it is recommended that opportunities are sought to establish employment routes that enable those currently unemployed to benefit from the construction works and for local apprenticeships and training scheme providers to be engaged in the works to provide maximum upskilling benefits.

### Safety and Security

Construction works have the potential to adversely affect health and well-being, both to those working on the construction site, but also members of the public who may come into contact with the works. The mitigation measures clearly identify that all works will be undertaken in accordance with the health and safety legislation prevailing when the scheme is constructed and that the works will be securely cordoned off to prevent public access. Whilst adherence to these legislative requirements will create a working environment that is conducive to safe working, the effects on health status are assessed as **neutral**. There is scope for further benefits to be delivered although this will depend upon the contractors appointed and the specific health and safety training they deliver to their employees, the hours that employees are required to work and any associated benefits that may be provided by the contractors that could benefit health.

### Air Quality

There is a large body of evidence which documents the health impacts of various pollutants and it is apparent that health effects of air pollution are greatest for 'at risk' groups including the elderly, people with chronic chest and heart disease and young children. Dust and particulate matter generated by construction sites has the potential to cause adverse health effects. Whilst dust cannot generally be ingested as the particle size is too large, it can cause eye, throat and nose irritation. PM<sub>10</sub> is of more concern from a health perspective as it can enter the lungs causing respiratory difficulties and cardiovascular concerns in the long-term<sup>14</sup>. The receptors most likely to be affected are Home Farm and the Lodge which are situated within 100m of the site. They are most likely to be affected by dust particles of greater than 30 µm. There is also the potential for particles of size 10–30 µm to travel up to 500m and particles of less than 10 µm to travel 1,000m or more.

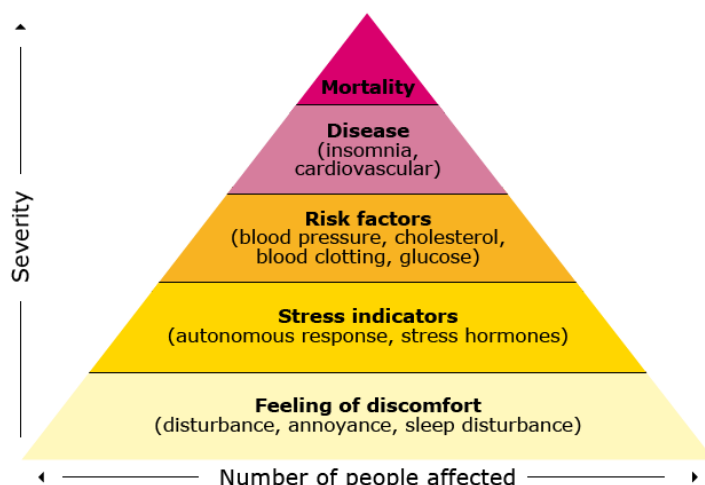
Owing to the temporary nature of the effects and the proposed mitigation measures, including regular dust monitoring during the construction works and the establishment of trigger levels to ensure effective mitigation is implemented, the health effects are assessed as **neutral** as there should be no significant change to health status. Dust generation will also be intermittent during the construction works. The review of the existing health status of the population in Section 14.4

identified that the health of the population in Bicester is generally good and so they may be considered less vulnerable to adverse air quality effects than a population where there is a higher prevalence of existing respiratory and cardiovascular conditions.

## Noise and Vibration

It is well documented that noise can adversely affect health and well-being. Figure 14-8 depicts the adverse health effects that can be generated by elevated noise levels.

**Figure 14-8 Health Effects of Noise (Source: Babisch, W, 2002 cited in Good Practice Guide on Noise Exposure and Potential Health Effects, 2010)<sup>15</sup>**



The key sensitive receptors that could be affected by elevated construction noise levels are Greenacres, Caversfield and the Lodge along the B4100. The construction noise assessment presented in Chapter 10 (Noise) states that with the implementation of mitigation there will be no significant noise impacts. Whilst, there may be some intermittent disturbance caused by certain, very noisy construction activities, they will not result in prolonged adverse effects and so it is assessed that there will be a **neutral** effect on human health as there will be no significant health improvement delivered and no significant health loss or deterioration caused. Through the use of a Section 61 consent during the construction period, it will be possible to ensure that noise levels are controlled in line with the recommendations outlined in Chapter 10 of this ES. Proactive engagement with the potentially affected receptors in advance of the construction works commencing will also be important to help manage any potential anxiety issues, as will the use and management of a complaints procedure during the construction works to ensure that any issues are promptly resolved.

## Physical Environment and Urban Design

During the construction works there will be changes to the built and natural environment within and adjacent to the site. Modifications to the physical environment have the potential to affect human health as a result of localised disturbance which may cause anxiety or as a result of emissions, such as dust emissions or increased levels of noise and vibration (the latter issues have been discussed above). There may be temporary deterioration in amenity value for users of nearby paths and bridleways particularly those to the north and west of the proposed Exemplar development as shown on Drawing 15-3, such effects are not considered likely to have a significant effect on health status. Similarly, the changes to the amenity value of the environment as a result of the construction works are not considered to result in significant changes to health status and are also assessed as **neutral**.

## Healthy Lifestyles

Based upon the analysis provided in the 'Physical Environment' section above, the assessment for the construction phase is **neutral** as the ability of nearby residents and the wider community to pursue healthy lifestyles will not be affected by the construction works.

## Transport and Access

Traffic and transport is a significant source of stress but there is a lack of epidemiological research on the health impacts. However, there is evidence that transport related stress can cause sleep disturbance and increase blood pressure amongst drivers<sup>16</sup>. Chapter 17 (Traffic and Transport) reports that there will be negligible effects on traffic and transport during the construction phase, with the implementation of the proposed mitigation measures which include careful routing of heavy goods vehicles to avoid residential areas and the use of on-site manufacture to reduce transport requirements. For this reason, it is assessed that effects on human health will be **neutral**.

## Waste Management and Contamination

Chapter 12 (Contaminated Land) confirms that there are no contaminants present above the relevant human health and controlled waters assessment criteria. Therefore, there will be no significant health risks to site operatives during the works and effects are assessed as **neutral**. During construction works it is possible for pathways to be created allowing any potential contaminants to migrate to underlying groundwater which may then be used as a drinking water source. However, owing to the absence of contaminants such human health effects are assessed as **neutral**.

Chapter 12 (Contaminated Land) identifies that naturally occurring radon is present and, therefore, basic radon protection measures will be required for the construction of new dwellings. The inclusion of this mitigation in the design means that health effects are assessed as **neutral** as there will be no residual risk to health status.

## Community and Social Infrastructure (including Community Spirit and Engagement)

During the construction phase, there will be no adverse effects on community and social infrastructure. Effects are assessed as **neutral** from a human health perspective.

The extent of an individual's participation in their community and the added control that this may offer to their lives and health status is documented in literature<sup>17</sup>. It will be important during the construction phase to communicate openly with the communities that may be affected such that they understand the works that are being undertaken and any potential disruption that it may cause to adequately manage any concerns and to reduce the risk of anxiety which can have adverse effects on mental health status.

## Access to and Provision of Health Facilities and Services

During the construction phase, there will be no adverse effects on the provision of health facilities and services as all existing facilities will continue to be operational and accessible. Effects are assessed as **neutral**.

## 14.6.2 Operational Phase Effects

### Employment and Economy

Chapter 15 (Socio Economics and Community) identifies a positive significant impact on employment as the proposed Exemplar development will generate a number of jobs and could potentially attract a significant amount of new investment within the immediate area i.e. the Central Impact Zone and potentially the Wider Impact Zone (study area terminology used in Chapter 15). These job opportunities could offer potential indirect **positive** health impacts. The likelihood of health benefits being realised is considered **possible** as the effects will depend upon who benefits from the employment opportunities and the types of jobs, pay and contracts offered (as identified in the discussion of potential construction effects).

The Marmot Review<sup>17</sup> identifies that health inequalities arise because of inequalities in society. A key factor is being able to access good employment opportunities and, therefore, improving access to good jobs and reducing long-term unemployment across the social gradient will help to reduce health inequalities. Whilst health status is generally good across Cherwell District, there are inequalities between parts of the district and this is reflected in the differences in life expectancy. There are opportunities for such issues to be addressed by providing access to the employment opportunities for those who are currently unemployed. This can be secured by promoting long-term apprenticeships and initiatives and maximising the upskilling opportunities presented by the proposed Exemplar development and in the future by the development of the rest of the eco development.

### Safety and Security

The proposed Exemplar development has been designed to minimise the risk of crime through the use of Secured by Design principles and this is assessed as having a potential **positive** health impact as the design will enable future residents and users of the site to pursue lifestyles that are not adversely affected by crime and fear of crime. The likelihood of this impact being realised is assessed as **probable** as there is a strong body of evidence that demonstrates the associations between urban design and incidence and fear of crime and the associated effects on health status and lifestyles. It has been identified that fear of crime may act as a barrier to physical (e.g. walking and cycling) and social activities (visiting places) that benefit health<sup>18</sup>. The positioning of key walking and cycling routes through the site has been designed to ensure they benefit from natural surveillance. In the long-term, the effective maintenance of the proposed Exemplar development and its soft and hard infrastructure will also help to ensure that such positive impacts continue to be realised.

### Air Quality

The House of Commons Environmental Audit Committee Report<sup>19</sup> critically reviews current performance across Government in relation to the achievement of air quality targets. Transport in particular comes under heavy scrutiny with a significant shift in transport policy needed to ensure that air quality targets can be achieved. The onus is put upon local authorities to do more to tackle poor air quality and the need for Government to provide guidance about how to further develop local air quality strategies. With improved air quality there will be improved benefits to the economy and human health. The development of the proposed Exemplar development will result in changes to traffic flows and access which have the potential to affect air quality and, therefore human health.

Chapter 9 (Air Quality) assesses the operational phase traffic emissions (including consideration of cumulative developments) for the opening year of the development for nitrogen dioxide (NO<sub>2</sub>) and PM<sub>10</sub>. For NO<sub>2</sub> concentrations, the impact magnitude at all receptors is either imperceptible or small and the overall impact is assessed as negligible. The magnitude of impact at all

receptors for PM<sub>10</sub> concentrations is imperceptible and the overall impact is negligible. Effects on human health are, therefore, assessed as **neutral**. Furthermore, the design has been focussed upon reducing travel by private car and encouraging the use of more sustainable modes of transport and use of active travel modes (walking and cycling).

Chapter 9 (Air Quality) identifies that the proposed energy centre has the potential to cause air quality impacts as a result of combustion emissions of NO<sub>2</sub> and PM<sub>10</sub> from the biomass boiler and gas Combined Heat and Power (CHP) plants. These will be emitted to atmosphere via dedicated stacks located on the roof of the energy centre. The air quality assessment predicts that the emission impacts will be between **slight adverse** and **negligible** on annual mean NO<sub>2</sub> concentrations and **negligible** on annual mean PM<sub>10</sub> concentrations at sensitive receptor locations. Exceedences of the relevant Air Quality Limit Values were not predicted at any location within the modelling extents. Based upon these results the health effects are assessed as **neutral**. The assessment also considered a worst case scenario of both the biomass boiler and the gas CHP plants operating at a maximum capacity continuously throughout the year and, therefore, the annual mean air quality impacts are likely to be significantly overestimated. An environmental permit will also have to be obtained for the operation of the energy centre and, therefore, the emissions and health effects will be subject to further scrutiny during the detailed design process.

## Noise and Vibration

The suitability of the site to accommodate residential development in line with the requirements of Planning Policy Guidance Note 24 (PPG24) has been assessed in Chapter 10 (Noise). The noise contours produced for the site (using a combination of baseline monitoring and modelling) indicate that the site falls within Noise Exposure Category (NEC) A which states that *'noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level'*. On this basis the use of the site for residential development is deemed acceptable from a human health perspective and effects on the health of future residents is assessed as **neutral**.

Studies suggest that the physiological and psychological impacts from transport related noise include speech interference, annoyance and sleep disturbance<sup>20</sup>. Within the literature there is some debate about causal links between noise levels and particular health outcomes although it is acknowledged that transport is a major source of ambient noise levels and so could have health impacts but the quantification of such effects is problematic.

Chapter 10 (Noise) assesses the noise effects of operational traffic of the proposed Exemplar development for the Opening Year (2016) and the Design Year (2026) at selected receptor locations. The assessment concludes that there will not be a significant increase in traffic noise. The noise levels at the selected receptor locations in the Do-Minimum scenario in 2016 are compared with the Do-Something scenario in 2026 and the results demonstrate that the maximum change in noise level is 1dB which is negligible in line with the significance criteria used in the assessment. Health effects as a result of traffic noise caused by the proposed Exemplar development are assessed as **neutral**. Furthermore, the design of the scheme has been focussed upon reducing travel by private car and encouraging the use of more sustainable modes of transport and use of active travel modes (walking and cycling) and the success of these measures both at the proposed Exemplar development and across the wider area could help to further reduce any risk of nuisance arising from road traffic noise.

The Energy Centre has the potential to generate noise nuisance and subsequent adverse health effects during its operation. Details about the plant to be installed and the potential noise effects are not known at this stage. Further studies will be undertaken to agree noise limits for plant to be installed on site with the local EHO and to ensure that the design meets these limits. The key issue will be to achieve a level below the night-time background (L<sub>A90</sub>) noise level



However, providing the mitigation measures identified in Chapter 10 (Noise) are implemented then health effects are considered to be **neutral**.

## Physical Environment and Urban Design

Central to the design of the proposed Exemplar development has been the concept of minimising travel by private car, and encouraging walking and cycling. The mitigation measures outlined in Section 14.5 identify how these concepts have been incorporated into the design. All of the measures should help to promote the pursuit of active lifestyles which should offer long-term health benefits and, therefore, effects are assessed as **positive**. The health effects of greater levels of physical activity include reductions in the risk of coronary heart disease, reductions in obesity, diabetes, hypertension, cancer, osteoporosis, depression and anxiety<sup>21</sup>. The evidence documenting the health benefits of active lifestyles and exercise is very strong and the concepts used in the proposed Exemplar development design are intended to make this possible and a way of life for new residents. The baseline data review identified that there is a need to increase activity levels to tackle issues like obesity incidence. Therefore, the likelihood of health effects being realised is **probable**.

The comprehensive green infrastructure strategy developed for the site is wide-ranging and has been designed to ensure that the requirements of PPS1 are achieved. The network of high quality, green spaces will provide opportunities for communities to interact, for residents to participate in physical activity and allow residents to engage with their wider environment, for example, through the development of the central riparian corridor that incorporates circular walks and through the inclusion of allotments.

The provision within the proposed Exemplar development for local food production from allotments is also assessed as offering potential health gains both physically and mentally. The provision of allotments offers the opportunity for local residents to grow vegetables which are essential to a healthy diet and also provide opportunities for social interaction which will offer mental well-being benefits. Health effects are assessed as **positive** as this is providing a proactive opportunity for healthier lifestyles to be adopted and the health benefits of a healthy diet are well documented. The likelihood of the effects being realised is **possible**.

These aspects again contribute to **positive** health effects as opportunities are provided to allow the pursuit of healthier lifestyles. Whilst the health benefits of green space are frequently cited, there are relatively few epidemiological studies on the relationship between nature and health and the mechanisms that underpin this relationship. A recent study in the Netherlands<sup>22</sup> sought to investigate this link further and again concluded that green space has an important effect on health. Based upon this evidence and the comprehensive green infrastructure strategy, the likelihood of such effects being realised is considered **probable**. The importance of ensuring sufficient green space provision has been further underlined by the shortfalls in parts of Cherwell District.

The housing to be provided across the site will meet Code for Sustainable Homes Level 5 and will meet Lifetime Homes standards. The Lifetime Homes Standard enables the housing produced to meet the requirements of a wide range of households, for example those with children or those requiring wheelchair access. Therefore, the housing provided on the site should be appropriate for a variety of owners (this is considered important in view of the ageing population and the potential need in the future for accommodation to meet the needs of an older population).

## Healthy Lifestyles

Issues relating to the ability to pursue healthy lifestyles through physical activity and diet have been addressed in the 'Physical Environment and Urban Design' and 'Transport and Access' sections of the assessment.



## Transport and Access

The majority of Bicester is located within a radius of approximately 3.2km (or 2 miles) from the centre of the proposed Exemplar development; a distance identified in PPG13 as being a reasonable journey by foot given the relatively flat topography of the town. Whilst there are currently limited opportunities for local journeys to be undertaken on foot to/from the, the design of the site has been modified to ensure that connections within Bicester town are developed making the scheme accessible. The design of the site from a transport and access perspective has the potential to offer potential health gains if the design encourages greater levels of walking and cycling and, therefore, effects are assessed as **positive**. Discussions with Oxfordshire County Council as part of the transport assessment have also identified proposals to improve a number of cycle routes in the vicinity of the proposed Exemplar development. In the long-term these improvements have the potential to further complement the measures that have been integrated into the design of the proposed Exemplar development, although it is not known when they will be implemented and, therefore, there is a greater level of uncertainty about whether such benefits will be delivered.

Chapter 17 (Traffic and Transport) concludes that issues of fear and intimidation as a result of the traffic flows generated by the development will be negligible as they have been considered as part of the design development through the provision of a joint footway/cycleway along the Banbury Road. Furthermore the internal layout of the proposed Exemplar development is such that traffic speeds and flows will be low which again ensures this issue to be negligible. High traffic flows and a perception of poor safety that may arise as a result of fear and intimidation could potentially inhibit levels of physical activity and as a result of design, it is considered that this perception has been successfully designed out and, therefore, there will be no adverse health effects. Overall effects on human health are assessed as **neutral**.

Effects on accidents (both number and severity) are uncertain at this stage as a Road Safety Audit has not been completed.

The provision of a bus service through the proposed Exemplar development that connects with the facilities in Bicester town centre is also seen as a strength as it ensures that facilities are accessible for those parts of the community who may not be as able to walk and cycle such as the elderly or those with physical disabilities. Further consideration of accessibility to different types of land use and facilities is provided in the Transport Assessment which concludes that the proposed Exemplar development is well located for a range of educational, employment, retail and leisure facilities within achievable walking and cycling distances. There are also facilities in Bicester town centre and other leisure opportunities that are easily accessible by cycling and public transport.

## Waste Management and Contamination

Chapter 12 (Contaminated Land) concludes that whilst end users of the site (residents) will come into regular contact with soil therefore there is the potential for accidental ingestion, dermal contact or inhalation of dust particles. However, as there are no contaminant sources confirmed on the site, the potential health effects associated with this risk are assessed as **neutral**.

## Community and Social Infrastructure (including Community Spirit and Engagement)

Community participation, inclusion and the establishment of strong community networks can help to protect against ill health and positively contribute to levels of overall well-being. The Department of Health<sup>23</sup> highlights the need to develop connected communities that promote social networks and engagement to provide long-term mental well-being benefits. The development includes provision of a number of community facilities to support the local

community that will live at the proposed Exemplar development. These facilities include: village shops, a primary school, a nursery, a community centre, and an eco pub and office space. These will provide opportunities for community interaction and engagement and provide an opportunity for healthier lifestyles to be pursued. Effects are, therefore, assessed as **positive** and the likelihood of the effect being realised is **possible** as effects will depend upon the extent to which the community facilities are used.

A community governance strategy has also been developed for the proposed Exemplar development. This is considered a strength from a human health perspective as it sets the framework for community ownership, engagement and responsibility that will further benefit community spirit and cohesion and could indirectly benefit mental well-being in the long-term. This is likely to benefit the local community living at the site but could also assist those living in the vicinity of the Exemplar development as there is a clear commitment in the governance strategy to integration of existing properties with the new development. The potential health effects are assessed as **positive**, although the likelihood of the effect being realised is **speculative**. Further consideration should be given to the use of public art within key areas of open space to create a sense of well-being and ownership within the development. This could offer positive health gains if a sense of well-being is achieved although such effects are considered speculative.

Chapter 15 (Socio Economics and Community) provides an assessment of the proposed Exemplar development on community facility provision and the effects on educational resources. The chapter assesses the effects as positive as there will be sufficient service capacity provided and there is potential for wider environmental and sustainability multiplier effects. Ensuring access to educational opportunities is vital to health and well-being. The provision of education facilities and services across the site is assessed as being appropriate and effects assessed as **neutral**.

## Access to and Provision of Health Facilities and Services

Based upon discussions with the Primary Care Trust and the results of the Community Facilities Audit, the proposed Exemplar development includes provision of a pharmacy. Current GP capacity in the area will be able to meet the demand arising from the development and, therefore GP provision is not proposed<sup>5</sup>. The provision of health facilities and services across the site is, therefore, assessed as being appropriate and effects assessed as **neutral**.

The transport assessment, as discussed in the 'Transport and Access' section above also concludes that health facilities are accessible from the proposed Exemplar development.

## 14.7 Cumulative Effects

The assessment of human health effects has considered the results of other chapters within the ES, as some of the effects they report have the potential to impact on human health either directly or indirectly. Therefore, the assessment presented within this chapter has inherently considered potential impact interactions and how they could cumulatively affect health status. There are likely to be a number of **positive** operational cumulative health impacts for the residents that will live at the proposed Exemplar development and potentially indirect benefits for other residents in the wider community if there are wider multiplier effects e.g. employment creation, improved cycle and walking links.

During the construction phase, there is the potential for cumulative adverse health impacts as a result of noise and vibration, dust and visual amenity nuisance, as well as potential disruption to transport and access. Individually, each of these issues have been assessed as having a **neutral** effect on human health, although there is a risk that during the works there could be particularly intense periods of activity which could result in some concerns for local residents,

although they are considered unlikely to result in significant adverse health effects with the implementation of the recommended mitigation measures. Such impacts will also be temporary. The use of Construction Environmental Management Plans will help to manage such potential adverse effects.

### 14.7.1 Cumulative Effects with NW Bicester

There is the potential for cumulative construction effects with the NW Bicester Eco-development linked to temporary increases in dust levels, potentially elevated noise levels and temporary increases in construction traffic. It is considered that such effects can be effectively controlled through the use of Construction Environmental Management Plans (CEMPs) and, therefore there will be no significant health effects.

The development of the NW Bicester eco development has the potential to generate a number of long-term positive cumulative health impacts with the proposed Exemplar development. There will be further opportunities to establish sustainable patterns of living, to promote greater levels of physical activity and to establish a community that has a strong sense of community spirit and well-being, whilst still being well-connected with other parts of Bicester town. The cumulative effects are uncertain and speculative at this stage as details of the design of the NW Bicester eco development are not known although it is understood that the principles of the proposed Exemplar development are to be continued. Achieving maximum cumulative health benefits will require continued engagement with the Primary Care Trust about the provision of health facilities, engagement with Oxfordshire County Council about the potential walking and cycling improvements needed and continued development of a comprehensive green infrastructure strategy. Ongoing dialogue with the local community will also be essential such that they are engaged in the process.

### 14.7.2 Cumulative Effects with Other Developments

The other developments that have the potential to have cumulative health effects with the proposed Exemplar development are presented in Table 18-2 of Chapter 18 (Interrelationships and Cumulative Effects). The assessment of the cumulative effects of these developments on human health during construction is uncertain as information is not available about the likely construction phasing. However, providing appropriate construction mitigation measures are implemented, such effects are unlikely to be significant.

In the long-term, there is potential for long-term cumulative health benefits with the other developments as they will provide infrastructure benefits including the provision of new schools, new civic buildings, new housing and new employment opportunities that could all offer indirect health benefits. The provision of associated infrastructure including new cycling routes and transport improvements as part of these developments could also offer benefits for physical activity.

Potential adverse effects could occur as a result of traffic generation and the associated effects on air quality and noise and vibration. These issues have been considered within the respective chapters of this ES and based upon current information are not assessed as likely to result in adverse effects that could adversely affect health status. Further details should be obtained from the Air Quality (Chapter 9) and Noise and Vibration (Chapter 10) chapters.

## 14.8 Summary

This chapter has assessed the potential effects on human health of the construction and operational phases of the proposed Exemplar development. A number of mitigation measures

have been incorporated into the design process to maximise potential health benefits and to minimise the likelihood of adverse health effects occurring.

During the construction phase, health effects were assessed as positive with regard to the potential employment opportunities that will be created and the wider upskilling benefits that may be delivered. The impacts on the following health determinants were assessed as having a neutral effect on health outcomes: safety and security, air quality, noise and vibration, physical environment and urban design, healthy lifestyles, transport and access, waste management and contamination, community and social infrastructure and access to and provision of health facilities and services. These assessments were informed by the results presented in the other ES chapters and the likelihood of there being a change to health status.

During operation the proposed Exemplar development will generate a number of jobs and could potentially attract a significant amount of new investment within the immediate area. Therefore indirect positive health effects were predicted. Positive health effects are also likely to occur (both physical and mental) as a result of the commitment within the design to creating a site where walking and cycling are encouraged, the provision of community facilities that will provide opportunities for community engagement and interaction, the use of Secured by Design principles that will help to reduce levels of crime and control perceptions of fear of crime and as a result of the comprehensive green infrastructure strategy that will provide a high quality environment and areas for informal sport and recreation. The air quality, noise and vibration and traffic and transport assessments also concluded that there would be no significant adverse effects during operation and this will also help to reduce the risk of potential associated adverse health effects for the population living at the proposed Exemplar development and those communities living in the vicinity of it.

# 15 Socio-Economics and Community

## 15.1 Introduction

This chapter presents the socio-economic impact assessment for the Exemplar development of the proposed North-West Bicester (NW Bicester) eco development, hereafter known as 'the proposals'. The assessment:

- Identifies the existing socio-economic and community context for the site and a defined wider study area.
- Assesses the potential impact of the proposal on local businesses, industry and retail sectors.
- Assesses the potential impact of the proposal on existing facilities and services.
- Identifies development and change likely to be facilitated or inhibited by the proposal.

## 15.2 Regulatory and Policy Framework

The following policies in Table 15-1 have been identified as relevant to this chapter. For each policy identified the requirements of that policy has been highlighted and considered in the context of the proposal.

**Table 15-1 Regulatory and Policy Framework**

Policy/Legislation	Requirements	Bicester eco development Exemplar Response
<b>National Planning Policy (Planning Policy Statements and Guidance notes)</b>		
Planning Policy Statement: eco-towns – A supplement to PPS1	<p>A range of minimum standards which are more challenging and stretching than would normally be required for new development. The standards act to ensure that eco-towns are exemplars of good practice and provide a showcase for sustainable living.</p> <p>Standards include:</p> <p>Meeting the functional characteristics of a settlement and a minimum of 5,000 homes.</p> <p>Homes must achieve Building for Life Silver Standard and Level 4 Code for Sustainable Homes, provide 30% affordable housing.</p> <p>40% of the eco-town total area should be allocated to green space, of which at least half should be public.</p>	The proposal (whole site) will meet all of the minimum standards identified in the PPS1 supplement.
PPG3 – Housing	Priority to achieve high quality housing, a mix of housing, effective use of land and the efficient use of land.	Quality and housing mix are fundamental components of the proposal; wherever realistic, maximising the eco-credentials

Policy/Legislation	Requirements	Bicester eco development Exemplar Response
		of the site, incorporating a diverse range and style of housing and achieving land use efficiency by incorporating a range of interconnected uses.
PPG4 – Planning for Sustainable Economic Growth  Policy EC2: Planning for Sustainable Economic Growth	Reference to the development plan needing to amongst other areas, support existing business sectors and where possible identify and plan for new emerging sectors. In addition, identify, protect and promote key distribution networks and locate or co-locate development which generates substantial transport movements in locations that are accessible.	The proposal supports existing and emerging sectors through an eco business and other on-site employment generating activities.
PPG17 – Planning for Open Space, Sport and Recreation	To ensure local communities cover the differing and distinctive needs of the population. Local standards need to be set and there should be a priority to maintain an adequate supply of open space and sports and recreational facilities. Planning for new open space and sports and recreational facilities should promote accessibility by walking, cycling and public transport, locate more intensive recreational sites that can contribute to the town centre vitality and viability, avoid loss of amenity to residents, neighbouring uses or biodiversity. The security and personal safety should be carefully considered, as should the scope for using any surplus land for use.	Provision for open space in the exemplar exceeds the 40% eco-town requirement, and a significant proportion of this has been designed for sports and recreation. Public transport and active travel options have been designed into the proposal.
<b>Local Planning Policy (Cherwell District Local Plan, adopted 1996)</b>		
Strategic Community Objective 7	To improve the affordability of housing in Cherwell and to provide social rented and intermediate housing to meet identified needs whilst ensuring the viability of housing development and a reliable supply of new homes.	The proposal incorporates a significant proportion of affordable housing, increasing the proportion of affordable housing for the area.
Strategic Community Objective 8	To improve the availability of housing to newly forming households in rural areas	The proposal is near to more rural areas of the county and considering the diversity of housing proposed will improve the availability to newly forming households.

Policy/Legislation	Requirements	Bicester eco development Exemplar Response
Strategic Community Objective 9	To seek a balance between economic growth, the development of new homes and the provision of sufficient, good quality services, facilities and infrastructure including green infrastructure to meet health, education, transport, open space, sport, recreation and other community needs.	The principals of the eco-town, highlighted in the PPS1 are aligned to this policy.
Policy NWB 1 – Strategic Allocation 1: North West Bicester Eco development	Allocation for 5,000 homes and jobs on land identified in North West Bicester with the standards set out in the Eco-towns' Planning Policy Statement (PPS) or any higher standards set out in the development plan. The site will be designed as an exemplar sustainable community in terms of places of employment, schools, travel planning, promoting and supporting healthier lifestyles, provision of local services and sustainable use of resources.	The policy relates directly to the development proposal.
Policy H5 – Affordable Housing Requirements	At Banbury and Bicester, all proposed developments that include 10 or more dwellings (gross), or which would be provided on sites suitable for 10 or more dwellings (gross), will be expected to provide at least 30% as affordable homes on site. All qualifying developments will be expected to provide 70% of the affordable housing as social rented dwellings, and 30% as other forms of intermediate affordable homes.	The proposal meets the 30% quantum of affordable homes. This proportion closely follows the socially rented/intermediate mix specified.
Policy H6 – Housing Mix	New residential development will be expected to provide a mix of homes to meet current and expected future requirements in the interests of meeting housing need and creating socially mixed and inclusive communities. The following mix will be used to guide decision making:  1 bed flats: 4% 2 bed upsizing flats: 8% 2 bed housing: 19% 3 bed houses and larger 35% 3 bed flats/cluster homes 2% 2 bed retirement/downsizing homes 23% 1/2 bed extra care homes 9%	The proposal has considered the range of housing specified within this policy and ensures a social mix and inclusive proposal.
Policy I3 – Open Space,	The Council will encourage partnership	The proposal has incorporated



<b>Policy/Legislation</b>	<b>Requirements</b>	<b>Bicester eco development Exemplar Response</b>
Sport and Recreation Provision	working to ensure that an appropriate quantity and quality of open space, sport and recreation provision is secured through measures which include ensuring that proposals for new development contribute to open space, sport and recreation provision commensurate to the need generated by the proposals.	a range of open spaces, including village square, green links, allotments and community gardens. The proposal actively promotes partnership working for example a dual use of school sports provision as a wider community facility.
Policy I4 – Local Standards of Provision	Proposals will be required to contribute to the provision of open space, sport and recreation, together with secure arrangements for its management and maintenance. The amount type and form of open space will be determined having regard to the nature and size of development proposed and the community needs likely to be generated by it.	The proposal includes the provision of over 40% open space (including private and public open space) which includes a range of sports and recreation provision including soft play, games courts and hard play areas. The scale of provision has responded to guidance and the demands of the associated community.
LO 4 (Community Objective for Bicester)	To deliver growth which improves the self-sufficiency of Bicester as a place to live and which addresses identified deficiencies in the provision of services, facilities and infrastructure.	The integration of the proposal within the existing community environment (including facilities and infrastructure) has been a core work stream. The proposal has considered the potential for new and the adaption or extension of existing facilities.
LO 5 (Community Objectives for Bicester)	To improve social cohesion by ensuring new development integrates and interacts with existing neighbourhoods, is accessible from those neighbourhoods by non-car modes of transport, and provides for a range of uses and dwellings that will contribute to delivering mixed communities.	The proposal has sought to maximise sustainable linkages both within the site and the wider environment. The proposal includes a range of land uses and housing types that collectively contribute to delivering mixed communities.
Policy BIC 5 Meeting the need for open space, sport and recreation in Bicester	Seek to establish an urban edge park around the outskirts of the town, linking existing green spaces with public footpaths/cycleways to create a circular route with connections to the town centre and the countryside beyond. Development that would prejudice this objective will not be permitted.	The proposal connects directly with the circular route around Bicester town and maintains the walking/cycling routes and access to the wider countryside.

## 15.3 Methodology

### 15.3.1 Introduction

The assessment has involved a combination of both quantitative and qualitative research methods to establish the socio-economic context in order to meet the outlined aims. The technical scope for this assessment has been defined by the nature of the proposal and the likely social and economic receptors that may be impacted upon. In summary the assessment is based on:

- Consideration of the socio economic and community issues highlighted by the Scoping Report and Scoping Response.
- The collection and analysis of socio-economic statistics in order to create a profile of the local area. This has been from a range of data sources including the Joint Strategic Needs Assessment for Oxfordshire (2009), the Office for National Statistics and Nomis web.
- Consultations undertaken including with stakeholders relating to the baseline topic areas. This has helped to ensure that the concerns of the statutory consultees and other stakeholders have been raised and addressed at an early stage.
- Use of the English Partnerships' Additionality Guide<sup>1</sup>, to assess the 'additional' impacts of projects during both the construction and operation stages of the proposal.
- Consideration for the existing land uses of the site, key social and economic facilities within the study area to help identify potential activity changes resulting from the proposed development.
- A site visit (August 2010) for further consideration of land uses of the site and its wider context.

The following sub-sections describe the assessment methodology in more detail.

### 15.3.2 Study Area

The spatial scope for undertaking baseline research has taken into account the following considerations:

- The site location in relation to surrounding electoral wards and settlements.
- The wider Bicester settlement characteristics and strategic location.
- The components of the proposal and their likely catchment area.

Aside from consideration for the Exemplar Site of the proposal, an assessment of potential socio-economic impact warrants consideration of two defined spatial areas: the Central Impact Zone (CIZ) and the Wider Impact Zone (WIZ).

The CIZ is defined by the four electoral wards that form Bicester settlement (Bicester North, West, East, South and Bicester Town), plus the electoral ward of Caversfield within which the site is located. Potential impacts in this area are highlighted as being more direct in nature and more significant in scale.

The WIZ considers the site in the wider region, focusing on the Local Authority area of Oxfordshire but the wider East Midlands region within which it sits. Potential impacts in this area are more indirect in nature and less significant in scale.

Selection of these two spatial areas allows consideration of both local and regional potential impacts of the proposed development. The CIZ will be the focus for the consideration of impact to include an appreciation for community facility capacity and provision.

Drawing 15-1 highlights the CIZ and WIZ areas that collectively form the study area:

### 15.3.3 Establishment of Baseline Conditions

#### Exemplar Site

Establishing the baseline conditions has drawn on a range of secondary information sources that have been supplemented by consultation with relevant stakeholders. Table 15-2 details the topic areas and spatial focus (dependent on appropriateness and availability of datasets).

**Table 15-2 Baseline topic areas**

Baseline Topic	Details	Spatial Focus	
		CIZ	WIZ
<b>Demography</b>	Population change	+	+
	Age structure	+	+
	Population forecast		+
<b>Economy</b>	Occupations	+	+
	Industry of employment		+
<b>Unemployment and other benefits</b>	Job seekers allowance	+	+
	Register of benefit claimants	+	+
<b>Housing</b>	Type, tenure	+	+
	Demand		+
<b>Education</b>	Provision, capacity and quality	+	+
<b>Other Community Facilities</b>	Sports and recreational facilities	+	+
	Community halls		
<b>Crime</b>	Crime rate	+	+
	Nature of crime		
<b>Tourism</b>	Attractions		+
<b>Walking/Cycling Links</b>	Public rights of way	+	
	Existing and proposed	+	
<b>Other Development Proposals</b>	Other significant development likely to generate cumulative impacts	+	

These topic areas have been identified to form the focus for consideration of potential socio-economic impacts.

### 15.3.4 Assessment of Effects

Whilst there is no published or established guidance for assessing the significance of effects on human environment and land use for a mixed use development, Volume 11, Section 3, Parts 3,

8 and 12 of the Design Manual for Roads and Bridges does refer to guidance for assessing the impact on Land Use, Community Access and Policies and Plans respectively. Whilst this guidance has been produced in relation to proposed roads and bridges it nonetheless provides a useful reference tool for consideration of any proposal in this context.

In addition, the Town and Country Planning Association in conjunction with the Communities and Local Government have produced an 'eco-towns economy worksheet' to support the development of an appropriate economic strategy for each eco-town to ensure a fully sustainable, competitive and prosperous future for the town. Section 4.1 of the worksheet refers to the development and analysis an economic baseline referencing a range of indicators and associated details.

This assessment seeks to identify and assess the land use changes and changes in socio-economic activities, which may arise from the proposed development, with resultant impacts on material assets. Unlike other environmental topics, such as noise, the sensitivity of socio-economic receptors to the proposed development is not determined by reference to designations or an objective standard. Instead, it is the nature of the activity that the human receptor is undertaking that is most influential in determining sensitivity. Professional judgement has therefore been applied in the case of each category of receptor considered in this chapter, with the degree of change to the receptor arising from the proposal determining whether or not an effect is likely to be significant.

## Impact Significance

All predicted impacts have been classified into one of three significance categories labelled 'Key Significant', 'Significant' and 'Not Significant'. Impact significance has been assessed by consideration of the following factors for each predicted impact:

- The magnitude of the predicted impact.
- The geographic extent of the impact.
- The duration and reversibility of the impact.
- The capacity of the local economy to absorb or adjust to the impact.

For an impact to be considered 'Key significant' it would need to display most or all of the following characteristics:

- Major or moderate impact magnitude – i.e. a sizeable change in relation to the baseline
- Affecting a wide geographic area e.g. of importance at local authority level rather than specifically the Bicester settlement
- Permanent or irreversible
- Presenting difficulties of adjustment for the local economy

'Significant' impacts would need to display at least two, of the above characteristics.

Finally, for an impact to be considered 'not significant' it would be expected to have most or all of the following characteristics:

- Slight or negligible impact magnitude
- Affecting only a relatively small geographic area
- Temporary or reversible
- Presenting few difficulties of adjustment for the local economy

### 15.3.5 Consultation

The following direct consultations were undertaken to establish the baseline for this chapter:

- Linda Currie, Education Team Leader, OCC
- Alison Millward, Education Department, OCC
- Kathy Brookshaw and John Goodwin, Land Use and Material Assets
- Joanna Sage, Integrated Transport Strategy, OCC
- Gillian Glason, Public Rights of Way Officer, OCC
- Stephen Norman, Commercial Property, Cherwell DC
- Fiona Brown, Strategic Housing Officer
- Chris Green, Chief Executive, SQW; involved in developing the economic strategy for the proposal
- Fiona Brenner, Independent Consultant; involved in developing the economic strategy for the proposal.
- Andy Cattermole, Senior Planner, Barton Willmore; involved in the development of social and community infrastructure for the proposal.

In addition to these consultations, the chapter has also taken into account consultation response as part of the wider consultation for the proposal. This includes minutes from key stakeholder meetings and public response to the open events.

## 15.4 Description of Existing Baseline Conditions

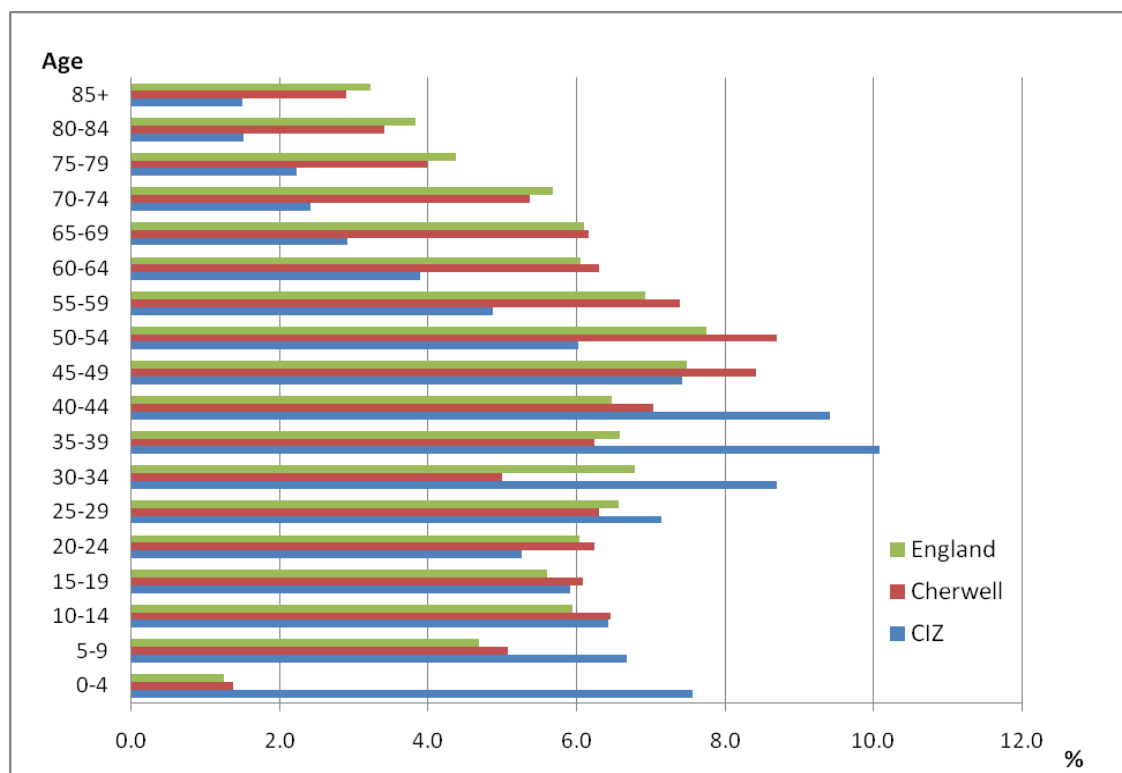
### 15.4.1 Demography

The combined population of the CIZ was predicated to be 32,933 in 2007 (mid-year population estimates). The most populated of the electoral wards was Bicester West (7,200 people), and the least populated was Caversfield (3,083 people).

In terms of population change, the CIZ has seen a total increase of 4 percent between 2001 and 2007 (according to mid-year population estimates) focused primarily within Bicester North and Bicester South electoral wards although other parts of the CIZ have seen a population decrease in this same period.

In terms of Age Structure the CIZ has a much higher proportion of people aged between 0-4 years (7.6%, in comparison to 1.4% in Cherwell DC and 1.3% in England as whole) and between 30 and 44 years old (28.2%, in comparison to 18.3% in Cherwell DC and 19.8% in England as a whole). Conversely, there is a comparatively smaller proportion of elderly people in the CIZ with 5.3% of the population over the age of 75 in comparison to 10.3% within Cherwell DC as a whole. These figures are indicated in Figure 15-1.

**Figure 15-1 Age Structure – mid-year population estimates, 2007, comparing CIZ, Cherwell DC and England**



Source: [www.nationalstatistics.co.uk](http://www.nationalstatistics.co.uk)

Population projections are available for the WIZ. Analysis of 5 year increments, as shown in Table 15-3, shows change over time between 2011 and 2031 within the Cherwell DC area reflects the population increases anticipated in the wider South East of England and England as a whole.

**Table 15-3 Population Forecast**

	2011-2016 % change	2011-2021 % change	2011-2026 % change	2011-2031 % change
<b>England</b>	3.6	7.3	10.9	14.3
<b>South East</b>	3.9	8.0	12.1	15.9
<b>Cherwell</b>	3.7	7.5	11.1	14.4

Source: Office of National Statistics, Population Projections

## 15.4.2 Economy

The economic baseline for the proposal is considered in terms of the site specific context before considering the wider economic context of defined Study Area (in terms of the CIZ and WIZ).

The existing economic functions of the exemplar site are primarily agricultural and the impacts in this context are covered within Chapter 13 (Land Use and Agriculture). Home Farm, directly east, includes the conversion and extension of its outbuildings into 'The Courtyard' which accommodates the following businesses:

- Pea Green: Sports Physiotherapy Clinic

- Hill Partnerships (Western) Ltd, an affordable homes provider
- Teslayn Engineering, a specialist American car workshop
- UKR Engineering Affairs Ltd, specialising in the application and management of national and international drugs licensing

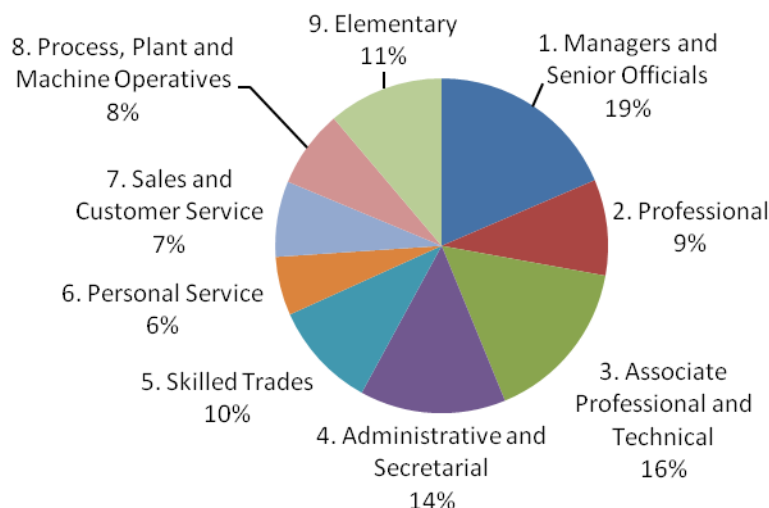
## Employment

In terms of the existing employment context the baseline has considered the type of occupations and industry of employment of people within the CIZ (taken from Census Data 2001), but then supplemented by more up to date statistics available at the local authority level (taken from the Annual Business Inquiry, 2007). The number of VAT registrations / deregistrations has also been considered to give an indication of business activity (taken from [www.nomisweb.co.uk](http://www.nomisweb.co.uk)).

## Occupation

The proportion of residents in the CIZ employed in each occupation is presented in Figure 15-2. The greatest proportion (19%) work as a 'Manager or Senior Official', with the next most common occupation detailed as 'Associate Professional and Technical' (16%). Conversely, the least popular occupations were 'Personal Service' roles and 'Sales and Customer Service'. These figures are broadly comparable to proportions for Oxfordshire as a whole.

**Figure 15-2 Occupations within the CIZ**



Source: Census 2001, [www.nomisweb.co.uk](http://www.nomisweb.co.uk)

## Industry of Employment

Those industries in which these residents were employed are generally comparable to the wider OCC industry employment areas, with the exception of the following:

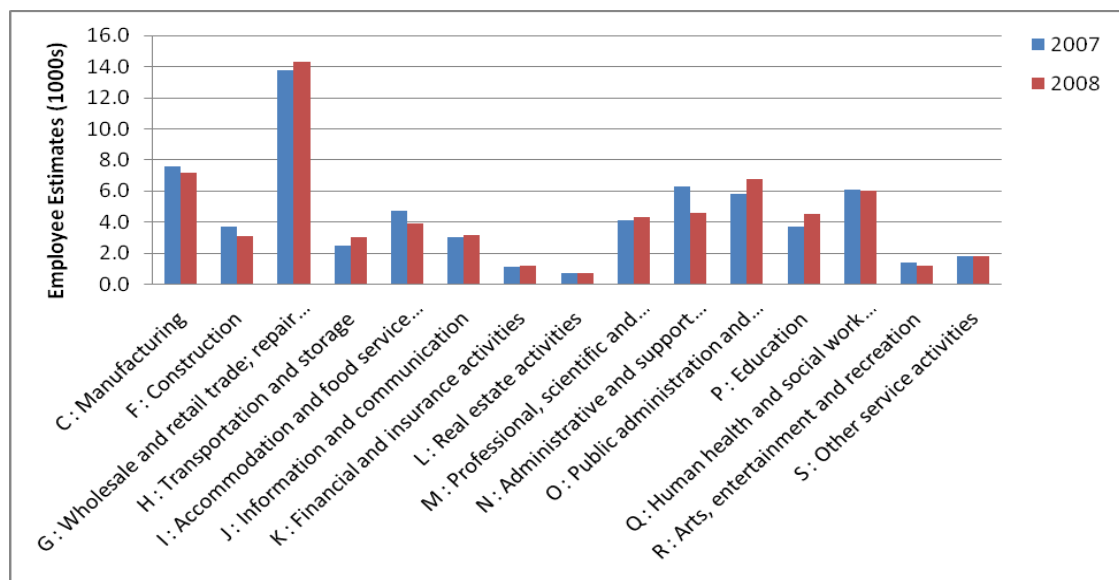
- A higher proportion (10.6%) of residents employed in 'public administration, defence and social security' than in Oxfordshire (6.1%)
- A lower proportion (5.7%) of residents employed in 'education' than in Oxfordshire (11%)
- A higher proportion (19.7%) of those employed in 'wholesale and retail trade and repair of motor vehicles' than in Oxfordshire (15.6%).

More recently, employment by industry statistics is available using the Annual Business Inquiry for the WIZ - specifically Cherwell DC, as indicated in Figure 15-3. 'Wholesale and retail trade



and repair of motor vehicles' continues to be the most dominant industry of employment. This industry along with 'Public Administration and Defence; Compulsory Social Security', 'Transport and Storage', 'Education', 'Information and Communication' and 'Professional, Scientific and Technical Activities' all saw increases in the number of employees between 2007 and 2008. Conversely sectors with declining numbers include 'Manufacturing', 'Construction', 'Accommodation and Food Service Activities' and 'Administrative and Support Service Activities'.

**Figure 15-3 Employee by Standard Industrial Classification within the WIZ (Cherwell DC)**



Source: Annual Business Inquiry, 2007, Office of National Statistics

In terms of VAT registrations/deregistrations within the WIZ (Cherwell DC) figures (Table 15-4) show a year on year increase in the number of VAT registered stock between 2001 and 2007. More recent figures may however indicate a net decline in the level of VAT stock, reflecting the economic downturn at the national level and the period of negative economic growth in 2008/2009.

**Table 15-4 VAT registrations/deregistrations within the WIZ**

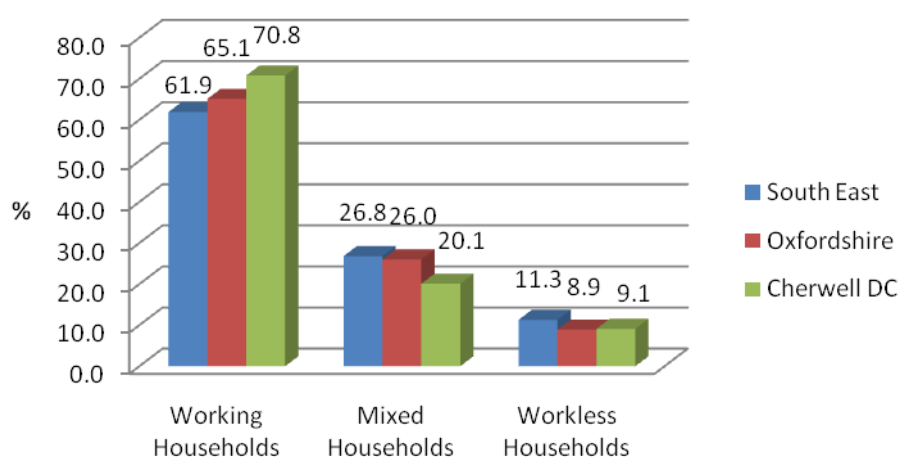
Year	2001	2002	2003	2004	2005	2006	2007
VAT stock	4,940	5,025	5,230	5,350	5,485	5,610	5,795

Source: VAT Registrations ([www.nomisweb.co.uk](http://www.nomisweb.co.uk))

## Worklessness

According to the Annual Household Population Survey (2008) and as highlighted in Figure 15-4, the WIZ (Cherwell DC) has a greater proportion of working households (70.8%) in comparison to Oxfordshire County Council and South East England as a whole. The proportion of workless households (9.1%) is more comparable to the average for Oxfordshire (8.9%) but slightly lower than the average for the South East (11.3%) as a whole.

**Figure 15-4 Worklessness in households comparing Cherwell DC with Oxfordshire and the South East**

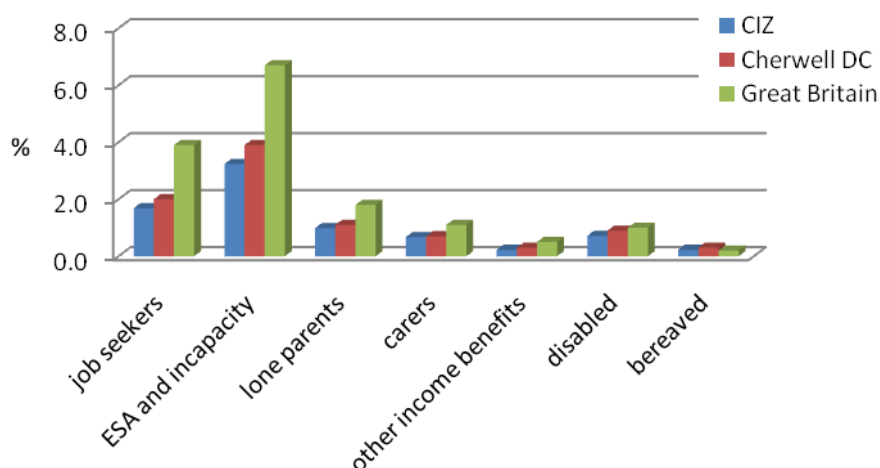


Source: Annual Population Survey Households, 2008

### 15.4.3 Unemployment and Benefits

In February 2010, the proportion of benefits claimants within both the CIZ (7.8%) and the WIZ (Cherwell DC, 9.1%), was much smaller than the average proportion of claimants for Great Britain as a whole (15.1%). Figure 15-5 portrays the breakdown in types of benefit claims. Particularly revealing is the breakdown of claimant types. Both the proportion of Job Seekers Allowance claimants, Employment Support Allowance claimants and Incapacity Claimants are significantly lower than the average for Great Britain.

**Figure 15-5 Benefit Claimants expressed as a proportion of the working age (16-64) within the CIZ, Cherwell DC and Great Britain**



Source: Claimant Count, February 2010, [www.nomisweb.co.uk](http://www.nomisweb.co.uk)

Focusing specifically on Job Seekers Allowance (JSA) as an indication of unemployment, within the CIZ there has been a general increase in the number of people claiming this benefit for longer than 6 months: there were 40 claimants registered for longer than 6 months in August 2007 and this number has increased to 90 claimants in August 2010. In terms of residents within the CIZ claiming for over 12 months, there has been a similar increase in the number of

people claiming for this period with 35 claimants registered for more than 12 months in August 2010 in comparison to just 15 claimants in 2007.

## 15.4.4 Housing

The following points summarise accommodation type and tenure within the CIZ in comparison to wider spatial areas as interpreted from Census Data 2001:

- The CIZ contained the greatest proportion of unshared houses/bungalows: 95.8% of all accommodation in comparison to 92.7% for Cherwell DC and 87.1% for Oxfordshire CC. (Census 2001).
- The CIZ includes a smaller proportion of flat/maisonette/apartments (3.7%), in comparison to 5.1% within Cherwell DC and 8.1% for Oxfordshire CC.
- There were a higher proportion of owner-occupied dwellings in the CIZ (79.9%) in comparison to 74.9% for Cherwell DC and 68.5% for Oxfordshire CC.
- There is a broadly similar proportion of homes in shared ownership in comparison to the average for Cherwell DC and Oxfordshire CC.
- A lower proportion of socially rented housing within the CIZ: 10.7% of housing is rented from the council or other social landlords, in comparison to 12.3% within Cherwell DC and 13.3% in Oxfordshire CC.
- A lower proportion of privately rented housing within the CIZ: 6.6% of housing tenure in comparison to 8.8% within Cherwell DC and 11.6% within Oxfordshire CC.

The Table 15-5 and Table 15-6 highlight quantities of housing type and tenure that have been included for the purposes of the impact assessment:

**Table 15-5 Accommodation Type**

	<b>CIZ (%) qu. in brackets</b>
<b>Unshared accommodation</b>	<b>99.5 (31,416)</b>
House/bungalow	95.8 (30,238)
Flat/maisonette/apartment	3.7 (1,166)
Mobile/temporary structure	0.03 (12)
<b>Shared accommodation</b>	<b>0.0 (0)</b>
<b>Communal establishment</b>	<b>0.5 (151)</b>
Medical and care establishment	0.5 (151)
Other type of establishment	0.0 (0)

Source: Census Data 2001

**Table 15-6 Housing Tenure**

	<b>CIZ (%) qu. in brackets</b>
Owns outright	14.8 (4,672)
Owns with a mortgage/loan	65.1 (20,548)
Shared ownership	0.5 (171)
Rented from council	7.3 (2,315)

	CIZ (%) qu. in brackets
Other social rented	3.4 (1,081)
Private rented	6.6 (2,071)
Living rent free	1.7 (552)
Communal establishment	0.5 (151)

Source: Census Data 2001

## Housing for the Elderly

Cherwell's Housing Strategy for Older People (2010-2015) prioritises providing and supporting preventative support services, increasing the provision of older peoples' specialist housing, improving the provision of information and advice and ensuring new housing developments meet the needs of older people now and in future.

## Housing Need and Affordability

The Housing Needs Estimates produced by B.Line Housing Information (June 2009) on behalf of Cherwell DC (Table 15-7) has revisited the Housing Needs Assessment undertaken in 2008 to account for the effect of the recession including the availability of mortgage finance and the fall in property prices. The document calculates the gross and net needs for affordable housing based on how prohibitive property prices and private rental costs were at the time of the study. Both of these statistics were compared against the affordable annual housing supply to provide the annual additional need estimated to be 1,250 properties. :

**Table 15-7 Annual Housing Needs Estimate**

		Annual Need
Gross need – based on entry level prices to buy	1,428	962
Affordable supply – general needs and supported lets and low cost sales	466	
Gross need – based on costs of private renting	754	288
Affordable supply – general needs and supported lets and low cost sales	466	
<b>Total annual estimated need</b>		<b>1250</b>

Source: Cherwell DC<sup>2</sup>

## 15.4.5 Education

Education services span from pre-school and nursery provision to universities and adult education.

### Day nurseries

Nursery and pre-school provision can broadly be split into two types of services. Provision for 0 to 2 year olds is mainly through the commercial sector. This can take place in a range of settings including childminders as well as part-time and full-time day care. Provision for 3 to 4 year olds involves part-time places within or associated with primary school, or service from the private sector sometimes requiring a 'top-up' contribution.

Amongst the 16 primary schools in the Bicester area, half have nursery classes. The closest three primary schools to the site are those which have nursery classes.

The nearest provision of day nurseries to the site is in Bicester and includes Busybees, Bubbles Pre-school and Jack and Jill Pre-school. Collectively, these nurseries provide 164 places. As well as the day nurseries in Bicester town centre, there is also some provision in the settlements surrounding Bicester including Fringford Pre-school Play Group in Fringford, and Chesterton Play Group in Chesterton.

## Primary Schools

As stated, there are 16 primary schools within the Bicester school area (see 'Education' map Drawing 15-2). The closest of these to the site are: King's Meadow Primary School, Southwold County Primary School and Bure Park Primary School. Ofsted reports for these schools show that both Southwold County Primary School and Bure Park Primary School<sup>3</sup> are assessed to be 'Satisfactory' while King's Meadow Primary School<sup>4</sup> is considered to be 'Excellent'.

According to Annual Schools Census (2009) data, the 16 primary schools in the Bicester have surplus capacity of 13% (equivalent to 534 places). Only one primary school in proximity to the site – Bure Park Primary School – is operating at full capacity. The other two schools closest to the site have 194 surplus places between them.

## Secondary Schools

Demand for secondary schools is usually spread across a wider area than that for primary schools and day nurseries. Secondary school aged pupils tend to travel further to school than those of primary school age. In addition, the range of specialist subjects taught in secondary schools naturally means that they are larger institutions with wider catchment areas than primary schools. Therefore, it is appropriate to consider secondary school capacity across Oxfordshire County as a whole as well as that of the nearest facility to the site.

The closest secondary schools to the Site, located in Bicester (see 'Education' map Drawing 15-2) are the Bicester Community College and Cooper School. Collectively, these schools have a surplus capacity of 420 places. Ofsted reports for these schools rate them as 'Satisfactory'<sup>5</sup> and 'Good'<sup>6</sup>, respectively.

Across Oxfordshire as a whole, Annual Schools Census (2009) data shows there is a 9% surplus capacity at secondary schools (equivalent to 2,800 places). As well as local authority secondary schools, there are also several academies in Oxfordshire. The most recent data available showed the North Oxfordshire Academy which opened in 2007 has 20% surplus capacity (based on PAN stated in Oxfordshire Council's admissions information)<sup>7</sup>. The Oxford Academy which opened in 2008 has surplus capacity of 40% (also based on PAN stated in Oxfordshire Council's admissions information).

Another academy – the Culham European School Academy – is due to open in September 2011 in Abingdon. The European School Culham is an existing school catering for children of staff at EU institutions and the children of fee paying bilingual and multinational families in South Oxfordshire. It is proposed that the European School Culham be brought into the mainstream state funded English system as an innovative, co-educational Academy, as far as possible retaining the ethos of a European school. The academy will specialise in Languages and Science. It will be an all-ages academy, providing an education for 3 to 18 year olds, and have an overall capacity of 980 places.

Discussions with the Education department of OCC suggests there is a growing demand for school places at the primary level resulting from increases in fertility, and both at the Primary and Secondary as a result of the economic downturn of 2008-2009 increasing the proportion of families using private education. OCC were confident that the growth in education capacity was in parallel with the anticipated expansion of the town.

## 15.4.6 Other Community Facilities

### Health Facilities

Existing capacity and quality of provision is discussed in the Human Health Assessment (Chapter 14).

### Sports and Recreation

Drawing 15-3 shows sports and recreation venues within the CIZ and those nearby in the WIZ that are likely to be affected by the proposal.

The Bicester Sports Association provides sports facilities at Oxford Road, Bicester and nearby in the WIZ, in Chesterton. These facilities are used by local sports clubs who accommodate a wide range of ages in their playing membership. The field sports include cricket, football (junior and senior) and rugby union.

Built facilities include the Bicester and Ploughley sports centre (see Drawing 15-3). The centre has undergone refurbishment offering a wide range of facilities for casual and regular users such as a Health Fitness suite, 25 metre swimming pool, Play n' Teach family pool with interactive water features, squash courts, activity halls and outdoor floodlit all-weather pitches. There is also a comprehensive keep-fit programme with over 30 classes to choose from. The centre also includes a registered creche and hosts a variety of sports clubs including martial arts, swimming and gymnastics. Further extension and refurbishment of the facility was undertaken in 2009 to including tenpin bowling.

The Cooper School Sports Facility is used by Cooper School during the day and managed by Bicester and Ploughley Sports Centre in the evenings and at weekends. The facility is situated adjacent to the Cooper School (see Drawing 15-3) on Churchill Road and includes a performance hall with theatre-style tiered seating, outdoor floodlit all weather pitches and an activity hall.

Other sports clubs located in Bicester using venues within the CIZ include Bicester Bowls Club (Garth Park), Bicester Hockey Club (Coopers School), Bicester Rugby Football Club, (adjacent to Kings End Hospital) and Bicester Tennis Club (Garth Park). Langford Kea Football is also located behind the KEA Social Club.

Other outdoors sports associated with Bicester including hunting, fishing and golf. Bicester is an established hunting centre and Bicester with Waddesdon Chase hold an annual point to point and organises hunting trials and horse shows.

In terms of fishing both the River Ray, the River Cherwell and other neighbouring rivers which flow down to the Thames can be fished and also some lakes. There is an established angling society at Bicester which rents six miles of stocked water of the River Ray.

For golfers, the nearest venue in or around Bicester is the Bicester Country Club (see Drawing 15-3).

### Play Areas

Bicester Town Council is responsible for all the play areas and the majority of open spaces in the town. The Town Council have a number of play areas within the town and the 2002 study highlighted an adequate provision of play spaces, albeit focused in particular areas of the town. The proceeding development of Bure Park redistributed the overall formal play space provision.

In addition there is a half-pipe (for skating/cycling) adjacent to Launton Road and a multi-purpose hard surface play area behind the leisure centre, Bowmont Square and at Keble Road.

Representatives from the Town Council are currently working in conjunction with Southwold School and Oxfordshire County Council Education Department for a third hard surface area in the town to be used by the school during the day and the community out of school hours.

## Community Centres

There are four community centres in Bicester. These are: Bicester East Community Centre; Langford Village Community Centre, Southwold Community Centre, and West Bicester. These centres provide a location for a number of groups to operate from. For example, Bicester Community Church uses Bicester East Community Centre to run toddler groups and over 50s groups.

The closest library to the Site is Bicester Library. This facility is open six days a week and offers internet access. The second nearest libraries to the Site is 17 kilometres away in Deddington (to the north-west) and 17 kilometres in Kidlington (to the south-west).

## Other Open Spaces

There are a number of open spaces in Bicester, including some within 1.5km of the Site. These are Purslane Drive and Shakespeare Drive Woods. Collectively, these areas offer approximately 10ha of open space. Both of these spaces are categorised as 'natural/semi-natural greenspace' in Cherwell District Council's Green Space Strategy. The majority of open spaces surrounding the Site are categorised as 'natural and semi-natural space'<sup>4</sup> and include a number of footpaths.

### 15.4.7 Crime

Crime levels for the CIZ (Table 15-8) are average in comparison to national levels. Analysis of crime statistics highlight the crime rate in Bicester Town is significantly higher than the wider Bicester settlement area and the Rural North. This reflects a much higher registration of anti-social behaviour and a higher rate of vehicle crime and burglary, generally characteristic of the more urban areas.

**Table 15-8 Crime rate Bicester area**

	Crime per 1000 people					
<b>Thames Valley Police Area</b>	<b>Burglary</b>	<b>Robbery</b>	<b>Vehicle crime</b>	<b>Violence</b>	<b>Anti-social behaviour</b>	<b>All crime</b>
Bicester Town	0.9	0	0.5	3.2	6.3	16.6
Bicester East	0.5	0	0.1	0.6	3.1	3.6
Bicester West	0.2	0.1	0	0.8	2.2	2.4
Bicester Rural North	0.5	0	0.3	0.4	1.3	2.9

Source: Crime Statistics: <http://maps.police.uk/view/thames-valley/> (August 2010)

<sup>4</sup> Cherwell District Council (July 2008) *Green Spaces Strategy Background Document*



## 15.4.8 Tourism

Bicester Village has strong international links with eight other associate outlet shopping villages in mainland Europe, all exponents of high-end retailing opportunities. Bicester Village has sought to connect with other high-end heritage attractions including Blenheim Palace (29 kilometres northwest) and Waddesdon Manor (19 kilometres southeast), but also luxury accommodation such as Le Manoir aux Quatre Saisons (29 km southeast) and Shakespeare House (20 km northeast). The proximity of Bicester Village and other regional assets has ensured there is a strong provision of high value visitor attractions that generate significant economic stimulus.

Bicester has a historic core with a good range of heritage buildings such as the Old Vicarage, Bicester House, and St Edburghs Church. Other buildings such as the Dovecote and the town's old Lock-Up also add to the character of the town and its distinctive appeal. Collectively these offer a degree of visitor interest albeit more local in appeal. In addition the Market Square in the town still holds a traditional market-day every Friday, as well as a Farmer's Market on the second Thursday of every month with other speciality markets throughout the year. Bicester Town Council host or support a number of other events, particularly through the Summer months. These include music and picnic events such as Proms in the Park and an annual Jazz Festival in Garth Park.

There are a number of other established accommodation facilities (Table 15-9) within the Bicester area, serving both business and leisure tourism markets. These include hotels/inns, guesthouses and farmhouse bed and breakfasts and self-catered units:

**Table 15-9 Visitor Accommodation**

Accommodation Type	North Oxfordshire Registered Accommodation
Hotels and Inns	<ul style="list-style-type: none"><li>▪ Bicester Hotel, Golf and Spa</li><li>▪ Bignell Park Hotel</li></ul>
Guest Houses Bed and Breakfasts	<ul style="list-style-type: none"><li>▪ AVA House bed and breakfast</li><li>▪ Weston Grounds Farm</li></ul>
Farmhouse Bed and Breakfasts	<ul style="list-style-type: none"><li>▪ Manor Farm</li></ul>
Self-catered units	<ul style="list-style-type: none"><li>▪ Grange Farm Country Cottages</li><li>▪ Grooms Cottage</li><li>▪ Stoke Lyne Farm Cottages</li></ul>

(Source: [www.visitnorthoxfordshire.com](http://www.visitnorthoxfordshire.com))

## 15.4.9 Public Rights of Way

Drawing 15-3 highlights the proximity of the Public Rights of Ways (PRoW) to the Exemplar Site.

There are no PRoW that conflict with the proposal; there is however an opportunity to connect the proposal to the wider PRoW network at the footpath junction with the B4100.

The wider Bicester area has also been the subject of further investigative work by Oxfordshire County Council to retrofit a series of walking and cycling greenway routes. This includes proposed widening around Caversfield, widening through Bure Park Nature Reserve and plugging the walking cycling gaps to connect existing walking and cycling links.

## 15.4.10 Other Development Proposals

Bicester is an area of significant development interest with a number of urban development schemes proposed either within the existing settlement boundary or seeking to extend the urban area in other directions. Proposals include mixed use schemes, containing a mixture of housing and commercial land uses but significantly their own provision of community facilities and services to accommodate an anticipated increase in population. The need to consider the cumulative impacts of the construction and functional stages of the proposal must account for the wider development context, both on the potential pressures on local infrastructure and other supporting services and the potential employment demands from the locality.

In terms of planned future development of the settlement, it is important to note the following significant schemes at various stages of the development process:

- Planning permission has been granted for a strategic housing site of 1,585 homes at South West Bicester, including a health village, sports provision, employment land, a hotel, a new secondary school, a community hall and a 'local centre'.
- Permission has also been granted for another site of 500 homes at Gavray Drive, including a new primary school, open space and a local wildlife site.
- Permission has also been granted for the redevelopment of the town centre including a Sainsburys supermarket, other retail premises, a cinema, library and a new civic building.
- Planning permission has also been given for a new business park comprising 60,000m<sup>2</sup> B1 employment space and hotel to the south of Bicester Village and east of the A41. Full development of this will however be subject to improvement to Junction 9 of the M40.
- Finally, Heyford Park is a mixed use scheme including 700 homes and 1.6 hectares B1, 1.8 hectares B2 and 8.6 hectares B8 of employment space. The development went to appeal in January 2010 and it looks like there will be a Public Inquiry.

## 15.4.11 Sensitive Receptors

### Construction

There are a number of receptors which would be sensitive to the potential sources of impact resulting from the construction of the proposed development. Sensitive receptors include:

- Residents within the CIZ
- Businesses within the CIZ
- Cyclists, walkers in proximity to the site
- Businesses in the CIZ and WIZ

It is important to stress that all impacts felt at this stage of the scheme would be short term and temporary in their nature, bringing few permanent adverse impacts to the social and economic environment. It is also likely that many of the potential impacts can be mitigated using best practice guidance. Potential mitigation measures are discussed further in Section 15.5.

### Operation

There are a number of receptors which would be sensitive to the potential sources of impact resulting from the operation of the proposal. Sensitive Receptors include:

- Local Residents
- Local Businesses
- Local Schools

- Community facilities

## 15.5 Design and Mitigation

A number of measures have been identified in order to minimise the potential adverse impacts but also maximise the potential benefits to be gained. These are discussed below.

Mitigation measures to reduce potential visual impacts and impacts upon noise are discussed in Chapter 6 Landscape and Visual Impact Assessment and Chapter 10 Noise and Vibration respectively.

### 15.5.1 Construction

A Construction Environmental Management Plan (CEMP) would be implemented to ensure that disruption is kept to a minimum, and careful working practices would be administered during the construction phase. The measures discussed below would be included as part of a CEMP:

- Traffic movements would be carefully phased and abnormal loads accompanied by the Police where necessary, to minimise any possible delays and disruption to regular road users, public access, community facilities, residences and businesses, particularly those used by vulnerable groups such as children.
- Establish a point of contact for listening to and addressing complaints or problems that is communicated to the general public.
- Produce a regular newsletter available in hard copy or via the internet to update the general public and businesses of construction progress. These mediums would also be used to forewarn public of impending construction activities.
- A curfew policy would be adopted so as to minimise disturbance for school users, by ensuring construction traffic would not affect local schools during the morning drop off and afternoon collection times.
- Any works to the existing highway network along the site access route would be conducted in a manner that would ensure access is maintained to residential properties, businesses and community facilities. Disruption would be kept to a minimum.
- Establish pre-employment routes with construction firms to help connect the long-term unemployed with employment opportunities and access to the wider labour market.
- Careful consideration would be given to the location and subsequent restoration of any areas of land required temporarily for access, storage and compounds, and other related facilities.
- Health and safety issues would be considered paramount during the construction phase.
- Register with the Considerate Constructors Scheme.
- Source contractors within the locality wherever possible.
- Working times implemented on site to minimise impact on residential amenity.

### 15.5.2 Operation

A number of potential sources of impact have been identified during the operation of the proposal. The following mitigation measures would be implemented during this stage:

- Careful working practices and regular building maintenance to ensure potential impacts during the function of the development are minimised.

- To ensure provision of education facilities within the proposal to accommodate the anticipated education demands of the resident population and positively contribute to the standard of education facilities within OCC as a whole.
- To include provision of other community facilities that will promote community interaction, empowerment and community development.
- To ensure the proposal includes opportunities for on-site business growth that is aligned to the eco-credentials of the site.
- To promote home-working through appropriate infrastructure such as broadband speeds.
- To ensure the safety of all user groups along the public routes, maintenance traffic using the access routes and internal roads would observe a low speed.
- Planning Obligations: Community Benefit Strategy. A tariff contributions system for community infrastructure that would cover all of the normal S106 items but excludes provision of affordable housing.
- Integration of the development with the local public transport network, providing information regarding transport availability in home owner's/tenant's start-up packs, and promoting public transport links in property sales.

## 15.6 Assessment of Effects

At the outset of each section, potential sources of impact have been identified and then discussed in further detail. A summary table of impact follows each impact description.

### 15.6.1 Construction Effects

The potential sources of impact on the socio-economic environment resulting from the proposal are identified as:

- Construction disturbances and nuisances – residential amenity may be affected by the construction works;
- A potential reduction in public safety due to construction activities;
- Local amenity: those travelling into the town centre and passing the construction site may experience a reduction in amenity due to construction activities;
- Construction employment generated locally;
- Construction staff expenditure may provide new custom for local businesses, particularly accommodation facilities, eateries and convenience retail outlets;
- Material sourcing; potential benefits to local suppliers of construction materials if sourced from the local economy;
- Sustainable construction techniques and the use of local materials; and
- Other Development considerations.

#### Disturbance and Nuisances

There may be short term disturbance and nuisances within the CIZ during the construction phase of the proposal. These impacts are discussed in more detail in Chapter 10 (Noise and Vibration) and Chapter 6 (Landscape and Visual Impact), but in the socio-economic context, implies that local users may experience a temporary reduction in amenity. For example, slight increases in noise as a result of construction activities, increased traffic volumes and congestion associated with construction traffic.

**Table 15-10 Impact overview: Disturbance and Nuisances**

Impact	Significance	Notes
Negative	Not significant	The impact on the local community is considered to be negligible, affecting only a relatively small geographic area and temporary in nature

## Public Safety

Construction works of any kind have the potential to effect public safety. Construction areas would need to be appropriately cordoned and signed to prevent public access and stipulate the necessary safety precautions if entering the site.

**Table 15-11 Impact overview: public safety**

Impact	Significance	Notes
Negative	Not significant	The impact on the local community is considered to be negligible, affecting only a relatively small geographic area and temporary in nature

## Local Amenity

The proximity of the wider Bicester settlement means that during the construction phase, there is the potential impact on local amenity including existing walking and cycling routes that circumnavigate the town and the opportunity for informal recreation may contribute to a short-term reduction in amenity, due to construction traffic and site clearance and construction works.

**Table 15-12 Impact overview: amenity**

Impact	Significance	Notes
Negative	Not significant	The impact on the local community is considered to be negligible, affecting only a relatively small geographic area and temporary in nature

## Employment

The construction of the proposal will provide construction jobs. Working on a basis of 0.7 person years per dwelling and at an indicative rate of 100 dwellings per year, this equates to 70 Full Time Employment (FTE) roles.

**Table 15-13 Impact overview: employment**

Impact	Significance	Notes
Positive	Significant	Job creation resulting from the construction resource demands of the proposal. The labour force that will benefit from this is likely to extend beyond the CIZ to the WIZ (Cherwell DC) and beyond.

## Local Expenditure

The construction costs of the proposal would be in the region of £65 million. It is anticipated that a significant proportion of this will be spent on local contracts, creating local employment opportunities. Construction works may also bring indirect benefits for local businesses,

particularly eateries and accommodation providers, with local spend associated with site workers.

**Table 15-14 Impact overview: local expenditure**

Impact	Significance	Notes
Positive	Significant	Direct and indirect expenditure within the WIZ as a result of the proposal: direct expenditure on construction resources, indirect expenditure on local accommodation and conveniences by the workforce during construction.

## Sustainable Construction Techniques

In addition to the employment generation potential of the construction process, the design specification of the proposal is likely to encourage the broadening in the skills base of existing skilled construction workers. It will also allow existing and future apprentices to learn more contemporary skills that could generate a step change in the demand for construction materials and the use of construction techniques for a new generation of construction workers.

**Table 15-15 Impact overview: skills**

Impact	Significance	Notes
Positive	Significant	Potential for existing and future construction workforce to learn new construction skills and materials that can influence the wider construction sector.

## Cumulative Effects: NW Bicester Eco development

The potential to construct the whole site area of the proposed NW Bicester eco development may exacerbate some of the potential adverse effects relating to local disturbances and nuisances, be detrimental to public safety and detract temporarily from the value of local amenity. In addition, the resource demands (both labour and materials) of the proposal may coincide with the resource demands of other development proposals and limit the potential to prioritise local employment. Conversely the proposal has the potential to, in conjunction with other development proposals, generate greater potential for local expenditure.

**Table 15-16 Open space**

Impact	Significance	Notes
Negative	Significant	Potential to exacerbate negative effects of the construction process in generating nuisances/disturbances. Whilst there is potential to generate greater local expenditure in conjunction with other development proposals, the collective demands for both labour and materials may detract from the local sourcing strategy advocated.

## Cumulative Effects: Bicester Area

The baseline research identified four other significant developments within Bicester Town that the proposal should take into account. All four schemes have already received planning permission and there is a potential adverse cumulative impact of the proposal: Mitigation measures should consider the integration of the construction programme with other schemes to address the cumulative impact of disturbance and nuisances from construction activities, the potential impact on key local amenities and potential demand and supply for construction materials and workforce.

**Table 15-17 Impact overview: cumulative effects**

Impact	Significance	Notes
Negative	Significant	Potential for the proposal to generate an adverse cumulative impact on a range of social and economic topics if the construction programme of other significant developments have not been taken into account.

## 15.6.2 Operational Effects

As with construction phase, the operational stage of the proposal highlights a number of potential Sources of Impact including:

- Population
- Industry of employment and economic growth.
- Unemployment levels
- Housing availability and type
- Education provision
- Other community facilities
- Crime
- Tourism
- Open space provision

### Population

There is a potential increase in population within the CIZ of 1,020<sup>8</sup>, resulting from the estimated capacity of residential units. Over the 20 year period from when the first units were occupied, this overall population figure is expected to drop but only slightly, to just under 1,000 people. Operation calculates this as a percentage of the total population of the WIZ (Cherwell DC):

**Table 15-18 Population forecast from the proposal**

Operating year of proposal	Total Projected WIZ Population	Forecast Increase	% of WIZ
1 (2016)	147,000	1,020	0.69%
15 (2031)	162,200	1,000 (estimate)	0.62%

Source: Combination of 2008 based population projections and Hunt Dobson Stringer Population Forecast

In addition, it is also observed that the eco-label for Bicester has the potential to generate greater demand for living within the CIZ, that is likely to generate and additional population increase.

**Table 15-19 Impact overview: Population**

Impact	Significance	Notes
Positive	Significant	A significant permanent increase in the population of the CIZ is likely to result re-enforce the vitality and viability of Bicester town centre and re-enforce the eco-branding for Bicester settlement.



## Industry of Employment and Economic Growth

In order to understand the potential impact on the defined industry of employment and occupation, the potential for employment generation needs to be considered in terms of on-site jobs (resulting from allocated land uses), population-derived jobs (resulting from estimated population increase) and additional potential employment (from home working).

### *On-site employment:*

The total on-site employment space is expected to provide 209 additional jobs<sup>9</sup>, equivalent to 0.33% increase in employment for the whole of Cherwell DC (according the ABI Estimates 2008). These will be primarily located in an eco-business centre (up to 130 jobs), a convenience store (22 jobs) and other office provision (18 jobs). A full overview of the on-site employment generating potential is provided in the following table. Those employment sectors relating to each employment source is also provided.

**Table 15-20 Onsite employment generation**

On-site employment	Estimated Job Numbers	Sector
Eco-business centre	120	Professional, scientific and technical activities
Convenience Store	22	Wholesale and retail trade
Office Provision	18	Professional, scientific and technical activities
Temporary outdoor market square	10	Wholesale and retail trade
Primary school	12	Education
Eco-pub	6	Accommodation and food service activities
Visitors Centre	5	Other service activities
Post Office	4	Wholesale and retail trade
Hairdresser	4	Other service activities
Nursery	4	Education
Pharmacy	3	Wholesale and retail trade
Multi-faith/community centre	1	Other service activities
<b>Total</b>	<b>209</b>	<b>0.32% increase in WIZ employment.</b>

Source: Economic Strategy for the Exemplar Development (November 2010)

### *Population-derived jobs:*

The growth in population associated with the proposal already highlighted will have important endogenous employment effects. The number of service (e.g. leisure and retail) jobs associated with the growth in population is expected to be approximately 40 FTE jobs, based on a multiplier of 0.4.

### *Additional potential employment:*

The construction of the proposal will involve the developer meeting its commitment to delivering manufacturing of eco houses in Bicester through an off-site factory. Whilst the building of the proposal is not contingent on a factory being built during the construction phase, it is assumed the proposal will result in an estimated 100 direct jobs and 350 indirect jobs required to meet the demands of the new factory.

The potential for home-working is an intrinsic component of the proposal. It is assumed that the proposal will be the main place of work for the equivalent of one full-time employee in every three households. This is therefore approximated to be 131 FTE jobs on-site, but accounting for potential double-counting the estimated number of jobs has been reduced by 10% to 118 FTE jobs on-site. There is the potential for spin-off employment generation during the operational phase as the principles of the proposal are realised and there is the potential to attract wider business investment. It is however not possible to quantify the employment generation from these impacts at this stage.

In terms of employment creation, this has been summarised in the following table:

**Table 15-21 Total employment generation**

Operational Employment	Number of Jobs
On-site jobs	209 FTE
Population-derived jobs	40 FTE
<b>Additional Potential Employment</b>	
Home working	118 FTE
Eco Factory	100 FTE+
New Investment	Too early to quantify

Source: Economic Strategy for the Exemplar Development (November 2010)

**Table 15-22 Impact overview: Employment**

Impact	Significance	Notes
Positive	Key Significant	The proposal will generate a number of jobs within the CIZ; directly through employment-related land uses and the potential to offer home working and indirectly through population derived jobs and the eco factory. It is also reasonable, although not possible to quantify, to suggest the proposal will generate a significant amount of new investment not just within the CIZ but also the WIZ.

## Unemployment Levels

The proposal has the potential to generate employment for those registered unemployed and potentially the long-term unemployed. The proposal will generate a range of skill demands and the extent to which the proposal will positively impact on unemployment levels will depend on the connectivity between emerging businesses and the unemployed cohort. There is an opportunity to maximise the employment benefits through appropriate mitigation.

**Table 15-23 Impact overview: Unemployment**

Impact	Significance	Notes
Positive	Significant	Potential to link those unemployed and in particular the long term unemployed with permanent employment opportunities.

## Housing Availability and Type

The proposal incorporates a range of housing types and tenures. 118 of the 393 properties within the proposal have been allocated as affordable housing; 30% of the housing stock. Of this 30%, 70% have allocated for affordable rent, and 30% in shared ownership.

Overall, the range of housing – from 1 bedroom flats to 5 bedroom dwellings – is considered to have a positive impact in promoting diverse, mixed communities. 100% of the properties are unshared accommodation, higher than the average for the CIZ (99.5%). Of these, 92.4% are either houses or bungalows and the remaining 7.6% allocated for flats. This will mean a net increase in the proportion of flats within the CIZ (currently only 3.74%) as indicated in the following table of 0.05%.

**Table 15-24 Housing stock change**

Accommodation Type	Total	CIZ (%) qu. in brackets (pre proposal)	CIZ post construction of proposal (%) qu. in brackets (post proposal)	% Change
<b>Unshared accommodation</b>	<b>393</b>	<b>99.52% (31,416)</b>	<b>99.53% (31,809)</b>	<b>0.01%</b>
House/bungalow	363	95.79% (30,238)	95.78% (30,601)	0.01%
Flat/maisonette/apartment	30	3.69% (1,166)	3.74% (1,196)	0.05%

Finally, in terms of housing, the design specification (minimum Code for Sustainable Homes Level 5) will increase the proportion of local housing stock.

**Table 15-25 Impact overview: Housing**

Impact	Significance	Notes
Positive	Significant	Expansion in the provision and range of affordable and private housing. Greater proportion of homes within the area of Code for Sustainable Homes, Level 5

## Education

The potential effect on local schools is dependent on the number of families to be attracted to the CIZ. Population modelling for the proposal has highlighted an approximate number of 135 primary and 55 secondary school children are likely to be resident within the proposal. These numbers are due to swell to 155 and 85 later on during the operation of the proposal<sup>8</sup>.

Considering the capacity analysis of the schools within Bicester Town, the nearest secondary schools, consultation with the OCC's education department, and other development considerations that have include an education component, the proposal is likely to have a positive effect on the community. There will be sufficient capacity to accommodate the increase in children of pupil age, and the wider environmental and sustainability principles advocated by the proposal are likely to generate positive educational spin-offs to include behavioural change and a reduction in carbon emissions.

**Table 15-26 Impact overview: Education**

Impact	Significance	Notes
Positive	Significant	Expansion in the capacity and quality of education facilities in the CIZ and WIZ. The education facility is likely to positively

		contribute to the education and wider development of young people attending the facilities on site.
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## Other Community Facilities

The proposal includes other community facilities that are considered to generate a range of wider socio-economic benefits to its residents but also to the wider community in the CIZ. These are:

- The Eco-pub
- Community Centre
- Convenience Store
- Two additional retail units

**Table 15-27 Impact overview: Other Community Facilities**

Impact	Significance	Notes
Positive	Significant	Community facilities designed primarily benefit residents in the CIZ and specifically within the site itself but offer significant opportunity for maintaining and enhancing community well-being.

## Crime

The design of the proposal has been developed to minimise the risk of crime occurring. The local constabulary have had the opportunity to comment on the design proposal and to this end, the impact of the proposal on this socio-economic is considered not significant.

**Table 15-28 Impact overview: Crime**

Impact	Significance	Notes
Neutral	Not significant	The potential for crime to occur has been minimised during the design development of the proposal.

## Tourism

The Exemplar Site is at the forefront of making the national eco-town concept a reality. It will be the first component of an eco-town to be constructed and as a consequence has the potential to generate some business tourism potential due to the overall appeal of the site but also its component parts, in particular the draw of the eco-business centre.

**Table 15-29 Impact overview: Tourism**

Impact	Significance	Notes
Positive	Significant	The proposal has the potential to generate for exemplar delivery of the eco-town concept but specifically through the eco-business centre activities.

## Open Space

The proposal incorporates around 46% of open space, that includes green links, village greens, river corridors, school gardens/playing fields, allotments and SuDS. Open space included within the proposal will result in net gain for the wider Bicester settlement.

**Table 15-30 Open space**

Impact	Significance	Notes
Positive	Significant	Net gain in the quantity of open space within the defined Bicester settlement boundary.

## Cumulative Effects: NW Bicester Eco development

The potential to construct the whole site area of the proposed NW Bicester eco development could reaffirm the vision of eco-Bicester and generate a number of significant positive impacts including:

- Potential inward investment and associated employment generation, particularly in high-tech manufacturing, engineering and environmental industries. The potential effect could spread throughout the CIZ as the eco-credentials of the region make it an appealing business location.
- Similarly, the eco-vision of the settlement could foster entrepreneurship as the business potential of the market becomes realised.
- Further net increase in the provision of affordable housing and improvements in the quality and range of housing stock.
- Expansion in the capacity and quality of local education provision.
- Potential increase in tourism revenue as the size and the scale of the eco development become realised.
- Whilst the actual level of crime within Bicester is likely to increase as the urban area of Bicester extends significantly, the crime rate (crime per 1000 people) is expected to remain unchanged if not reduce through effective scheme design.

**Table 15-31 Open space**

Impact	Significance	Notes
Positive	Significant	The whole site masterplan would affirm the eco-credentials of the proposal and add potency to the objectives of the proposal in generating significant social and economic growth.

## Cumulative Effects: Bicester area

The prevalence of a number of other significant development proposals within and around Bicester will generate a significant combined increase in the critical mass of Bicester and the services and facilities that are contained within it.

**Table 15-32 Open space**

Impact	Significance	Notes
Positive	Significant	Significant increase in critical mass and expanded provision in the provision of facilities and services.

# 15.7 Summary and Conclusion

The above assessment has considered the potential impacts of the construction and operational stages of the proposal.

It is important to recognise that the potential impacts identified during the construction phase of the proposal will, with the exception of employment (considered 70 FTE up until 2026) be short term and temporary in their nature. With the implementation of identified mitigation measures, the overall adverse impact of this phase would be minimised.

Potential impacts during the function of the proposal will depend on the perception of those identified receptors. For this reason, all potential impacts have been identified and mitigation measures proposed to minimise these impacts.

Overall, it is considered that with the appropriate mitigation measures, the potential impacts of the proposal on the defined social and economic environment would be positive.

# 16 Waste

## 16.1 Introduction

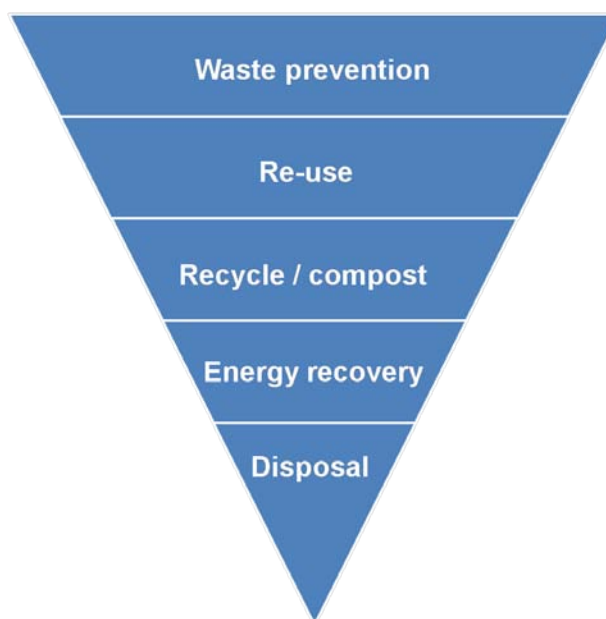
The proposed development will result in the generation of solid waste from excavation and construction (referred to this chapter as construction and excavation waste), and the operation of the site due to the residential and commercial uses of the site (referred to in this section as operational waste). Contaminated wastes are dealt with under Chapter 12, Contaminated Land.

### Introduction to waste management

Waste is defined in Article 3 of the European Framework Directive on waste (2008/98/EC) as “any substance or object which the holder discards or intends or is required to discard”, where the term ‘holder’ is defined as the producer of the waste or the person who is in possession of it and ‘producer’ is defined as anyone whose activities produce waste.

Waste can cause harm to the environment through its treatment and final disposal, and therefore, effective waste management should follow the principles of the waste hierarchy shown on Figure 16-6 below:

**Figure 16-6 Waste Hierarchy**



The assessment will consider the impact on the environment as a result of the generation of this waste and will detail measures to mitigate these impacts.

**Construction waste** – As the existing site is largely undeveloped land, it is anticipated that material waste likely to arise from the construction and excavation phases will consist of hard and inert materials, soils and stones, plastics, packaging (wooden and plastic), insulation material, miscellaneous metals, canteen and office waste.

**Operational waste** – As the development is predominantly residential, most waste generated during operation will be household waste, in addition to small quantities of waste from the commercial and public facilities.

Two key documents will be submitted as part of the planning application and will be referred to in this Chapter:



## Preliminary Site Waste Management Plan (SWMP)

The Site Waste Management Plan (SWMP) is used to plan, implement, monitor and review waste minimisation and management on construction sites. In April 2008 the Site Waste Management Plans Regulations 2008 came into force in England for construction projects costing more than £300,000 excluding VAT.

The SWMP is used to record how waste is reduced, reused, recycled and disposed of on a construction site. This effectively means:

- Recording decisions taken to prevent waste through concept and design.
- Forecast waste produced on site.
- Plan how to reduce, reuse and then recover the forecasted waste.
- Implement and monitor the planned activity.
- Review the SWMP and record lessons learnt.

The SWMP is a live document and is updated regularly during the course of the project. Preparing a SWMP at planning stage facilitates the identification and implementation of waste minimisation at the design stage and reuse and recycling opportunities during on site operations, reducing the quantities of construction waste sent to landfill. Preparing a SWMP also encourages the review of current waste reduction and recovery practice levels, highlighting areas where Good and Best Practice can be achieved.

## Sustainable Waste and Resources Plan (SWRP)

SWRPs are a requirement of *Eco-Towns - A supplement to PPS1*, to be submitted with all eco-town planning applications. The SWRP must:

- Set targets for residual waste levels, recycling levels and landfill diversion;
- Demonstrate how these targets will be achieved, monitored and maintained; and
- Establish how the development will be designed so as to facilitate the achievement of these targets.

The SWRP must also set out how developers will ensure that no construction, demolition and excavation waste is sent to landfill, except for those types of waste where landfill is the least environmentally damaging option.

## 16.2 Regulatory Framework

The framework for the assessment is derived from a combination of national, regional and local waste and policies and measures of which the key elements are:

- Meet and exceed the Landfill Directive diversion targets for biodegradable municipal waste.
- Increase diversion from landfill of non-municipal waste.
- Decouple waste growth (in all sectors) from economic growth and put more emphasis on waste prevention and re-use.

Details are listed in Table 16-33:

**Table 16-33 Waste Regulatory and Policy Framework**

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
EU Landfill Directive (Directive 1999/31/EC on the landfill of waste)	<p>Establishes a framework for the management of waste across the European Community. It also defines certain terms, such as 'waste', 'recovery' and 'disposal', to ensure that a uniform approach is taken across the EU. Furthermore, it is an instrument for driving waste up the hierarchy through waste minimisation and increased levels of recycling and recovery.</p> <p>Sets out a number of procedures and criteria for construction, excavation and operational waste acceptance at landfills, including targets for the progressive reduction of biodegradable municipal waste (BMW) being sent for disposal in landfill.</p> <p>The principles set up for the acceptance of hazardous and non-hazardous waste at relevant landfills includes ensuring that the waste will not endanger human health and the environment and satisfies the Waste Acceptance Criteria (WAC). They also set strict requirements for the acceptance of certain stable, non-reactive hazardous waste into non-hazardous waste landfills.</p>	<p>An assessment will be carried out against the context of the Schedule 10 of the Environmental Permitting (England and Wales) Regulations (EPR) 2010 (through which the Landfill Directive is implemented) and will assume that at a minimum, the targets in this Schedule will be met.</p> <p>Recommendations will be provided detailing the end destination of construction, excavation waste.</p>
The Waste Framework Directive (Directive 2006/12/EC on waste)	<p>The Waste Framework Directive (WFD; Directive 2006/12/EC on waste) contains the definition of waste. This definition is used to establish whether a material is a waste or not.</p> <p>In December 2008, the new WFD (Directive 2008/98/EC) came into force, amending some articles of the current WFD. Member States have until December 2010 for implementing the new WFD; at that time, Directive 2006/12/EC (and others) will be repealed. Amongst others, changes that will come into place include:</p> <ul style="list-style-type: none"> <li>▪ The setting of recycling targets for non-hazardous construction and demolition waste (70% by 2020).</li> <li>▪ A provision which would enable the European Commission to adopt EU-wide end-of-waste criteria for specified wastes. A waste specified in this way would cease to be waste when it has undergone a recovery operation and complies with the criteria set by the Commission.</li> <li>▪ The obligation for Member States to set up waste prevention plans within five years from the adoption of the Directive.</li> </ul>	<p>The WFD will be implemented through the Environmental Protection Act 1990 (as amended), the Duty of Care and Carriers and Brokers regimes and regulations and the Environmental Permitting (England and Wales) Regulations 2010.</p>
Environmental Permitting (England and	The Environmental Permitting Regulations (EPR) introduced a permitting and compliance regime,	A SWRP covering construction,

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
Wales) Regulations 2010	<p>which deliver many of the requirements of the European Environmental Directives and of national policy.</p> <p>The Schedules to the Regulations identify precise requirements, article by article, for each Directive which must be delivered through the permitting system. Each Directive covered by the Regime has a specific schedule. The most relevant for this project are:</p> <ul style="list-style-type: none"> <li>▪ Part A installations and Part A mobile plant (the Integrated Pollution Prevention and Control Directive) - Schedule 7.</li> <li>▪ Domestic Part B installations and Part B mobile plant - Schedule 8.</li> <li>▪ The Waste Framework Directive - Schedule 9.</li> <li>▪ The Landfill Directive - Schedule 10.</li> </ul>	excavation and operational waste will be produced. This will be carried out against the context of the Environmental Permitting (England and Wales) Regulations 2010.
Waste Strategy for England 2007 (WSE 2007)	<p>This strategy builds on Waste Strategy 2000 and the progress since then but aims for greater ambition by addressing the key challenges for the future through additional steps.</p> <p>The Government's key objectives are to:</p> <ul style="list-style-type: none"> <li>▪ Decouple waste growth (in all sectors) from economic growth and put more emphasis on waste prevention and re-use.</li> <li>▪ Meet and exceed the Landfill Directive diversion targets for biodegradable municipal waste in 2010, 2013 and 2020.</li> <li>▪ Increase diversion from landfill of non-municipal waste and secure better integration of treatment for municipal and non-municipal waste.</li> <li>▪ Secure the investment in infrastructure needed to divert waste from landfill and for the management of hazardous waste.</li> <li>▪ Get the most environmental benefit from that investment, through increased recycling of resources and recovery of energy from residual waste using a mix of technologies.</li> </ul>	<p>The assessment will be carried out against the context of the Waste Strategy for England 2007 and will assume that at a minimum, the targets in this Strategy will be met.</p> <p>The assessment will also apply the waste hierarchy with a focus on resource efficiency.</p>
Planning Policy Statement 1: Delivering Sustainable Development (CLG 2005)	<p>Whereas much of the guidance offered by PPS1 is of general or background relevance to the current proposals, the following specific points are noteworthy:</p> <ul style="list-style-type: none"> <li>▪ Paragraph 3 of PPS1 identifies sustainable development as 'the core principle underpinning planning'.</li> <li>▪ Paragraph 20 highlights that development plan policies should take account of environmental</li> </ul>	The ES chapter will have a section which considers the impact of waste in the development and will make recommendations to lesson that impact and for designing out

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
	<p>issues, such as the mitigation of the effects of and the adaptation to climate change, the protection of the wider countryside, the potential impact of the environment on proposed developments and the management of waste in ways that protect the environment and human health, including producing less waste and using it as a resource wherever possible.</p> <ul style="list-style-type: none"> <li>Paragraph 27 addresses the impacts of climate change, the management of pollution, and natural hazards, the safeguarding of natural resources and the minimisation of impacts from the management and use of resources.</li> </ul>	waste.
<p>Planning Policy Statement: eco-towns, A supplement to Planning Policy Statement 1 (CLG 2009)</p>	<p>This Planning Policy Statement (PPS) provides the standards any eco-town will have to adhere to and the list of locations identified with the potential for an eco-town.</p> <p>Eco-town planning applications should include a sustainable waste and resources plan (SWRP), covering both domestic and non-domestic waste, which:</p> <ul style="list-style-type: none"> <li>Sets targets for residual waste levels, recycling levels and landfill diversion, all of which should be substantially more ambitious than the 2007 national Waste Strategy targets for 2020; it should be demonstrated how these targets will be achieved, monitored and maintained.</li> <li>Establishes how all development will be designed so as to facilitate the achievement of these targets, including the provision of waste storage arrangements which allow for the separate collection of each of the seven priority waste materials as identified in the Waste Strategy for England 2007.</li> <li>Provides evidence that consideration has been given to the use of locally generated waste as a fuel source for combined heat and power (CHP) generation for the eco-town.</li> <li>Sets out how developers will ensure that no construction, demolition and excavation waste is sent to landfill, except for those types of waste where landfill is the least environmentally damaging option.</li> </ul>	<p>A SWRP covering construction, excavation and operational waste will be produced. This will be carried out against the context of the Planning Policy Statement: eco-towns, A supplement to Planning Policy Statement 1.</p>
<p>Planning Policy Statement 10: Planning for Sustainable Waste Management 2005 [6]</p>	<p>The publication of Planning Policy Statement 10; Planning for Sustainable Waste Management (PPS10) established decision making principles to which regional planning bodies and all planning authorities should adhere when preparing planning</p>	<p>A SWRP and a project specific SWMP will be prepared to identify the volume and type of material to be</p>

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
(CLG 2005)	<p>strategies.</p> <p>Paragraph 34 suggests that proposed new development should be supported by Site Waste Management Plans (SWMPs) to identify the volume and type of material to be demolished and/or excavated, opportunities for the reuse and recovery of materials and to demonstrate how off-site disposal of waste will be minimised and managed.</p>	<p>excavated, opportunities for the reuse and recovery of materials and to demonstrate that no construction and excavation waste is sent to landfill, except for those types of waste where landfill is the least environmentally damaging option.</p>
Strategy for Sustainable Construction (HM Government 2008)	<p>This Strategy is aimed at providing clarity around the existing policy framework and signalling the future direction of Government policy. It aims to realise the shared vision of sustainable construction by:</p> <ul style="list-style-type: none"> <li>▪ Providing clarity to business on the Government's position by bringing together diverse regulations and initiatives relating to sustainability.</li> <li>▪ Setting and committing to higher standards to help achieve sustainability in specific areas.</li> <li>▪ Making specific commitments by industry and Government to take the sustainable construction agenda forward.</li> </ul> <p>To deliver the Strategy, Government and industry have devised a set of overarching targets related to the 'ends' and 'means' of sustainable construction. The 'ends' relate directly to sustainability issues, such as climate change and biodiversity; the 'means' describe processes to help achieve the 'ends'.</p> <p>By 2012, a 50% reduction of construction, demolition and excavation (CD&amp;E) waste to landfill compared to 2008.</p>	<p>The assessment will be carried out to reduce construction, demolition and excavation (CD&amp;E) waste to landfill compared to 2008 baseline.</p>
Site Waste Management Plan Regulations 2008 (SI 314)	<p>The Site Waste Management Plan (SWMP) Regulations came into force on 6th April 2008. These Regulations do not apply in relation to projects planned prior to this date, but must be enforced where the construction began before 1st July 2008.</p> <p>The Regulations require any client who intends to carry out a construction project with an estimated cost greater than £300,000 (excluding VAT), must prepare a SWMP conforming to these Regulations before construction work begins. There are</p>	<p>A SWMP will be carried out against the context of the SWMP Regulations 2008 and will ensure that no construction and excavation waste is sent to landfill, except for those types of waste where landfill is the least</p>

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
	<p>additional requirements imposed on projects greater than £500,000 in value in relation to updating the SWMP.</p> <p>A SWMP records the type of waste produced on a construction site and how it will be reused, recycled or disposed of. The Regulations aim to:</p> <ul style="list-style-type: none"> <li>▪ Increase the amount of construction waste that is recovered, reused and recycled to improve materials resource efficiency.</li> <li>▪ Prevent illegal waste activity by requiring that waste is disposed of appropriately, in accordance with the Waste Duty of Care provisions.</li> </ul>	environmentally damaging option.
The Hazardous Waste (England and Wales) Regulations 2005, Statutory Instrument 2005 No. 894	<p>The Hazardous Waste (England and Wales) Regulations 2005 (HWR 2005) were amended on 6 April 2009. This principally widened the scope of the exemption from hazardous waste producer registration with the Environment Agency.</p> <p>Under the Hazardous Waste Regulations 2005, <i>“it is an offence to produce hazardous waste at premises, or remove that waste from premises, unless those premises are either registered with the Environment Agency or are exempt.”</i></p> <p>Where subcontractors produce hazardous waste, it will be removed under the Hazardous Waste Premises Registration for that site.</p> <p>The Hazardous Waste (England and Wales) Regulations 2005 require a Hazardous Waste Consignment Note (HWCN) to be produced for each consignment of hazardous waste removed from site. This may take the form of either:</p> <ul style="list-style-type: none"> <li>▪ A “Standard Procedure” (single movement) HWCN, where waste is moved from one premises to a Consignee in a single journey.</li> <li>▪ A “Multiple Collection” HWCN, where waste is collected from a number of premises and taken to the same Consignee.</li> </ul>	<p>The SWMP will include a classification of the estimated waste that will be produced on the site as inert, non-hazardous or hazardous.</p> <p>It will also include details (e.g. license number) of each waste carrier and each waste management facility the project intends to use. This will enable the project to ensure compliance with the regulations.</p>
Environmental Protection (Duty of Care) Regulations 1991 and amendments	<p>Anyone who produces, imports, carries, keeps, treats or disposes of controlled waste from business or industry or acts as a waste broker in this respect has a duty to ensure that any waste produced is handled safely and in accordance with the law. A summary of the obligations can be found on the Duty of Care page. The Regulations have been amended by the Environmental Permitting (England and Wales) Regulations 2007 and 2010 to introduce the new environmental permitting</p>	<p>The SWMP will include details of each waste carrier and each waste management facility the project intends to use. This information will also be used to match waste streams with waste facilities and actual waste</p>

Policy/Legislation	Requirements	Bicester Eco development Exemplar Response
	terminology. DEFRA is working on amendments to the Duty of Care regime, with new Regulations expected for December 2010.	movements.
The Clean Neighborhoods and Environment Act 2005	It is the responsibility of everyone working in the construction industry to ensure that all waste is disposed of properly. All employees need to be made aware that if they are tasked with waste disposal this must be carried out in accordance with the law, or they risk being fined	A SWRP covering construction, excavation and operational waste will be produced. This will be carried out against the context of the Clean Neighbourhoods and Environment Act 2005.

## Review of existing policy and strategy

In addition to existing policies, the Coalition Government has recently announced plans for a review of waste policy in England in order to speed up the development of a zero-waste economy as pledged by the Coalition. The review is expected to:

- Look at policies that can bolster the economic contribution of the waste and recycling sectors.
- Examine how to create a so-called zero-waste economy where the amount of waste produced and sent to landfill is drastically reduced.
- Include the Coalition's waste policy to use incentive schemes to help households recycle.
- Include the Coalition's plan to incentive schemes to help households recycle.
- Include the Coalition's plan to accelerate the rollout of anaerobic digestion technologies capable of generating energy from food waste.

The Oxfordshire Joint Municipal Waste Management Strategy is also due for review in 2010 and is likely to set out targets from 2010.

## 16.3 Methodology

### 16.3.1 Introduction

The assessment will address potential impacts resulting from waste management and the use of resources associated with the works in the construction, excavation and operational phases of the development. Construction and excavation wastes will be dealt with separately to operational wastes.

As noted above, only the Site Waste Management Plan Regulations 2008 are a legislative requirement governing the assessment of construction, demolition and excavation waste matters. The framework for the assessment of operational waste is derived from a combination of national, regional and local waste and policies combined with expert judgement.



## 16.3.2 Study Area

In addition to the Exemplar Site itself, the study area will comprise Cherwell District (as Cherwell District Council is the waste collection authority) for operational waste, and Berkshire, Buckinghamshire and Oxfordshire (as data from Cherwell District Council is not available) for construction and excavation waste. The study area will also comprise any waste facilities that will receive waste arising from the construction and excavation and operational phases of the development. Whilst the study area will not include the operation of these facilities, it will be necessary to ensure that the facilities have the capacity and capability to support the Bicester Eco development Exemplar Site deliver on its waste objectives and targets.

## 16.3.3 Establishment of Baseline Conditions

### Construction waste

For the purpose of this assessment, the baseline conditions include the current waste management infrastructure in Berkshire, Buckinghamshire and Oxfordshire and the performance in terms of the proportion of construction waste recycled to produce graded and ungraded aggregates and soil, used for engineering and capping and used on exempt sites.

Baseline conditions have been established through desk-top research, including the interrogation of key data bases such as NetRegs Waste Directory<sup>2</sup> and the Environment Agency register of licences waste disposal and treatment facilities<sup>3</sup>.

### Operational waste

For the purpose of this assessment, the baseline conditions are the existing waste management system in Cherwell District, the quantities of waste and recyclables collected, and the performance in terms of the proportion recycled/composted.

Baseline conditions have been established through consultation with Cherwell District Council Environmental Services, and desk-top research, including the interrogation WasteDataFlow<sup>4</sup>.

## 16.3.4 Assessment of Effects

The assessment of effects from construction and operational waste has focused on the potential direct impact of waste arisings on the existing local, regional, and national waste management infrastructure.

At the current stage of outline design, the details (types, quantities, specifications, the construction methods and the suitability for reuse of excess site materials) are not known so it is not feasible to accurately determine the quantities of waste arisings during the construction and excavation phases. The likely types and quantities of operational waste arisings are estimated in Section 16.5.2.

A qualitative assessment has therefore been carried out based on available knowledge. The following approach has been developed:

- 1 **Sensitivity of resource or receptor:** The sensitivity of the identified resource is determined used the terminology shown in Table 16-34 below:

**Table 16-34 Guidance for estimating the sensitivity of the resource or receptor**

<b>Sensitivity of the resource or receptor</b>	<b>Example</b>
High	Environment has very poor management capacity for potential waste impacts and minimal amount of waste diverted from landfill
Medium	Environment has poor management capacity for potential waste impacts and limited amount of waste diverted from landfill
Low	Environment has manageable capacity for potential waste impacts and significant amount of waste diverted from landfill
Negligible	Environment has ample capacity to accommodate waste impacts and maximum amount of waste diverted from landfill

For example, if the maximum amount of waste is currently diverted from landfill the sensitivity will be low or negligible. If there is a lot of hazardous waste currently being produced and there is no treatment disposal infrastructure in the local area or region, the sensitivity to any additional waste will be high (i.e. no waste diverted from landfill).

- 2 Magnitude of impact:** This will be determined by the residual effect that the waste arisings from construction, excavation and operational phases will have on the existing waste management strategy. This is outlined in Table 16-35:

**Table 16-35 Magnitude of impact**

<b>Magnitude of impact</b>	<b>Example</b>
Major	Considerable impact (by type, duration or volume) of more than local significance in relation to relevant legislation and construction and operational waste targets
Moderate	Limited impact (by type, duration or volume) of more than local significance in relation to relevant legislation and construction and operational waste targets
Minor	Slight impact (by type, duration or volume) of more than local significance in relation to relevant legislation and construction and operational waste targets
Negligible	No change (by type, duration or volume) of more than local significance in relation to relevant legislation and construction and operational waste targets

- 3 **Significance of effect:** The significance of effect is based on the sensitivity of the receptor and the magnitude of the impact according to the matrix set below in Table 16-36:

**Table 16-36 Significance of effect**

Magnitude of Impact	Sensitivity of the resource or receptor			
	<i>High</i>	<i>Medium</i>	<i>Low</i>	<i>Negligible</i>
<b>Major</b>	Large Adverse	Moderate Adverse	Slight Adverse	Slight Adverse
<b>Moderate</b>	Moderate Adverse	Moderate Adverse	Slight Adverse	Neutral
<b>Minor</b>	Slight Adverse	Slight Adverse	Neutral	Neutral
<b>Negligible</b>	Neutral	Neutral	Neutral	Neutral

The significance of effect is defined as shown in Table 16-37 below:

**Table 16-37 Definitions of significance of effect**

Significance	Definitions
Large adverse	Significant change in environmental conditions. Effects are likely to be of a high magnitude and frequency and will impact on the existing strategy to deal with waste. Impact likely to be on a permanent basis
Moderate adverse	Noteworthy effects are of moderate magnitude and frequency. The impact on the current waste management strategy will be affected. Impact likely to be on a permanent basis
Slight adverse	No noteworthy or material impact on waste management strategy. Impact likely to be on a temporary basis
Neutral	No significant effects on waste management strategy

### 16.3.5 Consultation

Consultation has been undertaken as part of the assessment to:

- Define the targets in the new Oxfordshire Municipal Waste Management Strategy (currently under review).
- Discuss waste management aspirations for the eco development and set targets.
- Determine a formal position with regards to any future waste facilities in the region and implications on waste management at the development.
- Determine details of Cherwell DC waste and recycling collection systems (materials collected, receptacles provided, frequency of collection etc).
- Details of any proposed Energy from Waste facility within the development and impacts and/or integration with waste management in the surrounding region.

Further consultation will be required as the development progresses.

### 16.3.6 Meetings

An Energy, Waste and Water Workshop was held on 16<sup>th</sup> July, 3<sup>rd</sup> August and 23<sup>rd</sup> September 2010 at the Cherwell District Council offices in Banbury. Present at the workshops were

representatives from Hyder Consulting, CDC Environmental Services, A2Dominion, Terry Farrell Partners, Environment Agency and Thames Water.

Waste management topics discussed:

- Review of Oxfordshire waste management strategy updates.
- Waste targets
- Design Solutions for waste.
- Current waste treatment facilities and plans for the eco development.
- Waste contracts.

## 16.4 Baseline Conditions

### Construction waste

Berkshire, Buckinghamshire and Oxfordshire have an estimated total Construction, Demolition and Excavation (C,D&E) waste arisings of 4,233,432 tonnes (2005)<sup>5</sup>. Of this total, 29% was recycled to produce graded and ungraded aggregates and soil (excluding topsoil) by the regions 25 recycling crushers. Of the residual waste, 41% entered licensed landfill sites (of this 28% was used for engineering and capping and 72% was waste) and 30% was used on exempt sites.

The Exemplar Site is largely undeveloped land. It is anticipated that little or no demolition materials would need to be considered for incorporation into the construction phase of the project.

In order to meet the challenging target from WRAP of halving C,D&E waste to landfill by 2012 (as a result of reduction, reuse, recycling and recovery) complementary, action by industry will be needed through all elements of the supply chain. While the overarching target of halving waste to landfill may not automatically translate at project level, PPS1 requires that the Exemplar Site ensure that no construction, demolition and excavation waste is sent to landfill, except for those types of waste where landfill is the least environmentally damaging option.

### Operational waste

#### Existing system

Cherwell District Council provides an alternate weekly waste collection for the properties in the district (approximately 59,000 residential properties).

For households, residual waste is collected on one week and co mingled dry recyclables and organics are collected the following week. Blue bins or two blue boxes are provided for co mingled dry recyclables (food tins and drinks cans, plastic bottles and containers, newspapers, directories and magazines, paper and card and aerosol cans). Brown bins are provided for mixed organics (food waste cooked and uncooked, prunings, pet straw and sawdust, grass cuttings, plants and leaves). Glass is not collected at the kerbside, instead residents are encouraged to use 'bring banks' for glass.

Residents of flats are provided with communal bin stores which typically comprise of blue co mingled recycling bins which are emptied one week, and green residual bins which are emptied the next. Some developments also have black wheeled bins for the collection of glass bottles and jars.

A chargeable bulky waste collections service is provided to all residents for items such as furniture and white goods.

Most dry recyclables are currently delivered to Enstone Community Waste Materials Recovery Facility (MRF) in West Oxfordshire (approximately 90%). The other 10% to Helmdon transfer station from where it is transferred to Milton Keynes Community Waste MRF. (This has about 6-18 months before it needs to be re-tendered).

The mixed garden waste and food waste goes to an in vessel composting facility (IVC) at Ardley (operated by Agrivert). This is in year 1 of a 15 year agreement.

Most residual waste goes to Ardley Landfill. Residual waste generated in the north of the district goes to Banbury Waste Transfer station and then to Calvert in Buckinghamshire.

### **Current performance**

#### 2008/09 recycling rate

According to WasteDataFlow in 2008/09 (the most recent complete year's worth of data), Cherwell DC achieved a recycling rate of 50%, compared to 42% in Oxfordshire and 38% in the UK.

#### 2009/10 recycling rate

Cherwell DC recycling rates are already well above the UK average. According to Cherwell DC data in 2009/10, 14,078 tonnes was sent for dry recycling (10,579 from the kerbside and 3,498 from bring banks), 15,002 tonnes of mixed organics was sent for composting, and 28,042 tonnes of residual waste was collected.

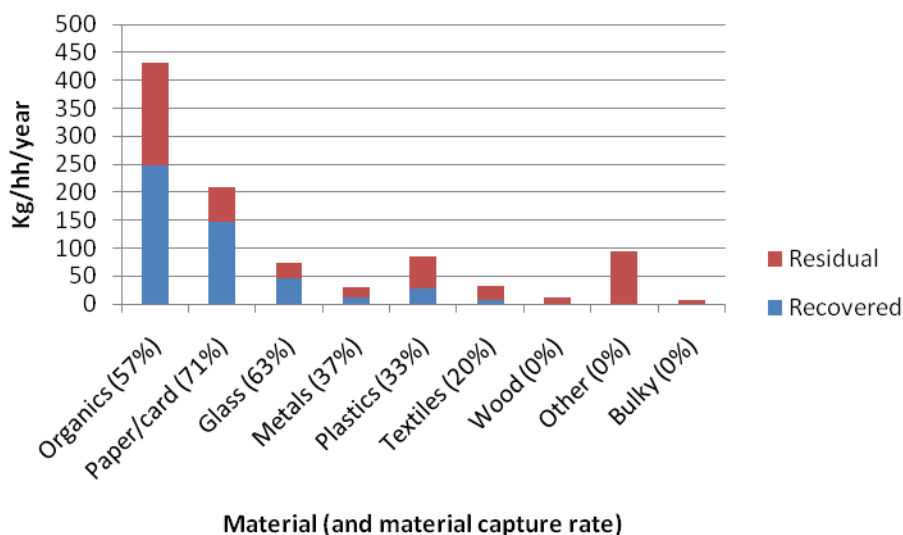
Taking into account rejects and a small amount of commercial waste, this equates to total waste arising of 57,621, or 970 kg per household of waste material per year, and a recycling rate of 51%, with a dry recycling rate of 25% and an organics recycling rate of 26%

#### Material Capture

An estimate of individual material capture rates has been put together using actual waste and recycling data provided by Cherwell DC and WasteDataFlow and compositional data for Cherwell DC in a recent audit<sup>6</sup>, and is shown in Figure 16-7. The estimate is based on 2009 material capture data as it is the most recent full year's data in WasteDataFlow.

Materials are listed according to the seven priority materials listed in the WSE 2007, bulky waste (which could highlight opportunities for reuse) and other waste (which includes non recyclables items such as nappies, household hazardous waste etc).

**Figure 16-7 Compositional Analysis Data for Cherwell District Council**



## 16.5 Design and Mitigation

### 16.5.1 Construction waste

The potential waste types that could arise during the excavation and construction phases are summarised in Table 16-38 below:

**Table 16-38 Potential waste sources during site construction**

Construction phase	Potential wastes produced	Classification of waste
Excavation	Made ground, soil and sub-soils	Inert; and /or Non hazardous. Potentially hazardous if it contains sufficiently high levels of heavy metals.
Construction	Construction materials, such as concrete, bricks, plastics, metals, plasterboard, timber, paint, etc.	Inert; and / or, Non hazardous; and / or, Hazardous.
	Made ground, soil and sub-soils	Non hazardous, and hazardous if it contains sufficiently high levels of heavy metals.

#### Excavation waste

At the time of writing, the foundation and building designs had not been carried out and so it was not possible to accurately estimate the volume of waste arising from the excavations. The geology identified at the site indicates that shallow spread foundations may be suitable for all anticipated low-load structures; therefore, the generation of spoil is expected to be minimal.

It is anticipated that any spoil generated may be reused on site for landscaping or other purposes, therefore it is expected that only minimal volumes of material may require disposal off-site.

## Construction waste

The amount of waste produced during the construction phase will be affected by the types and methods of construction. At the time of writing, the types and methods of construction had not been decided and so it was not possible to accurately estimate the volume of waste arising from the construction.

Using waste benchmarking data from the Buildings Research Establishment (BRE, December 2008) the amount of construction waste for the buildings has been forecasted. The forecasts are shown in Table 16-39 below:

**Table 16-39 Forecasted construction waste arisings from buildings**

Construction Type	Average waste (m <sup>3</sup> /100m <sup>2</sup> )	Development size (m <sup>2</sup> )	Forecasted waste arising (m <sup>3</sup> )	Forecasted waste arising (tonnes)*
Residential Units	15.28	38,369	5,862	8,794
Primary School	13.30	757	101	151
Eco-Pub	15.32	350	54	80
Eco-Business Centre	20.14	930	187	281
Energy Centre	20.06	400	80	120
Community Centre	13.76	455	63	94
Convenience Store	15.32	510	78	117
Hairdresser	15.32	77	12	18
Visitor Centre / Tea-room	15.32	220	34	51
Nursery	13.30	240	32	48
Office	20.14	250	50	76

\*Based on 1.5 tonnes per cubic metre<sup>7</sup>

The composition of construction waste arisings from buildings is likely to be similar to that shown in Table 16-40 below:

**Table 16-40 Key construction materials waste streams on typical new build**

Waste material	Wastage percentage
Packaging (including wood pallets, plastic, cardboard, tins)	25 – 35
Plasterboard	5 – 36
Rubble (including broken bricks, blocks, tiles)	35 – 40
Timber (excluding pallets)	15 – 25
Cement and plaster	10 – 17
Insulation	6 – 15
Metal	3 – 9
Dry concrete products – blocks, slabs, etc.	2 – 12
Plastic products (excluding packaging)	1 -11
Ceramic material	1 - 8



The volume of waste arising from construction will depend on how the site is managed and the implementation of the Site Waste Management Plan.

## Construction Waste Management Measures

### **Produce a Site Waste Management Plan (SWMP)**

The Bicester Eco development Exemplar Site development requires a SWMP under the SWMP Regulations 2008. The Regulations make it mandatory to prepare a SWMP for any construction works with an estimated value above £300,000 before development breaks ground. The SWMP is used to identify the type and quantity of waste that will be produced on a construction site and sets out how waste will be managed so that it is reused, recycled, or disposed of appropriately.

A Preliminary SWMP for the Bicester Eco development Exemplar Site is being submitted with the planning application. This forecasts the type and quantity of waste that will be produced on the Exemplar Site and sets out how waste will be managed so that it is reused, recycled, or disposed of appropriately. The SWMP is a live document and will be updated during the duration of the project by the Client and the Principal Contractor to record the movements of waste, how it was managed and to encourage better waste management practices.

### **Waste generated by the excavation works**

The alignment, location, level and grading of the Bicester Eco development Exemplar Site development has been designed to minimise excavation volumes. It has also been designed to enable flexibility in the landscaping, so that it can accommodate the changes in spoil volumes that may arise when site conditions differ from those assumed during the design. Both these approaches should enable all excavation waste (except where contaminated) to be reused onsite where conditions allow.

### **Managing wastes onsite**

To reduce waste production during the construction phase the project will employ modern methods of construction such as prefabrication of units and products off site as described by WRAP<sup>8</sup>.

The Bicester Eco development Exemplar Site development requires a SWMP which has been developed in line with the current DTI guidance and DEFRA's Non-statutory Guidance for SWMPs. Guidance can also be found on the Environment Agency's NetRegs website<sup>9</sup> and Waste & Resources Action Programme (WRAP) website<sup>10</sup>.

As part of the SWMP the Principal Contractor will have to monitor waste arisings and management practices. Auditing and measurement will enable more effective management of waste through the setting of performance targets for recycling and segregation and monitoring subcontractors on all the sites.

The phasing of the proposed development allows the opportunity for the construction and excavation wastes to be reused or recycled onsite in subsequent stages of the development. The SWMP will ensure such opportunities are maximised as the preferred option for dealing with waste arising from the site.

## 16.5.2 Operation

The types of waste that will arise during operation are summarised in Table 16-41 below.

**Table 16-41 Types of waste generated during site operation**

Waste stream	Constituents	Recyclable / reusable / non recyclable
Mixed organics	Food waste cooked and uncooked, prunings, pet straw and sawdust, grass cuttings, plants and leaves).	Recyclable
Dry recyclables	Food tins and drinks cans, plastic bottles and containers, newspapers, directories and magazines, paper and card and aerosol cans	Recyclable
Glass	All colours of glass jars and bottles	Recyclable
Bulky	Furniture, white goods	Recyclable / non recyclable
Textiles	Clothes and small pieces of material	Recyclable
Residual	Any of the above that has not been separated for recycling. Non recyclable food packaging, plastic film, disposable nappies	Recyclable / non recyclable

Based on recent WasteDataFlow returns and data provided by CDC, it is estimated that approximately 500 tonnes of waste (including domestic and non domestic waste) will be generated during operation of the site per annum.

Likely compositions are set out in Table 16-42 below.

**Table 16-42 Key operational materials waste streams**

Waste material	Wastage percentage
Organics	49
Dry recyclables	36
Glass	8
Wood	1
Textiles	4
Bulky	1
Other	1

A number of waste management measures will be put in place to minimise the impacts of operational waste. These are outlined in Table 16-43 below:

**Table 16-43 Mitigation Measures**

Impact	Mitigation Measure	Comment
Increased generation of waste	Extend the CDC recycling and waste collection system to the development.	The recycling and waste collection system provided by CDC achieves a high recycling performance. This successful system will be extended to the development to utilise existing waste infrastructure and a proven system to increase recycling and reduce waste. The system comprises an alternate weekly collection for co-mingled recyclables, mixed food and garden waste, and residual waste
	Initial recycling/composting target of 70%	This is the target set out in the SWRP as a requirement under PPS1, and has been set in conjunction with the Energy, Water and Waste Workstream working group, having been taken into consideration during the planning application.
	Initial residual waste level target of 300kg/household	This is also set out in the SWRP as requirement under PPS1.

In addition to the mitigation measures above there are number of alternative initiatives that could be undertaken in the future, although no specific provision has been made within the Exemplar Site at present.

- Reuse/repair centre - Compliant with the first two tiers of the waste hierarchy (prevention and reuse), it is possible that a centre will be established for the reuse and repair of household bulky and white goods for reuse/distribution within the development
- Community composting project - compliant with the first two tiers of the waste hierarchy a community composting project could possibly be established
- Public Incentives Scheme - a scheme could be implemented to incentivise participation in recycling.

## 16.6 Assessment of Effects

### 16.6.1 Construction waste

Table 16-44 below summarises the potential impacts and the significance of the effects of waste arisings from the development prior to mitigation. The assessment is based on the following assumptions:

- Current landfill capacity in Berkshire is 938,000 tonnes, in Buckinghamshire 1,683,000 and in Oxfordshire is 1,173,000 and the current landfill capacity is projected to be reduced to 72% by 2024<sup>11</sup>. Therefore the sensitivity of the receptor is assessed to be low because the environment has manageable capacity for potential waste impacts. Waste arising from earthworks can be used as landfill capping or reused on site; therefore the sensitivity of the receptor is assessed to be low for earthworks.
- The timescale of the construction phase is a medium term activity. Therefore the magnitude of the impact is assessed to be Minor for construction waste. This will require mitigation to prevent an adverse impact on the Scheme and local targets, as well as waste management capacity.

- The magnitude of the impact for earthworks is assessed as Negligible due to the volume of excavated material that will be reused on site, and therefore earthworks will not generate a significant amount of spoil requiring off-site disposal

During the construction period there are two key phases of development which could result in impacts upon the waste generation and capacity of the local waste management infrastructure to accommodate this material. These are the excavation phase and the construction phase.

The excavation phase would be short-term impacts with a significant quantity of waste diverted from landfill, resulting in a low sensitivity of resource. The construction phase would be a medium-term impact, with a limited quantity of waste diverted from landfill, resulting in a medium sensitivity of resource.

The alignment, location, level and grading of the Exemplar development has been designed to minimise excavation volumes. It has also been designed to enable flexibility in the landscaping, so that it can accommodate the changes in spoil volumes that may arise when site conditions differ from those assumed during the design. Both these approaches should enable all excavation waste (except where contaminated) to be reused onsite where conditions allow. . The excavation works will result in no significant effects following implementation of these approaches, thereby resulting in a Neutral effect.

Recycling all inert and non hazardous waste onsite and implementing the SWMP (Appendix 16A) will ensure that impacts of construction waste are minimised. The significance of effect on the Oxfordshire waste management infrastructure following mitigation is likely to be Slight Adverse. Examining the construction programme it is likely that the slight adverse impacts will diminish after the first 5 years of the project. This is because between 2011 and 2016 the Exemplar site infrastructure work and housing construction will be taking place alongside the longer term NW Bicester units which will be completed between 2011 and 2026. However, we are unsure of the construction programme for all other developments at present.

The residual significance of effects following mitigation are shown in Table 16-44 below:

**Table 16-44 Significance of Effects (Construction)**

Development phase	Mitigation	Significance of effects
Excavation	Excavation volumes minimised through design All excavation materials to be reused onsite	Neutral
Construction	Waste to be managed through the development SWMP (Appendix A) Waste to be monitored and audited	Slight adverse

## 16.6.2 Operation

Prior to any of the mitigation measures identified in Section 16.5.2, waste arisings from the Exemplar development would contribute an additional 500 tonnes per annum of waste and recyclables to the circa. 58,000 tonnes per annum already being generated by Cherwell District.

Effects of waste generated in the operational phase of the Exemplar development would be long-term effects. The assessment anticipates a limited volume of waste generated from the Exemplar development would be diverted away from landfill, thereby resulting in low sensitivity of this resource.

However, with an increase of less than 1%, the magnitude of impact on waste disposal facilities contracted to dispose of Cherwell's waste will be negligible, resulting in a Neutral significance of effects.

The significance of effects following mitigation are shown in Table 16-45 below:

**Table 16-45 Significance of Effects (Operation)**

Development phase	Mitigation	Significance of effect
Operation	Implementation of SWRP, and specifically: <ul style="list-style-type: none"> <li>▪ Extend the CDC recycling and waste collection system to the development</li> <li>▪ An initial recycling/composting target of 70%</li> <li>▪ Initial residual waste level target of 300kg/household</li> <li>▪ Establish a community composting project</li> </ul>	Neutral

### 16.6.3 Cumulative Effects

The cumulative impact on the waste arisings and management of the Exemplar Site in Cherwell District and Oxfordshire County have been reviewed. Due to the design and mitigation measures being implemented as part of the Development, it is considered that **no likely cumulative effects** would occur during the construction or operational phases of the development.

## 16.7 Summary

This Chapter has assessed the potential environmental impacts of waste materials in relation to the proposed development. Table 16-46 below provides a summary of significance of effects assuming implementation of these mitigation measures

**Table 16-46 Significance of effects (Summary)**

Sensitivity	Magnitude of Impact	Mitigation measure	Significance of effect
<b>Waste generated from excavation</b>			
Low	Negligible	Excavation volumes minimised through design. All excavation materials to be reused onsite.	Neutral
<b>Waste generated from construction</b>			
Medium	Minor	Waste to be managed through the SWMP. Waste monitored and audited	Slight adverse
<b>Waste generated from operation</b>			
Low	Negligible	Implementation of targets and measures set out in SWRP	Neutral

# 17 Transport

## 17.1 Introduction

This chapter considers the potential impacts of traffic and transport associated with the proposals and the predicted associated effects on sensitive receptors in the area. This chapter should be read in conjunction with the Transport Assessment<sup>1</sup> and draft Travel Plan<sup>2</sup> accompanying the planning application.

The chapter follows the assessment methodology set out in the document entitled, "Guidelines for the Environmental Assessment of Road Traffic"<sup>3</sup> published by the Institute of Environmental Assessment (IEA) in 1994. The IEA is now known as the Institute of Environmental Management and Assessment (IEMA), so this document will be referred to as the 'IEMA Guidelines' throughout the remainder of this chapter.

## 17.2 Regulatory Framework

### 17.2.1 National Policy

'A Supplement to Planning Policy Statement 1 - Eco-towns' was published by Communities and Local Government (C&LG) in 2009. This document was prepared with the intention that Eco-towns were considered as exemplar projects to achieve greener and low carbon developments.

Section ET11 commencing on page 8 sets out the requirements with respect to transport. For convenience this has been reproduced below.

*"ET11.1 Travel in eco-towns should support people's desire for mobility whilst achieving the goal of low carbon living. The town should be designed so that access to it and through it gives priority to options such as walking, cycling, public transport and other sustainable options, thereby reducing residents' reliance on private cars, including techniques such as filtered permeability. To achieve this, homes should be within ten minutes' walk of (a) frequent public transport and (b) neighbourhood services. The provision of services within the eco-town may be co-located to reduce the need for individuals to travel by private car and encourage the efficient use of the sustainable transport options available.*

*ET11.2 Planning applications should include travel plans which demonstrate:*

- (a) How the town's design will enable at least 50 per cent of trips originating in eco-towns to be made by non-car means, with the potential for this to increase over time to at least 60 per cent*
- (b) Good design principles, drawing from Manual for Streets, Building for Life, and community travel planning principles*
- (c) How transport choice messages, infrastructure and services will be provided from 'day one' of residential occupation, and*
- (d) How the carbon impact of transport in the eco-town will be monitored, as part of embedding a long term low-carbon approach to travel within plans for community governance.*

*ET11.3 Where an eco-town is close to an existing higher order settlement, planning applications should demonstrate:*

- (a) Options for ensuring the key connections around the eco-town do not become congested as a result of the development, for example by extending some aspects of the travel plan beyond the immediate boundaries of the town, and
- (b) Significantly more ambitious targets for modal share than the 50 per cent (increasing to 60 per cent over time) mentioned above and for the use of sustainable transport.

*ET11.4 Where eco-town plans intend to incorporate ultra low carbon vehicle options, including electric car schemes to help achieve a sustainable transport system, planning applications should demonstrate that:*

- (a) There will be sufficient energy headroom to meet the higher demand for electricity, and
- (b) The scheme will not add so many additional private cars to the local road network that these will cause congestion.

*ET11.5 Eco-towns should be designed in a way that supports children walking or cycling to school safely and easily. There should be a maximum walking distance of 800m from homes to the nearest school for children aged under 11, except where this is not a viable option due to natural water features or other physical landscape restrictions.”*

‘Planning Policy Statement 3 – Housing’ published by C&LG in June 2010 has limited reference to transportation issues. However, paragraph 16 on page 8 is relevant and reads as follows,

*“Matters to consider when assessing design quality include the extent to which the proposed development:*

- *Is easily accessible and well-connected to public transport and community facilities and services, and is well laid out so that all the space is used efficiently, is safe, accessible and user-friendly.*
- *Provides, or enables good access to, community and green and open amenity and recreational space (including play space) as well as private outdoor space such as residential gardens, patios and balconies.*
- *Is well integrated with, and complements, the neighbouring buildings and the local area more generally in terms of scale, density, layout and access.*
- *Facilitates the efficient use of resources, during construction and in use, and seeks to adapt to and reduce the impact of, and on, climate change.*
- *Takes a design-led approach to the provision of car-parking space, that is well-integrated with a high quality public realm and streets that are pedestrian, cycle and vehicle friendly.*
- *Creates, or enhances, a distinctive character that relates well to the surroundings and supports a sense of local pride and civic identity.*
- *Provides for the retention or re-establishment of the biodiversity within residential environments.*

Planning Policy Statement 3 cancels all earlier publications relating to Planning Policy Guidance 3 – Housing, and paragraphs 12 to 17 of Planning Policy Guidance 13 – Transport.

Planning Policy Statement 4 – Planning for Sustainable Economic Growth was published by C&LG in 2009. One of the objectives of this document is to deliver more sustainable patterns of development, reduce the need to travel, especially by car and respond to climate change.

Policy EC8 of Planning Policy Statement 4 relates to car parking for non-residential development. Paragraph EC8.2 on page 14 is particularly relevant and it states,



*“In setting their maximum standards, local planning authorities should take into account:*

- (a) The need to encourage access to development for those without use of a car and promote sustainable transport choices, including cycling and walking*
- (b) The need to reduce carbon emissions*
- (c) Current, and the future, levels of public transport accessibility*
- (d) The need to reduce the amount of land needed for development*
- (e) The need to tackle congestion*
- (f) The need to work towards the attainment of air quality objectives*
- (g) The need to enable schemes to fit into central urban sites and promote linked trips*
- (h) The need to make provision for adequate levels of good quality secure parking in town centres to encourage investment and maintain their vitality and viability*
- (i) The need to encourage the shared use of parking, particularly in town centres and as part of major developments*
- (j) The need to provide for appropriate disabled parking and access*
- (k) The needs of different business sizes and types and major employers*
- (l) The differing needs of rural and urban areas*

Planning Policy Statement 4 cancels paragraphs 53, 54 and Annex D of Planning Policy Guidance Note 13 – Transport.

Planning Policy Statement 6 – Planning for Town Centres was published by the Office of the Deputy Prime Minister in 2005. Paragraph 2.49 at page 17 of this document provides the following guidance on transportation matters,

*“The Government is seeking to reduce the need to travel, to encourage the use of public transport, walking and cycling and reduce reliance on the private car, to facilitate multi-purpose journeys and to ensure that everyone has access to a range of facilities. Good access to town centres is essential. Jobs, shopping, leisure and tourist facilities and a wide range of services should therefore be located in town centres wherever possible and appropriate, taking full advantage of accessibility by public transport. In selecting appropriate sites for allocation, local authorities should have regard to:*

- i) Whether the site is or will be accessible and well served by a choice of means of transport, especially public transport, walking and cycling, as well as by car; and*
- ii) The impact on car use, traffic and congestion.*

*Guidance on transport assessment, accessibility analysis and parking matters is set out in Planning Policy Guidance Note 13: Transport (PPG13).”*

Planning Policy Guidance 13 – Transport was last updated in March 2001, and should be used with care as some sections, as set out above, are cancelled as a consequence of new Planning Policy Statements. However, the objectives of the document are still valid and are reproduced below.

*“The objectives of this guidance are to integrate planning and transport at the national, regional, strategic and local level to:*

- 1. Promote more sustainable transport choices for both people and for moving freight;*
- 2. Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and*

3. *Reduce the need to travel, especially by car.*"

## 17.2.2 Best Practice Guidance

In April 2008 the Department for Transport published, 'Building Sustainable Travel into New Developments: A Menu of Options for Growth Points and Eco-towns.'

Communities and Local Government produced a, 'Design to Delivery: Eco-towns Transport Worksheet Advice to Promoters and Planners' in March 2008. This supplements the Department for Transport guidance stated above providing a menu of options, concentrating primarily on outcomes and a route map.

Both documents are relevant to the proposed development being considered.

## 17.2.3 Oxfordshire County Council Policy and Guidance

The 'Oxfordshire Local Investment Plan' (LIP) was published on 31<sup>st</sup> March 2010. The LIP has four objectives to achieve, which are:

- *Deliver new housing, including affordable homes*
- *Support economic growth*
- *Achieve regeneration and tackle deprivation, and*
- *Contribution to meeting strategic infrastructure needs.*

Pages 24 and 25 of the LIP are specific to Bicester and Upper Heyford, which is identified as a key area for investment and growth. It is anticipated that a further 3,825 homes can be achieved over the next five years from the following developments:

- NW Bicester Eco-town
- SW Urban Extension
- Bicester Business Park
- Former RAF Upper Heyford, and
- Gavray Drive

The strategic transport infrastructure required for this growth is identified as:

- Bicester Park and Ride
- Improvements in and around Bicester including the SW Bicester perimeter road
- M40 Junctions 9 and 10, and
- Chiltern Railways/Evergreen 3 Project (linked to East West Rail).

The LIP refers to Local Transport Plan 3 (LTP3), which is currently being prepared to cover the period from 2011 to 2030. There is a set of approved LTP3 policies published in July 2010 and cover all aspects of transportation across the county.

Oxfordshire Parking Policy was published on 9<sup>th</sup> November 2009. This document has been prepared in accordance with the requirements of all local authorities in the county including Cherwell District Council. This data is also included within the 'Residential Road Design Guide', which forms the basis of site layout, priority of modal movement, and infrastructure.

## 17.2.4 Local Policy

The latest Local Plan prepared and adopted by Cherwell District Council is dated November 1996. As an interim measure whilst the Local Development Framework is being progressed a number of policies set out in the Local Plan have been saved.

## 17.3 Methodology

### 17.3.1 Introduction

As mentioned in Section 17.1 above, this chapter has been prepared using the assessment methodology set out in IEMA Guidelines. This chapter should be read in combination with the Transport Assessment and draft Travel Plan submitted with this application. Where appropriate cross-references will be made to the Transport Assessment and draft Travel Plan, and summary of the relevant sections of these documents reproduced in this chapter for convenience.

### 17.3.2 Study Area

The IEMA Guidelines set out two rules that are used to establish whether an environmental assessment of traffic effects should be carried out. They are set out below:

- |        |  |
|--------|--|
| Rule 1 | Include road links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%) |
| Rule 2 | Include any other specifically sensitive areas where traffic flows have increased by 10% or more.  |

In this instance it is considered that as the proposed development forms part of an eco-development, which forms an 'exemplar development' and as traffic movement is a particularly sensitive issue around Bicester the 10% threshold should apply.

Oxfordshire County Council was consulted on the extent of the study area to be considered using the information from traffic studies and forecasts (described below), and agreed that the study area should include:

- Howes Lane between Bucknell Road and Middleton Stoney Road
- Lord's Lane between Bucknell Road and Banbury Road
- Banbury Road between the A4095 and Bainton Road

### 17.3.3 Establishment of Baseline Conditions

The baseline conditions were established from automatic traffic count data commissioned in July 2010 and applying growth factors for 2016 and 2026 supplied by Halcrow. The traffic count data was collected in July prior to the school summer holiday as improvements to junction 9 of the M40 commenced in August 2010 and construction is programmed to finish in December 2010. It is acknowledged that July is a 'non neutral month' in transport planning terms so October 2009 traffic count data was obtained from Oxfordshire County Council, and further traffic counts conducted in October 2010 for comparison purposes to ensure that the use of the July 2010 data is robust. It was established that most of the traffic flows set out in the October 2009 data is lower than that in July 2010. The October 2010 traffic flows were obtained but considered to be inappropriate as road works in the area affected distribution of traffic. The July 2010 traffic flows are therefore robust and used for the purpose of this assessment.

The growth factors supplied by Halcrow take into consideration the following committed development in the area:

**Table 17-47 2016 and 2026 Committed Development**

<b>2016 Committed Development Location</b>	<b>Housing Number</b>	<b>Employment Area</b>
South West Bicester	1585	3.91ha 100 bedroom hotel
Bicester Business Park		6ha
Town Centre redevelopment		Food 0.74ha Non-food 0.64ha Cinema 0.22ha
Gavray Drive	500	8.56ha
Heyford Park	700	B1 – 1.6ha B2 – 1.8ha B8 – 8.6ha
<b>2026 Committed Development Location</b>	<b>Housing Number</b>	<b>Employment Area</b>
South West Bicester Phase 2	500	5ha
Howes Lane	500	5ha
Lords Lane	500	5ha
Wretchwick Farm	500	5ha

Personal Injury Accident data has been obtained for Howes Lane, Lord's Lane and Banbury Road from Oxfordshire County Council for the period commencing on 1<sup>st</sup> January 2005 and ending on 31<sup>st</sup> May 2010. This sets out all accidents reported to the police during that time and will inform the baseline conditions.

Those who are likely to be affected by environmental impacts are set out in the 'Guidelines for the Environmental Assessment of Road Traffic' as:

- People at home
- People at work
- Sensitive groups including children, elderly and disabled
- Sensitive locations such as hospitals, churches, schools, and historical buildings
- People walking
- People cycling
- Open spaces, recreational areas, shopping areas
- Sites of ecological/nature conservation value
- Sites of tourist/visitor attraction

Within the study area the predominant sensitive receptor is the private dwelling.

## 17.3.4 Assessment of Effects

The methodology for assessment of effects as set out in the 'Guidelines for the Environmental Assessment of Road Traffic' cover the following areas of concern:

- Severance
- Driver delay
- Pedestrian delay
- Pedestrian amenity
- Fear and intimidation
- Accidents and safety
- Hazardous loads
- Dust and dirt

The remaining headings in the IEMA Guidelines are discussed in other chapters within this Environmental Appraisal. They include noise and vibration (Chapter 10), air pollution (Chapter 9), visual effects (Chapter 6), ecological effects (Chapter 7), and heritage (Chapter 11).

Severance occurs when there is difficulty experienced in crossing a heavily trafficked road. The guidance set out in Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects suggests that changes in traffic flow of 30%, 60% and 90% are considered as 'slight', 'moderate' and 'substantial' changes in severance respectively.

Driver delay is determined through junction capacity analysis using computerised junction assessment packages recognised by the Department for Transport. This analysis was carried out during the peak periods for the purpose of the Transport Assessment so reference to this document is set out in the Assessment of Effects below.

The IEMA Guidelines suggest that pedestrian delay is experienced at a lower threshold when pedestrians experience a 10 second delay crossing a carriageway with no crossing facilities for a two-way flow of 1,400 vehicles per hour. The upper threshold amounts to a 40 second delay, also where no crossing facilities exist.

The pedestrian amenity threshold, as set out in the IEMA Guidelines to assess the significance of change, is where the traffic flow is doubled.

Fear and intimidation can be established through a combination of traffic flow, speed and composition. The criteria from the IEMA Guidelines for assessing this have been set out in Table 17-48 below.

**Table 17-48 IEMA Guidelines for Fear and Intimidation**

Degree of Hazard	Average Traffic Flow over 18 Hour Day (Vehicle/hour)	Total 18 Hour Goods Vehicle Flow	Average Speed over 18 Hour Day (Mile/hour)
Extreme	1800+	3000+	20+
Great	1200 - 1800	2000 – 3000	15 – 20
Moderate	600-1200	1000 - 2000	10 - 15

Accidents and safety is assessed using the personal injury accident data obtained from highway authority records. The IEMA Guidelines recommend that professional judgement will be needed to assess the impacts.

There are no hazardous loads associated with the development proposals so this section does not apply.

Finally, dust and dirt should be considered for a distance of up to 50m from a site and the impact depends upon the adequacy of site management practices.

In order to ensure that the traffic and transport issues are fully assessed the cumulative effects are considered. The cumulative effects comprise committed development set out in Table 17.7 of the Traffic and Transport Chapter and associated growth in traffic to 2026. This is identical to the baseline conditions considered in this chapter. The traffic growth factors and distribution were obtained from Halcrow who prepared the Central Oxfordshire Transport Model (COTM) on behalf of Oxfordshire County Council.

## 17.4 Description of Baseline Conditions

### 17.4.1 Key Roads within the Study Area

#### B4100 Banbury Road

The B4100 Banbury Road carriageway extends in a south to north alignment, from its convergence with Buckingham Road, Field Street and North Street via a 5-arm roundabout (southern extent) to its roundabout convergence with the A4095 Lord's Lane and Southwold Lane and then past the Exemplar development. The northern section (north of the roundabout junction with the A4095) is predominately rural in character and subject to the national speed limit.

#### A4095 Lord's Lane

The A4095 Lord's Lane is a single lane carriageway (in each direction) that extends between its roundabout junctions with the B4100 Banbury Road and Bucknell Road. The road is subject to a 50mph speed limit and street lighting is provided.

#### A4095 Howes Lane

The A4095 Howes Lane is a single lane carriageway that extends from Bucknell Road to the junction with the B4030 Middleton Stoney Road. It is rural in character with a speed limit varying between 40 and 50mph, no lighting for the majority of its length and no footways or adjacent path.

### 17.4.2 Baseline Traffic Flows

The automatic traffic count data obtained in July 2010 has been used to establish base 2010 traffic flows (see Section 17.3.3 addressing traffic data collection) which have been forecast to include increases to 2016 base year and 2026 base year using 1.236 and 1.358 growth rates respectively. The growth rates were provided by transport consultant Halcrow, working on behalf of Oxfordshire County Council, and were established by applying the committed and LDF future development (Table 17-47) to the base traffic flows. This data and the base 18-hour and 24-hour traffic flows for 2016 and 2026 are set out in Appendix 17A. For convenience the base traffic flows for 2016 and 2026 are set out in Table 17-49**Error! Reference source not found.** and Table 17-50**Error! Reference source not found.**

**Table 17-49 2016 Do-Minimum Traffic Flows**

Road Link	18 hour			24 hour		
	Total	Cars/Light Vehicles	HGVs	Total	Cars/Light Vehicles	HGVs
Middleton Stoney Road	6,886	6,316	570	6,456	5,995	461
Howes Lane	7,055	6,650	405	6,540	6,219	321
Bucknell Road	5,415	5,103	311	5,253	4,994	259
Lord's Lane	9,783	9,354	429	9,373	8,989	383
Banbury Road (S of A4095)	11,641	11,098	542	11,604	11,097	508
Banbury Road (N of A4095)	13,415	12,096	1,318	12,530	11,393	1,137

**Table 17-50 2026 Do-Minimum Traffic Flows**

Road Link	18 hour			24 hour		
	Total	Cars/Light Vehicles	HGVs	Total	Cars/Light Vehicles	HGVs
Middleton Stoney Road	7,566	6,940	627	7,093	6,587	506
Howes Lane	7,752	7,306	445	7,185	6,833	352
Bucknell Road	5,949	5,607	342	5,772	5,487	285
Lord's Lane	10,749	10,277	472	10,298	9,877	421
Banbury Road (S of A4095)	12,790	12,194	596	12,750	12,192	558
Banbury Road (N of A4095)	14,739	13,290	1,448	13,767	12,518	1,249

### 17.4.3 Severance and Pedestrian Amenity

The majority of Bicester is located within a 2 mile distance of the Exemplar development and therefore accessible by cyclists and those on foot, particularly given the flat topography of the town. The nearest footpath to the Exemplar development is located adjacent to A4095 Lord's Lane / Southwold Lane carriageways. This footway aligns the entire southern extent of the A4095 carriageway between its roundabout convergences with Bucknell Road (to the south west) and the A4421 to the south east. Included in **photographs 1** and **2** are images of the pedestrian facilities that adjoin the A4095 Lord's Lane and Southwold Lane routes.



#### Photographs 1 & 2: Pedestrian facilities adjoining the A4095 carriageway



This pedestrian route that aligns the A4095 carriageway is considered to benefit from a good horizontal alignment, street lighting, tactile paving and pedestrian refuges at junctions (as shown in [photograph 1](#)), and is largely clear of vegetation. In addition, the footways that form the route are considered to be of an appropriate width and are well maintained in terms of their surface condition. A toucan crossing (shown in [photograph 2](#)) has been installed on the A4095 Southwold Lane approximately 100m to the east of the A4095 / B4100 roundabout convergence. This facility allows both pedestrians and cyclists to cross at this location so no adverse severance occurs at this location.

It is clear that pedestrians and cyclists wanting to cross the A4095 close to the Banbury Road junction (the desire line to the town centre) do not currently have a signalised crossing facility.

Pedestrians wishing to access the north of Bicester town centre can follow footpaths on both sides of the B4100 Banbury Road. The B4100 Banbury Road carriageway is generally aligned by footways along both sides for its entire route, varying in width between 1.2 and 2.0 metres, which is substandard in places. The footways do however benefit from a generally good horizontal alignment, street lighting, tactile paving and appropriate crossing infrastructure and are considered to be well maintained in terms of their surface condition. Images of footways and cycle lanes aligning the B4100 carriageway are shown in [photographs 3 and 4](#) overleaf.

#### Photographs 3 & 4: Pedestrian and cycle facilities adjoining the B4100 Banbury Road carriageway



Approximately 150m south of the priority controlled junction with Lodge Close, the footways that align both sides of the B4100 carriageway are guided away from the highway carriageway by hedge line boundaries, as shown in [photographs 3 and 4](#). These pedestrian routes benefit from a generous width, a good surface condition and the presence of street lighting. The presence of formal crossing infrastructure at a number of locations along the B4100 corridor assists in the movement of pedestrians and cyclists. A pelican crossing (shown in [photograph 5](#)) is in place approximately 100m north of the B4100 Banbury Road/Lucerne Avenue roundabout, whilst a zebra crossing (shown in [photograph 6](#)) has been installed along the

B4100 Banbury Road between its junctions with Almond Road (to the north) and the Buckingham Road roundabout (to the south).

**Photographs 5 & 6: Pedestrian/cycle crossing infrastructure in place along the B4100 Banbury Road**



Bucknell Road has footways along both sides of the carriageway, varying in width between 1.2 and 2.0 metres, which is substandard in places. The footways do generally benefit from a good horizontal alignment, street lighting, appropriate crossing infrastructure and a well maintained surface condition.

There are also various cycle and pedestrian routes through the Bure Park residential area that lies between the Exemplar development and Bicester town centre. These are shown in **photograph 7** and **photograph 8** below.

**Photographs 7 & 8: Cycle/pedestrian routes throughout the Bure Park area of Bicester**



Included in **photographs 9** and **10** are images of the footpath and cycle route that runs parallel to the Birmingham to London railway line. Site observations indicate that this route is well used and it provides a linkage between the A4095 Lord's Lane and the B4100 Banbury Road, and beyond. It is recognised however that it is not well lit and in places is not a properly surfaced route.



Photographs 9 & 10: The pedestrian and cycle route that runs parallel to the railway line



It is clear from the study of the baseline conditions that the crossing facilities on the A4095 close to the Banbury Road roundabout is the main area of concern with respect to severance.

#### 17.4.4 Existing Driver Delay

The current performance of the existing junctions (1 to 6) during the morning and evening peak hours in the Base 2010 scenario have been obtained from the Transport Assessment submitted with the planning application and summarised in Table 17-51 below, while full details of the modelling outputs are attached as Appendix I of the Transport Assessment. All junctions assessed in the Transport Assessment have been included within the table below although it should be noted some fall outside the scope of the Environmental Chapter study area.

Table 17-51 Capacity Assessment of External Junctions (Base 2010 scenario)

Existing Junctions / Peak Hour Operational Performance Assessments		2010 'No Exemplar development'			
		AM Peak Hour 0800-0900 hrs		PM Peak Hour 1700-1800 hrs	
Junc 1	<b>A4095 Howes Lane / B4030 Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4095 Howes Lane (northern arm)	-	-	-	-
	B4030 Middleton Stoney Road (western arm)	-	-	-	-
	A4095 Howes Lane (southern arm)	-	-	-	-
	B4030 Middleton Stoney Road (eastern arm)	-	-	-	-
Junc 2a	<b>A4095 Howes Lane / Bucknell Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.083	0	0.088	0
	A4095 Howes Lane (western arm)	0.370	1	0.326	1
	Bucknell Road (southern arm)	0.287	0	0.408	1
Junc 2b	<b>A4095 Lord's Lane / Bucknell Rd Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.663	2	0.553	1
	A4095 Lord's Lane (eastern arm)	0.439	1	1.047	27
	Bucknell Road (southern arm)	n/a	-	n/a	-
Junc 3	<b>A4095 / B4100 Banbury Road Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.589	1	0.449	1
	A4095 Southwold Lane (eastern arm)	0.459	1	0.614	2
	B4100 Banbury Road (southern arm)	0.203	0	0.357	1
	A4095 Lord's Lane (western arm)	0.355	1	0.521	1
Junc 4	<b>A4095 / A4421 Skimmingdish Lane Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4421 Buckingham Road (northern arm)	0.659	2	0.404	1
	A4421 Skimmingdish Lane (eastern arm)	0.349	1	0.827	5
	A4421 Buckingham Road (southern arm)	0.309	0	0.539	1
	A4095 Southwold Lane (western arm)	0.662	2	0.561	1
nc 5	<b>Bicester Road / Bainton Road Crossroads</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Ardley Road (northern arm)	0.004	0	0.008	0

Junc 6	Bainton Road (eastern arm)	0.052	0	0.045	0
	Bicester Road (southern arm)	0.012	0	0.004	0
	Middleton Road (western arm)	0.053	0	0.033	0
	<b>B4100 Banbury Road / Bainton Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.019	0	0.023	0
	Bainton Road (western arm)	0.025	0	0.023	0
	B4100 Banbury Road (southern arm)	n/a	-	n/a	-

It can be seen that the Lord's Lane/Bucknell Road roundabout is currently operating beyond design capacity in the evening peak hour, and the Skimmingdish Lane eastern arm of the A4095/A4421 roundabout is close to capacity also in the evening peak hour.

The performance of the seven junctions (1 to 6) has also been assessed during the morning and evening peak hours using the forecast 2016 'Without Exemplar development' flows. The results of the capacity analysis are summarised in **Error! Reference source not found.** below while full details of the modelling outputs are attached as Appendix I of the Transport Assessment.

**Table 17-52 Capacity Assessment of External Junctions (2016 'Without Exemplar development' scenario)**

Existing Junctions / Peak Hour Operational Performance Assessments		2016 'No Exemplar development'			
		AM Peak Hour 0800-0900 hrs		PM Peak Hour 1700-1800 hrs	
Junc 1	<b>A4095 Howes Lane / B4030 Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4095 Howes Lane (northern arm)	0.387	1	0.233	0
	B4030 Middleton Stoney Road (western arm)	0.304	0	0.420	1
	A4095 Howes Lane (southern arm)	0.159	0	0.319	1
	B4030 Middleton Stoney Road (eastern arm)	0.333	1	0.357	1
Junc 2a	<b>A4095 Howes Lane / Bucknell Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.107	0	0.121	0
	A4095 Howes Lane (western arm)	0.463	1	0.422	1
	Bucknell Road (southern arm)	0.360	1	0.553	1
Junc 2b	<b>A4095 Lord's Lane / Bucknell Rd Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.839	6	0.696	3
	A4095 Lord's Lane (eastern arm)	0.572	1	<b>1.348</b>	<b>128</b>
	Bucknell Road (southern arm)	n/a	-	n/a	-
Junc 3	<b>A4095 / B4100 Banbury Road Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.781	4	0.610	2
	A4095 Southwold Lane (eastern arm)	0.598	2	0.781	4
	B4100 Banbury Road (southern arm)	0.275	0	0.498	1
	A4095 Lord's Lane (western arm)	0.466	1	0.712	3
Junc 4	<b>A4095 / A4421 Skimmingdish Lane Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4421 Buckingham Road (northern arm)	<b>0.927</b>	<b>10</b>	0.530	1
	A4421 Skimmingdish Lane (eastern arm)	0.457	1	<b>1.071</b>	<b>63</b>
	A4421 Buckingham Road (southern arm)	0.411	1	0.771	3
	A4095 Southwold Lane (western arm)	<b>0.868</b>	<b>6</b>	0.752	3
Junc 5	<b>Bicester Road / Bainton Road Crossroads</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Ardley Road (northern arm)	0.004	0	0.010	0
	Bainton Road (eastern arm)	0.065	0	0.055	0
	Bicester Road (southern arm)	0.014	0	0.004	0
	Middleton Road (western arm)	0.065	0	0.036	0
Junc 6	<b>B4100 Banbury Road / Bainton Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.028	0	0.032	0
	Bainton Road (western arm)	0.038	0	0.033	0

	B4100 Banbury Road (southern arm)	n/a	-	n/a	-
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In terms of the operational performance of the assessed junctions during the morning peak hour, the modelling results for the 2016 baseline (without the Exemplar development) indicate the occurrence of a maximum queue of 10 vehicles on the A4421 Buckingham Road (northern arm) of the A4095 / A4421 Skimmingdish Lane roundabout (junction 4), in addition to a maximum queue of 6 vehicles on the A4095 Southwold Lane (western arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4). In terms of the operational performance of the assessed junctions during the evening peak hour, the modelling results indicate that a maximum queue of 128 vehicles is expected on the A4095 Howes Lane (western arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b), along with a maximum queue of 63 vehicles on the A4421 Skimmingdish Lane (eastern arm) of the A4095 Southwold Lane / A4421 Skimmingdish Lane Roundabout (junction 4).

### 17.4.5 Pedestrian Delay

The IEMA Guidelines suggest that pedestrian delay is experienced at a lower threshold when pedestrians experience a 10 second delay crossing a carriageway with no crossing facilities for a two-way flow of 1,400 vehicles per hour. The upper threshold amounts to a 40 second delay, also where no crossing facilities exist. It was established in section 17.4.3 above that crossing facilities exist on the route between the Exemplar development site and the town centre, however, crossing facilities on the desire line on the A4095 near the Banbury Road junction will be examined further in section 17.6.2.

### 17.4.6 Fear and Intimidation

Table 17-49 **Error! Reference source not found.** to Table 17-50 **Error! Reference source not found.** above demonstrate that the traffic flows associated with the road links being considered for this chapter currently fall within the 1,800 vehicles over an 18-hour period where the impact of fear and intimidation could be considered to be extreme.

### 17.4.7 Accidents and Safety

Personal injury accident (PIA) data was provided by Oxfordshire County Council for the period between 01/01/2005 and 31/05/2010. The PIA study area includes roads in the vicinity of the Exemplar development, namely the B4100 Banbury Road, the A4095 Lord's Lane, Bucknell Road, the A4095 Howes Lane and the B4030 Middleton Stoney Road.

A summary of the PIA data recorded between 2005 and 2010 throughout the study area shows that:

- A total of 27 accidents were recorded, resulting in 44 casualties.
- Of the 27 recorded accidents, 2 resulted in 'serious' injuries and 23 resulted in 'slight' injuries. There were 2 fatal accidents recorded within the study area over the 5 year period, resulting in 4 fatalities.
- Of the 44 casualties, 28 were vehicle drivers, 12 were vehicle passengers, 2 were motorcycle riders and 2 were cyclists. There were no pedestrian casualties recorded.
- Of the 2 casualties with 'serious' injuries, 1 was a motorcycle rider and 1 was a car driver.
- Of the 4 fatalities, 2 were vehicle drivers and the other 2 were vehicle passengers.
- 6 of the 27 of the accidents occurred during darkness, with street lighting either 'not present' or 'unknown'.

- The road surface conditions recorded at the time of the accidents indicate that accidents occurred when the road surface was wet/ damp. The balance of accidents occurred during dry road surface conditions.

The PIA data has been examined further in order to identify any clusters / trends in the nature and location of the accidents, with the subsequent findings detailed in the following paragraphs.

There have been four personal injury accidents recorded on the B4100 Banbury Road at the bend by the turn to Caversfield and Home Farm within the last 5 years. Whilst all of these resulted in slight injuries, “driving too fast (for the prevailing conditions)” and a “subsequent loss of control” was identified as a probable cause in three out of the four accidents. It is suggested in the interpreted listing that one of the accidents resulted from a loss of control due to a spillage (possibly oil) on the carriageway.

There have been 10 personal injury accidents recorded at the crossroads junction between the A4095 Howes Lane and the B4030 Middleton Stoney Road within the last 5 years. Of the ten accidents, eight were slight in nature, one was serious and one resulted in a fatality. Failing to look properly and appropriately judge the other driver’s path or speed was reported as a causation factor in eight of the ten accidents. Both the serious accident and the fatality were attributable to excessive speed (for the fatality 130mph), sudden braking and a loss of control – all of which are factors that are not reflective of the current arrangement of the junction. Moreover, this junction is to be subject to the provision of a roundabout junction as part of the SW Bicester development proposal.

As accidents and safety are directly associated with junction capacity analysis and therefore the driver delay section of this chapter, this issue is discussed further in the cumulative impact section of the ES.

## 17.5 Design and Mitigation

### 17.5.1 Construction

The Exemplar development infrastructure work is due to start in the summer of 2011 and last a period of 6 months. The construction phase of development is anticipated to commence in 2012 with 50 residential units in year one and 100 residential units per year until completion. It is noted that infrastructure construction for the SW Bicester development is currently underway and house construction is programmed to commence in the Spring of 2011.

As a large proportion of the construction traffic is anticipated to be heavy goods vehicles it is essential that residential areas are avoided during the course of construction by heavy goods vehicle drivers associated with the proposals. It is therefore considered appropriate to have a lorry routing agreement to ensure drivers use the A4095 and will be prohibited from passing through the centre of Bicester unless they are transporting locally sourced materials/goods.

It is anticipated that, over the life of the construction period, virtually all construction traffic for the Exemplar development will use the A4421 around the eastern side of Bicester (due to weight limit restrictions on the A4095) and the A41 Oxford Road via the M40 Junction 9. It is however intended that construction traffic will be reduced by the manufacture of housing components on site.

Although heavy goods vehicles are to be routed along the A4421 to avoid the main residential areas there are sensitive receptors along these routes. In order to reduce adverse effects of the temporary increase in heavy goods vehicle traffic the hours of operation at the site should be restricted. They should be limited as set out below:

- Monday – Friday 07:00 – 19:00
- Saturday 07:00 – 13:00.
- Sundays and Bank Holidays the site would be closed.

There are residential properties close to the site boundaries to the east and on the opposite side of Banbury Road. It is therefore proposed that space is allocated within the site during construction for the parking of vehicles and plant, and storage of materials away from these sensitive areas.

Dust and dirt is of primary concern during the construction phase. As previously mentioned, new junctions are to be formed onto Banbury Road. During the construction process an access route of a bound construction will be provided as soon as possible in order to minimise the transportation of mud onto the public highway. However, if mud is carried on the wheels of HGVs leaving the site either a wheel wash facility will be set up at the site exits for egressing vehicles or a road sweeper will be deployed on Banbury Road.

## 17.5.2 Operation

The proposed layout of the Exemplar development has been designed to facilitate easy movement by foot and cycle. The objective is to provide a principal network of segregated footways and cycleways, some of these alongside roads or shared with vehicles. Traffic speeds within the development will be controlled accordingly in order to provide a safe environment for pedestrians and cyclists.

Well lit, high quality walking and cycling routes are provided throughout the site using the network of streets and some segregated routes making shorter connections between areas. Routes are:

- Segregated from other traffic where possible
- Well lit and under natural surveillance
- Aim to provide more direct connections compared to the same journey by car
- Signed with information on journey times and with route maps at regular intervals
- Given due priority where there is a traffic route to cross (these crossing points have been combined with traffic calming features to give the pedestrian route priority)
- Provide a high level of permeability through the site

Specifically, the following is proposed for the Exemplar development:

- On road routes through the development, with surfacing and features designed to discourage traffic speed
- A segregated walking and cycling shared route adjacent to the west side of Banbury Road between the southern site access junction and the ring road
- A toucan crossing on the ring road connecting to the cycle network into Bicester

It is recognised that there is a need to improve the walking and cycling routes along Banbury Road towards the town centre and it is assumed that this will be delivered by OCC as part of the proposals for the town.

The routes for the strategic pedestrian and cycle network have been carefully considered in response to the disposition of land uses and an identification of the key desire lines for movements within the proposed development. The resulting proposals ensure that foot and cycle journeys to destinations within the Exemplar development, such as the local shops and primary school, can be undertaken directly and comfortably.



The provision of secure cycle parking and storage facilities will be incorporated into the residential areas, local centre and employment areas. In this regard, cycle parking and storage is to be provided in accordance with Cherwell District Council cycle parking standards.

The existing Public Rights of Ways (PROW) within the site are to be retained. The high quality pedestrian and cycle routes within the site have been designed to link into the wider pedestrian / cycle and (PROW) networks and, as a result, the quality of journeys by non-car modes will be upgraded providing improved accessibility and encouraging new users.

As stated in **Chapter 4**, of the Transport Assessment both Oxfordshire County Council and the Bicester ITS have previously identified pedestrian and cycle improvements along Howes Lane and toward Bicester town centre from the north west of Bicester. The on-site facilities would be designed to link to the existing and proposed facilities along these corridors. The development proposals include the provision of a crossing facility across the A4095 Lord's Lane close to the Banbury Road roundabout. This is to reduce severance and also fear and intimidation.

In addition to the above, the overall vehicular access strategy for the Exemplar development is illustrated on Figure 5.1 of the Transport Assessment. The access strategy for the Exemplar development has been designed not only to ensure that it does not prejudice future development in the north-west Bicester area, but also to bring forward infrastructure that is needed to enable the comprehensive development of the area. Figure 5.1 of the Transport Assessment is reproduced at Drawing 17-1 Transport Proposals Plan.

## 17.6 Assessment of Effects

### 17.6.1 Construction

The design and mitigation features on the site mean that the effects of the development during the construction phase will be negligible.

### 17.6.2 Operation

The design and mitigation features discussed in section 17.5.2 above demonstrate that severance and pedestrian delay have been addressed within the application proposals and therefore the impacts associated with these will be negligible.

#### Driver Delay

The performance of the seven junctions (1 to 6) has been assessed during the morning and evening peak hours using the 2016 and 2026 'With Exemplar development' flows. The results of the capacity analysis are summarised in Table 17-53 and Table 17-53 Capacity Assessment of External Junctions (2016 'With Exemplar development' Flows)

Existing Junctions / Peak Hour Operational Performance Assessments		2016 'With Exemplar development'			
		AM Peak Hour 0800-0900 hrs		PM Peak Hour 1700-1800 hrs	
Junc 1	<b>A4095 Howes Lane / B4030 Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4095 Howes Lane (northern arm)	0.437	1	0.273	0
	B4030 Middleton Stoney Road (western arm)	0.312	1	0.433	1
	A4095 Howes Lane (southern arm)	0.201	0	0.359	1
	B4030 Middleton Stoney Road (eastern arm)	0.343	1	0.365	1
Junc 2a	<b>A4095 Howes Lane / Bucknell Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.112	0	0.127	0
	A4095 Howes Lane (western arm)	0.512	1	0.468	1

Junc 2b	Bucknell Road (southern arm)	0.424	1	0.604	2
	<b>A4095 Lord's Lane / Bucknell Rd Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	<b>0.953</b>	<b>15</b>	0.802	5
	A4095 Lord's Lane (eastern arm)	0.690	2	<b>1.472</b>	<b>188</b>
	Bucknell Road (southern arm)	n/a	-	n/a	-
Junc 3	<b>A4095 / B4100 Banbury Road Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	<b>0.900</b>	<b>8</b>	0.727	3
	A4095 Southwold Lane (eastern arm)	0.651	2	0.843	5
	B4100 Banbury Road (southern arm)	0.324	1	0.557	1
	A4095 Lord's Lane (western arm)	0.559	1	0.799	4
Junc 4	<b>A4095 / A4421 Skimmingdish Lane Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4421 Buckingham Road (northern arm)	<b>0.934</b>	<b>10</b>	0.531	1
	A4421 Skimmingdish Lane (eastern arm)	0.468	1	<b>1.080</b>	<b>69</b>
	A4421 Buckingham Road (southern arm)	0.414	1	0.785	3
	A4095 Southwold Lane (western arm)	<b>0.876</b>	<b>7</b>	0.753	3
Junc 5	<b>Bicester Road / Bainton Road Crossroads</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Ardley Road (northern arm)	0.004	0	0.010	0
	Bainton Road (eastern arm)	0.065	0	0.065	0
	Bicester Road (southern arm)	0.014	0	0.004	0
	Middleton Road (western arm)	0.071	0	0.036	0
Junc 6	<b>B4100 Banbury Road / Bainton Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.028	0	0.032	0
	Bainton Road (western arm)	0.055	0	0.042	0
	B4100 Banbury Road (southern arm)	n/a	-	n/a	-

It can be seen from reference to [Error! Reference source not found.](#) that in terms of the operational performance of the assessed junctions during the morning peak hour, the modelling results indicate the occurrence of a maximum queue of 15 vehicles on the Bucknell Road (northern arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b). Furthermore, a maximum queue of 8 vehicles is expected on the B4100 Banbury Road (northern arm) of the A4095 / B4100 Banbury Road Roundabout (junction 3), in addition to the forecasting of a maximum queue of 10 vehicles on the A4421 Buckingham Road (northern arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4). Moreover, a maximum queue of 7 vehicles is predicted on the A4095 Southwold Lane (western arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4).

In terms of the operational performance of the assessed junctions during the evening peak hour, the modelling results indicate that a maximum queue of 188 vehicles would be experienced on the A4095 Howes Lane (western arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b), in addition to a maximum queue of 69 vehicles on the A4421 Skimmingdish Lane (eastern arm) of the A4095 Southwold Lane / A4421 Skimmingdish Lane Roundabout (junction 4).

Table 17-54 below while full details of the PICADY and ARCADY outputs are provided in the Transport Assessment.

**Table 17-53 Capacity Assessment of External Junctions (2016 'With Exemplar development' Flows)**

Existing Junctions / Peak Hour Operational Performance Assessments		2016 'With Exemplar development'			
		AM Peak Hour 0800-0900 hrs		PM Peak Hour 1700-1800 hrs	
	<b>A4095 Howes Lane / B4030 Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>

Junc 1	A4095 Howes Lane (northern arm)	0.437	1	0.273	0
	B4030 Middleton Stoney Road (western arm)	0.312	1	0.433	1
	A4095 Howes Lane (southern arm)	0.201	0	0.359	1
	B4030 Middleton Stoney Road (eastern arm)	0.343	1	0.365	1
Junc 2a	<b>A4095 Howes Lane / Bucknell Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.112	0	0.127	0
	A4095 Howes Lane (western arm)	0.512	1	0.468	1
	Bucknell Road (southern arm)	0.424	1	0.604	2
Junc 2b	<b>A4095 Lord's Lane / Bucknell Rd Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.953	15	0.802	5
	A4095 Lord's Lane (eastern arm)	0.690	2	1.472	188
	Bucknell Road (southern arm)	n/a	-	n/a	-
Junc 3	<b>A4095 / B4100 Banbury Road Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.900	8	0.727	3
	A4095 Southwold Lane (eastern arm)	0.651	2	0.843	5
	B4100 Banbury Road (southern arm)	0.324	1	0.557	1
	A4095 Lord's Lane (western arm)	0.559	1	0.799	4
Junc 4	<b>A4095 / A4421 Skimmingdish Lane Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4421 Buckingham Road (northern arm)	0.934	10	0.531	1
	A4421 Skimmingdish Lane (eastern arm)	0.468	1	1.080	69
	A4421 Buckingham Road (southern arm)	0.414	1	0.785	3
	A4095 Southwold Lane (western arm)	0.876	7	0.753	3
Junc 5	<b>Bicester Road / Bainton Road Crossroads</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Ardley Road (northern arm)	0.004	0	0.010	0
	Bainton Road (eastern arm)	0.065	0	0.065	0
	Bicester Road (southern arm)	0.014	0	0.004	0
	Middleton Road (western arm)	0.071	0	0.036	0
Junc 6	<b>B4100 Banbury Road / Bainton Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.028	0	0.032	0
	Bainton Road (western arm)	0.055	0	0.042	0
	B4100 Banbury Road (southern arm)	n/a	-	n/a	-

It can be seen from reference to [Error! Reference source not found.](#) that in terms of the operational performance of the assessed junctions during the morning peak hour, the modelling results indicate the occurrence of a maximum queue of 15 vehicles on the Bucknell Road (northern arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b). Furthermore, a maximum queue of 8 vehicles is expected on the B4100 Banbury Road (northern arm) of the A4095 / B4100 Banbury Road Roundabout (junction 3), in addition to the forecasting of a maximum queue of 10 vehicles on the A4421 Buckingham Road (northern arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4). Moreover, a maximum queue of 7 vehicles is predicted on the A4095 Southwold Lane (western arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4).

In terms of the operational performance of the assessed junctions during the evening peak hour, the modelling results indicate that a maximum queue of 188 vehicles would be experienced on the A4095 Howes Lane (western arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b), in addition to a maximum queue of 69 vehicles on the A4421 Skimmingdish Lane (eastern arm) of the A4095 Southwold Lane / A4421 Skimmingdish Lane Roundabout (junction 4).

**Table 17-54 Capacity Assessment of External Junctions (2026 'With Exemplar development' Flows)**

Existing Junctions / Peak Hour Operational Performance Assessments		2026 'With Exemplar development'			
		AM Peak Hour 0800-0900 hrs		PM Peak Hour 1700-1800 hrs	
Junc 1	<b>A4095 Howes Lane / B4030 Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4095 Howes Lane (northern arm)	0.486	1	0.292	0
	B4030 Middleton Stoney Road (western arm)	0.350	1	0.480	1
	A4095 Howes Lane (southern arm)	0.215	0	0.389	1
	B4030 Middleton Stoney Road (eastern arm)	0.388	1	0.397	1
Junc 2a	<b>A4095 Howes Lane / Bucknell Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.128	0	0.144	0
	A4095 Howes Lane (western arm)	0.560	1	0.500	1
	Bucknell Road (southern arm)	0.456	1	0.648	2
Junc 2b	<b>A4095 Lord's Lane / Bucknell Rd Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	1.049	37	0.865	7
	A4095 Lord's Lane (eastern arm)	0.765	3	1.613	257
	Bucknell Road (southern arm)	n/a	-	n/a	-
Junc 3	<b>A4095 / B4100 Banbury Road Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	1.017	30	0.806	4
	A4095 Southwold Lane (eastern arm)	0.732	3	0.921	10
	B4100 Banbury Road (southern arm)	0.372	1	0.641	2
	A4095 Lord's Lane (western arm)	0.625	2	0.902	8
Junc 4	<b>A4095 / A4421 Skimmingdish Lane Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4421 Buckingham Road (northern arm)	1.113	62	0.593	1
	A4421 Skimmingdish Lane (eastern arm)	0.521	1	1.198	148
	A4421 Buckingham Road (southern arm)	0.476	1	0.839	5
	A4095 Southwold Lane (western arm)	1.022	34	0.828	5
Junc 5	<b>Bicester Road / Bainton Road Crossroads</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Ardley Road (northern arm)	0.006	0	0.010	0
	Bainton Road (eastern arm)	0.082	0	0.070	0
	Bicester Road (southern arm)	0.017	0	0.006	0
	Middleton Road (western arm)	0.077	0	0.043	0
Junc 6	<b>B4100 Banbury Road / Bainton Road Priority</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	0.041	0	0.043	0
	Bainton Road (western arm)	0.062	0	0.048	0
	B4100 Banbury Road (southern arm)	n/a	-	n/a	-

In terms of the operational performance of the assessed junctions during the morning peak hour, it can be seen from Table 17-54 that a maximum queue of 37 vehicles on the Bucknell Road (northern arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b), along with a maximum queue of 30 vehicles expected on the B4100 Banbury Road (northern arm) of the A4095 / B4100 Banbury Road Roundabout (junction 3). In addition, a maximum queue of 62 vehicles will occur on the A4421 Buckingham Road (northern arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4), together with a maximum queue of 34 vehicles on the A4095 Southwold Lane (western arm) of the A4095 / A4421 Skimmingdish Lane Roundabout (junction 4).

In terms of the operational performance of the assessed junctions during the evening peak hour, a maximum queue of 257 vehicles is expected on the A4095 Howes Lane (western arm) of the A4095 Howes Lane/Bucknell Road roundabout (junction 2b), as well as a maximum

queue of 10 vehicles on the A4095 Southwold Lane (eastern arm) of the A4095 / B4100 Banbury Road Roundabout (junction 3). A maximum queue of 8 vehicles is forecast for the A4095 Southwold Lane (western arm) of the A4095 / B4100 Banbury Road roundabout (junction 3), plus a maximum queue of 148 vehicles on the A4421 Skimmingdish Lane (eastern arm) of the A4095 Southwold Lane / A4421 Skimmingdish Lane Roundabout (junction 4).

Despite the findings of the modelling assessments outlined in the preceding sub sections indicating that there are a number of junctions (2b, 3 and 4) that are forecast to experience vehicle queuing problems during the morning and evening peak hours in 2016 and 2026 (with Exemplar development), it is important to note that similar queuing problems will largely occur at these junctions without development at the Exemplar development coming forward. As part of the junction modelling assessments that have been performed, a series of (small-scale) amendments to the configurations junctions 2b, 3 and 4 could help to address the forecast queuing problems at these junctions. The results of the modelling assessments performed to reflect minor amendments to junctions 2b, 3 and 4 are included in Table 17-55, whilst a series of plans showing the highway amendments that have been implemented within the respective traffic models (for junctions 2b, 3 and 4) are included in [Drawing 17-2 S278 Layout Plan](#).

**Table 17-55 Capacity Assessment of Junctions 2b,3&4 following amendments (2026 'With Exemplar development' Flows)**

Junction(s) / Peak hour(s)		2026 'With Exemplar development'			
		AM Peak Hour 0800-0900 hrs		PM Peak Hour 1700-1800 hrs	
Site 2b	<b>A4095 Howes Ln/Bucknell Rd Pro Roundabout</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	Bucknell Road (northern arm)	0.631	2	0.602	2
	A4095 Lord's Lane (eastern arm)	0.465	1	<b>0.943</b>	<b>11</b>
	Bucknell Road (southern arm)	0.069	0	0.052	0
Site 3	<b>A4095 / B4100 Banbury Rd Amended Rbt</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	B4100 Banbury Road (northern arm)	<b>0.852</b>	<b>5</b>	0.664	2
	A4095 Southwold Lane (eastern arm)	0.628	2	0.787	4
	B4100 Banbury Road (southern arm)	0.373	1	0.643	2
	A4095 Lord's Lane (western arm)	0.638	2	0.809	4
Site 4	<b>A4095 / A4421 Skimmingdish Ln Amended Rbt</b>	<b>RFC</b>	<b>Queue</b>	<b>RFC</b>	<b>Queue</b>
	A4421 Buckingham Road (northern arm)	<b>0.929</b>	<b>10</b>	0.501	1
	A4421 Skimmingdish Lane (eastern arm)	0.467	1	<b>1.046</b>	<b>53</b>
	A4421 Buckingham Road (southern arm)	0.479	1	<b>0.976</b>	<b>14</b>
	A4095 Southwold Lane (western arm)	<b>0.984</b>	<b>21</b>	0.825	4

It is apparent from reference to Table 17-55 that the forecast queuing problems at junction 2b and junction 3 could be significantly addressed, in tandem with a significant reduction to the forecast level of queuing at junction 4. A key point of note is that these junction 'tweaks' will significantly improve the performance of the junctions in 2026 with Exemplar development versus the 2026 without Exemplar development scenario. **Error! Reference source not found.** provides a summary of a comparative analysis between the modelling assessment results presented in **Error! Reference source not found.** (2026 Without Exemplar) and Table 17-55 (2026 With Exemplar + Junction Amendments).

**Table 17-56 Comparative assessment of modelling assessment findings for Junctions 2b, 3 & 4**

Junction(s) / Peak hour(s) / Assessment Scenarios	AM Peak Hour		PM Peak Hour	
	2026 Without Exemplar (Table 18.1)	2026 With Exemplar + Amendments (Table 18.2)	2026 Without Exemplar (Table 18.1)	2026 With Exemplar + Amendments (Table 18.2)
<b>Junction 2b</b>	<b>Queue</b>	<b>Queue</b>	<b>Queue</b>	<b>Queue</b>
Bucknell Rd (north arm)	14	2	4	2
A4095 Howes Ln (east arm)	2	1	196	11
Bucknell Rd (south arm)	0	0	0	0
<b>Junction 3</b>	<b>Queue</b>	<b>Queue</b>	<b>Queue</b>	<b>Queue</b>
B4100 Banbury Rd (north arm)	8	5	2	2
A4095 Southwold Ln (east arm)	2	2	5	4
B4100 Banbury Rd (south arm)	1	1	1	2
A4095 Lord's Ln (west arm)	1	2	4	4
<b>Junction 4</b>	<b>Queue</b>	<b>Queue</b>	<b>Queue</b>	<b>Queue</b>
A4421 B'ham Rd (north arm)	58	10	1	1
A4421 S'dish Ln (east arm)	1	1	142	53
A4421 B'ham Rd (south arm)	1	1	5	14
A4095 S'wold Ln (west arm)	24	21	5	4

In short, it can be seen from reference to Table 17-56 that the highway improvement measures that have been explored and implemented within each of the traffic models developed for junction 2b (ARCADY model), junction 3 (ARCADY model) and junction 4 (ARCADY model) could deliver the following benefits (versus the 2026 Without Exemplar development scenario):

- A reduction in the maximum queue forecast to be experienced on the Bucknell Road north arm of junction 2b from 14 to 2 vehicles during the morning peak hour;
- A reduction in the maximum queue forecast to be experienced on the A4095 Howes Lane east arm of junction 2b from 196 to 11 vehicles during the evening peak hour, which is considered to be notably significant;
- A reduction in the maximum queue forecast to be experienced on the B4100 Banbury Road north arm of junction 3 from 8 to 5 vehicles during the morning peak hour;
- A marginal increase in the maximum queue forecast to be experienced on the A4095 Southwold Lane east arm of junction 3 from 4 to 5 vehicles during the evening peak hour;
- A reduction in the maximum queue forecast to be experienced on the A4421 Buckingham Road north arm of junction 4 from 58 to 10 vehicles during the morning peak hour;
- A reduction in the maximum queue forecast to be experienced on the A4421 Skimmingdish Lane east arm of junction 4 from 142 to 53 vehicles during the evening peak hour, which is considered to be noteworthy;
- A small increase in the maximum queue forecast to be experienced on the A4421 Buckingham Road south arm of junction 4 from 5 to 14 vehicles during the evening peak hour, which is not considered to be detrimental to the junction; and
- A decrease in the maximum queue forecast to be experienced on the A4095 Southwold Lane west arm of junction 4 from 24 to 21 vehicles during the morning peak hour.



It is clear from the above that driver delay has been addressed as a consequence of the proposed junction improvements and does not need to be considered further. The impact is negligible.

## Pedestrian Amenity

The IEMA guidelines suggest that pedestrian amenity is compromised when traffic flow is doubled. Table 9.2 of the Transport Assessment sets out the increase in traffic flow expected as a consequence of the Exemplar development. For convenience this is reproduced as [Error! Reference source not found.](#) below.

**Table 17-57 Calculated net and percentage impact of Exemplar development generated traffic in 2016**

Junctions	Forecast 2016		Opening 2016		Net increase		%age increase	
	AM	PM	AM	PM	AM	PM	AM	PM
Junction 1	1,344	1,560	1,459	1,662	115	102	9%	7%
Junction 2a	1,277	1,408	1,432	1,536	156	128	12%	9%
Junction 2b	1,215	1,579	1,370	1,707	156	128	13%	8%
Junction 3	2,585	2,908	2,873	3,140	289	233	11%	8%
Junction 4	3,065	3,406	3,110	3,431	44	25	1%	1%
Junction 5	342	256	351	262	9	6	3%	2%
Junction 6	1,387	1,400	1,399	1,406	12	7	1%	0.5%
Junction 7	3,865	4,130	3,894	4,151	29	21	1%	1%
Junction 8	2,453	3,213	2,482	3,234	29	21	1%	1%
Junction 9	2,126	2,329	2,166	2,355	39	26	2%	1%
M40 J9	6,779	7,407	6,852	7,482	73	75	1%	1%
M40 J10	3,607	3,415	3,610	3,416	3	1	0.1%	0%

It can be seen that the maximum increase in traffic flow is expected to be 13%, therefore pedestrian amenity will not be compromised and does not need to be considered further.

## Fear and Intimidation

[Error! Reference source not found.](#) The current traffic flows on the carriageways within the scope of this chapter leads to a need for Fear and intimidation to be assessed further. Particularly as the traffic flows are to be increased as a consequence of development. Fear and intimidation occurs as a consequence of narrow footways adjacent to heavily traffic carriageway, or areas where there is a high content of heavy goods vehicles. The internal layout of the Exemplar development is such that traffic speeds will be low and the road system will not be heavily trafficked.

In order to ensure that pedestrians and cyclists are not vulnerable to road traffic it is proposed that a joint footway/cycleway is constructed on the western side of Banbury Road between the southern junction and the A4095 roundabout. This route is to link to a toucan crossing on the A4095 to the west of the roundabout and subsequently to the existing off-road pedestrian/cycle route on the southern side of the carriageway. There is a vegetation between the existing route and the carriageway of Banbury Road to the south of the A4095 junction. This facility will provide a continuous link from the site and reduce any fear and intimidation that is likely to be experienced by pedestrians and cyclists. It is therefore concluded that the impact can be considered to be negligible.



## Accidents and Safety

The personal injury accident data was examined in section 17.4.7 of the traffic and transport chapter. The junction improvements discussed will have an impact on the level of safety currently enjoyed. However, such changes will be subject to the Road Safety Audit process to ensure that the accident does not increase in number or severity. The effect associated with accidents and safety of the area can therefore be considered to be negligible.

## 17.7 Summary

The traffic and transport chapter of the ES demonstrates that the Exemplar development traffic will have a Negligible impact on the following areas of concern:

- severance
- pedestrian delay
- pedestrian amenity
- fear and intimidation
- hazardous loads
- dust and dirt

The impacts on driver delay, and accidents and safety have been assessed in detail in the cumulative effects assessment in Section 17.6.2. This assessment demonstrates that design and mitigation measures will result in a Negligible impact on the study area. Overall, there will be a Negligible effect during the construction and operational phases of the Exemplar development.

# 18 Interrelationships and Cumulative Effects

## 18.1 Introduction

This chapter assesses the potential cumulative effects of the development of the Exemplar Site for Bicester Eco development, located to the north west of Bicester, hereafter known as 'the proposed Development'. This Chapter aims to ensure the incremental effects resulting from the combined effects of various actions are assessed. Even though the effects of each action, when independently assessed, are considered insignificant, incrementally, the effects could be significant.

This Chapter will address three main areas where there is potential for cumulative effects:

- 1 Bicester Eco development Exemplar with NW Bicester (NW Bicester) Eco development
- 2 Bicester Eco development Exemplar Site with other local developments (including additional in-combination effects with NW Bicester Eco development)
- 3 In-combination effects of Bicester Eco development Exemplar Site on specific receptors

## 18.2 Technical Assumptions and Method

### Legislation and Planning Policy Context

EC Directive 85/337/EEC requires assessment of "the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent or temporary, positive and negative effects of the project". EC Directive 97/11/EC selection criteria for projects to be assessed include the "cumulation with other projects" and the "existing land use".

Schedule 3(1) of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 state that "*the characteristics of development must be considered, having regard, in particular to ...b) the cumulation with other development*", Schedule 3(20) "*the existing land use*" and Schedule 4(4) "*description of the development on the environment which should cover....cumulative effects.*"

### Guidance Documents

The DCLG (2006, page 40) Environmental Impact Assessment: A guide to good practice and procedures <sup>1</sup> states that: "In the context of EIA, cumulative effects could refer to the combined effects of different activities within the vicinity or those of different aspects of a single development on a particular receptor". This document identifies two types of cumulative effects:

- Cumulative effects from different developments
- Cumulative effects from different environmental features

There is no specific UK guidance on cumulative effects assessment but the European Commission has published the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions in 1999 <sup>2</sup>. These guidelines provide information on methods, the assessment process and information needed to assess the impacts.

### Spatial Scope

The spatial scope for the assessment has taken into consideration the following:

- Cumulative effects with other developments
- Combined effects from impact interactions

This required the analysis of cumulative effects at two spatial scales. The area wide assessment considered the cumulative effects of the:

- Cumulative effects with other developments in the vicinity of the site
- Cumulative effects of the Bicester Eco development Exemplar and the other proposals within the NW Bicester Eco development

The site specific assessment considered impacts from construction and operation, where individual impacts have the potential to cause impact interactions.

## Methodology

The assessment of cumulative effects consisted of two elements:

### Combined Effects with Other Developments

Other developments considered in the vicinity of the Application site where the proposed Development has potential for cumulative impacts are set out in Table 18-2 below. The developments included have been defined following consultation between Halcrow Group, OCC and CDC when developing the Central Oxfordshire Transport Model in 2009 to inform the Local Development Framework process. Traffic data from this model has been applied to the Exemplar development traffic, noise and air quality assessments, therefore traffic forecasts for 2016 and 2026 incorporate the predicted growth from these other developments.

In addition, since cumulative impacts assessment need to consider past, present and future actions, the cumulative impact of the scheme and the other future developments in the NW Bicester Eco development have been considered.

### Combined Effects of Individual Impacts

The combined effects of individual impacts from the proposed Development on a particular receptor have been assessed using the methodology as outlined in the EC guidelines and good practice accepted methodology.

The assessment of interactions and cumulative effects has been carried out using a variety of techniques including: expert opinion and consultation.

## Assessment of Effects

As discussed above, there is no established guidance in the UK for assessing the significance of cumulative effects. For cumulative effects assessment, the key is to focus on the receptor and consider its capacity to accommodate the changes that are likely to occur because of the proposed Development. Sensitive receptors have been identified in the technical chapters (Chapters 6 to 17). The existing status of these receptors, current trends and existing regulatory requirements were established in defining the baseline.

## Significance Criteria

The terms used to define significance of cumulative and residual impacts are as follows:

- **Adverse** detrimental or negative impacts to an environmental resource or receptor
- **Negligible** imperceptible impacts to an environmental resource or receptor; and
- **Beneficial** advantageous or positive impact to an environmental resource or receptor.

Where beneficial or adverse impacts have been identified, these have been assessed against the following scales:

- **Minor** slight, very short or highly localised impact;

- **Moderate** limited impact (by extent, duration or magnitude) which may be considered significant; and
- **Major** considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy and standards.

## Consultations

OCC and CDC were consulted during the development of the Central Oxfordshire Transport Model, identifying other developments that were to be considered in the Local Development Framework process. CDC was also consulted by Barton Willmore in July 2010 to identify other developments in the vicinity of the Exemplar development. These suggestions have been reviewed and, where considered relevant, included in the cumulative assessment.

## Limitations

NW Bicester Eco development is in the early stages of development so there is uncertainty as to exact future use on the wider site. It was not possible to do any quantitative predictions because of the uncertainty of future uses or numbers of users.

## 18.3 Baseline Conditions

The baseline for assessing cumulative effects considered the other proposed developments in the vicinity which are likely to have in combination effects with the proposed Development. The baseline also established the policy and planning context for the development, which identified likely developments in the future. These are discussed in more detail below.

For the assessment of combined impacts and impact interactions during construction, the baseline has been established in the technical chapters where potential cumulative impacts have been identified. This chapter presents a summary and identifies any other impact interactions.

## 18.4 Mitigation and Enhancement Measures

### Construction Mitigation

The potential cumulative effects during construction are due to the combined effect of traffic generation, noise, vibration, visual impact and dust, as well as generation of waste during construction. These impacts are likely to be temporary and occur in the immediate vicinity of the site. A Construction Environmental Management Plan (CEMP) will be prepared, which would be likely to reduce these impacts. Mitigation measures identified in the technical chapters will help mitigate impacts.

### Operational Mitigation

The Cumulative Impact Assessment undertaken in the Traffic and Transport assessment (Chapter 17) concluded that the cumulative traffic generated from developments would not create any adverse environmental effects. Therefore no mitigation measures have been proposed.

## 18.5 Assessment of Cumulative Effects

This assessment has considered the potential cumulative effects with NW Bicester Eco development and proposals in policy documents.

## Exemplar Site with NW Bicester Eco development

NW Bicester Eco development for Bicester Eco development includes removal of existing open farmland to form a sustainable community comprising residential, commercial, retail and community uses.

NW Bicester Eco development incorporates the key features identified in PPS1: eco-towns and Policy NWB1 from CDC's Core Strategy 2010. The Policy sets out the principles and parameters to guide proposals for developing the area. The cumulative effects assessment indicates the potential likely effects of the Exemplar Site.

The Exemplar Site is likely to have an indirect effect by launching the eco-town vision. Once operational, the Exemplar Site will attract inward investment into the local area both within the Exemplar Site itself and also attract commercial activity beyond the site boundary. NW Bicester Eco development will demonstrate the potential for stimulating further investment to the area on land adjoining the Exemplar Site. The potential cumulative effects of the Exemplar and other elements in the wider NW Bicester Eco development are indicated in Table 18-58.

**Table 18-58 Exemplar Site and NW Bicester Eco development elements**

Potential Impact Area	Exemplar Site	Other Elements of the NW Bicester Eco development	Cumulative Impact
Landscape Effects	=	=	=
Visual Impact	-	=	=
Ecology	-	=	-
Hydrology			
- Recreation	+	=	+
- Dilution & Water Quality	+	-	=
- Conveyance & Flood Risk	=	=	=
- Groundwater	=	-	-
Air Quality	-	-	-
Noise and Vibration	=	-	-
Heritage			
- Built Heritage	-	-	-
- Archaeology	=	=	=
- Historic Landscape	-	-	-
Contaminated Land	=	=	=
Agriculture and Land Use	=	=	=
Human Health	+	+	+
Socio-economics	+	=	+
Waste			
- Excavation waste	=	=	=
- Construction waste	-	=	-
- Operational waste	=	=	=
Traffic and Transport	-	--	--

- minor adverse effect    - - moderate adverse effect    --- major adverse effect

= neutral effect    + beneficial effect

## Exemplar Site with other developments

In most cases, detailed consideration of the combined effects of the proposed development together with other developments will be limited to others that have been constructed, are being constructed or those that have been granted consent. Developments considered as part of the qualitative cumulative effects assessment are set out in **Table 18-59**. These are committed developments that are included in OCC's Central Oxfordshire Traffic Model (COTM), which is developed and operated by Halcrow Group.

**Table 18-59 Other developments near Bicester**

<b>Project/ Development</b>	<b>Description</b>	<b>Status</b>
South West Bicester (06/00967/OUT)	Development of residential accommodation consisting of 1585 units, 3.91ha employment space, hotel, health village, secondary school and community hall. This development is around 2.3 km from the Exemplar Site.	Planning Permission granted
Bicester Business Park (07/01106/OUT)	Development of 6ha employment space (B1). This development is around 2.8 km from the Exemplar Site.	Planning Permission granted
Town Centre redevelopment (04/02797/OUT)	Redevelopment comprising Food 0.74ha; Non-food retail space 0.64ha; Cinema 0.22ha; library and new civic building. This development is around 2.3 km from the Exemplar Site.	Planning Permission granted
Gavray Drive (04/02797/OUT; Appeal 09/00584/F)	Development of 500 residential units, a Primary school; Open Space; and Local Wildlife Site. This development is around 2.3 km from the Exemplar Site.	Planning Permission granted
Heyford Park	Construction of employment space comprising 1.6ha B1, 1.8ha B2 and 8.6ha B8. This development is around 6 km from the Exemplar Site.	
East West Rail and Project Evergreen 3	Rail improvements scheme, which includes works along the railway corridor. Level crossing on Charbridge Lane and London Road will be included in the works. This development is around 2.6 km from the Exemplar Site.	Currently at Public Inquiry
South West Bicester Link Road	Including new roundabouts at north and south ends of link, realignment of A4095, two signalised junctions on A41 (incorporating Bicester Business and South West Bicester development) and removal of slips at Chesterton. This development is around 2.4 km from the Exemplar Site.	
Lidl (10/00385/F)	Erection of discount foodstore (Class A1) including 75 no. car parking spaces, servicing area and landscaping This development is around 2.1 km from the Exemplar Site.	Planning permission granted
B1 Skimmingdish Lane (05/01563/OUT; Reserved Matters 09/01659/REM)	Development for B1 office development with associated parking, turning and landscaping areas. This development is around 2.1 km from the Exemplar Site.	Pending Consideration on reserved matters. Outline planning permission granted.

Project/ Development	Description	Status
<b>2026 Committed Development Location</b>		
South West Bicester Phase 2	Proposed development of 500 residential units and a 5ha employment area.	
Howes Lane	Proposed development of 500 residential units and a 5ha employment area.	
Lord's Lane	Proposed development of 500 residential units and a 5ha employment area.	
Wretchwick Farm	Proposed development of 500 residential units and a 5ha employment area.	

Due to the distance of these proposed developments to the Exemplar Site, the only potential cumulative effects are those relating to traffic.

The Traffic and Transport Chapter and the Transport Assessment details the Cumulative Impact Assessment which considered other developments, which are likely to generated traffic onto the adjacent highway network. The cumulative effects upon driver delay and accidents and safety have been qualitatively assessed. It was considered that the cumulative traffic generated from developments have Negligible impacts, thereby resulting in **no likely cumulative effects**.

### In combination effects of the Exemplar Site on specific receptors

It is considered that construction works have the greatest potential for impact interactions. The combination of noise, visual and air quality impacts (dust and emissions from increased vehicle traffic) have the potential to cause **significant adverse cumulative effects**.

#### Construction Effects

It is considered that the construction phase of the proposed Development could have the greatest potential to contribute to combined impacts and impact interactions. During construction, potential impacts exist for sensitive receptors. The receptors considered to be most sensitive during the construction phase are pedestrians on the surrounding roads and residents of nearby residential areas adjacent to the eastern and northern boundaries of the Exemplar Site and users of the local road network. Criteria for identifying those receptors that are potentially sensitive include the nature of the receptor, proximity to the works and extent of exposure to impacts and impact interactions.

Potential impact interactions are mainly related to noise, vibration, dust and traffic. Interactions will occur during the construction phase, therefore will be temporary effects.

#### Operational Effects

The assessment of operational effects considers the effect of the Scheme with other future developments. Cumulative effects during operation are likely to be effects on traffic and transport and air quality. There will be a beneficial cumulative impact on employment.

### Topic Specific Cumulative Effects

The following sections provide an assessment of the potential cumulative effects associated with each environmental topic and their likely significance.



## Landscape and Visual Impact

There would be **no likely cumulative effects** associated with the Exemplar Site and NW Bicester Eco development, as common design principles would be applied cross the whole Eco development. Similarly, there would be **no likely cumulative effects** associated with visual impact, as NW Bicester Eco development would dominate the foreground such that visual impact from the Exemplar Site would be insignificant for receptors from the northern edge of Bicester and from the railway.

Other committed developments in the vicinity of Bicester, as identified in Table 18-2, are separated from Bicester Eco development by the existing urban area such that there would not be cumulative impacts on the local landscape or visual amenity north-west of Bicester. As a result, there would be **no likely cumulative effects**.

## Ecology

The NW Bicester Eco development will include for the provision of wide ecological corridors and adjacent areas of open green space surrounding habitats of mobile species from the Exemplar Site. In addition, significant opportunities for habitat creation will be incorporated into the Eco development design, ensuring a net gain in biodiversity. As a result, there would be **no likely cumulative effects** on species and habitats known to be present on the Exemplar Site.

There would be **no likely cumulative effects** resulting from other developments due to the distances between them and the Exemplar Site.

## Hydrology

The development of the Exemplar Site will not have any adverse effects upon the water environment, therefore there would be **no likely cumulative effects** resulting from the construction or operational phases of the Exemplar Site with the NW Bicester Eco development.

Similarly, there would be **no likely cumulative effects** resulting from other developments in the vicinity of the site given their distance from the Exemplar Site.

There is currently no information available regarding foul water treatment and sewerage and water supply capacity in the area. In the absence of this information it is not possible to determine the potential cumulative effects upon these resources. However, investigations are ongoing and in the event that resources are near capacity, there is potential for adverse cumulative effects upon foul water and water supply both for the Exemplar Site with NW Bicester Eco development and with other developments. The Water Cycle Study will assess the cumulative effects of all developments in the area.

In the absence of the foul water and water supply information at this time, it is not possible to determine whether there will be any cumulative effects upon water resources arising from this development and others planned in the area.

## Air Quality

There are likely to be cumulative effects of construction dust with the rest of the NW Bicester Eco development and other committed developments within 1km of the site. The most immediate impact will be from further development of NW Bicester Eco development and will include the Exemplar development once built. Implementation of the suggested mitigation will result in a **minor adverse cumulative effect**.

During the operational phase, the scale of the NW Bicester Eco development means there is potential for significant traffic generation with associated vehicle exhaust emissions. In

combination with the Exemplar Site, these have the potential to cause **minor adverse cumulative effects** with respect to effects on air quality at sensitive receptor locations.

Similarly, the other developments identified around Bicester also have potential for significant traffic generation with associated vehicle exhaust emissions. However, the assessment in this chapter takes into account future committed developments as these have been included in the growth factors in the Transport Assessment for the Exemplar development. There are considered to be **no likely cumulative effects** with respect to effects on air quality at sensitive receptors locations.

Further assessment work would be needed for both scenarios in order to confirm these cumulative effects once detailed information is available.

## Noise

There is potential for **minor cumulative effects** associated with construction noise from the development of the NW Bicester Eco development alongside the Exemplar Site. At the operational phase, there is likely to be significant traffic generation as a result of the combined Eco developments, although there is no traffic data available as NW Bicester Eco development is not currently a committed development. In some key locations there may be potential for adverse cumulative traffic effects, therefore there is potential for **adverse cumulative effects** with regards to noise effects at some sensitive receptor locations.

There are no other committed developments in the immediate vicinity of the Exemplar Site, therefore it is unlikely that cumulative construction noise impacts would be of concern. There may be cumulative effects to the ambient noise climate during construction, which is the combined effect of construction vehicles on the local road network and the operation of machinery. There are, however, no details available regarding traffic volumes or routes therefore it is not possible to assess these cumulative construction noise impacts. Cumulative operational noise impacts have been included in the noise assessment for the Exemplar, as the traffic data growth factors incorporate predicted traffic generated by other developments outlined in Table 18-2. **No likely cumulative effects** are anticipated as a result of these other developments.

## Built Heritage

The combination of the Exemplar Site with the NW Bicester Eco development could result in a **minor adverse cumulative effect** on the setting of listed buildings and non-listed buildings within the vicinity of the Eco developments. The design of the proposed developments would be in sympathy with the adjacent built heritage assets to minimise these adverse effects.

There would be **no cumulative effects** associated with other developments in the Bicester area due to their distance from the Exemplar Site.

## Archaeology

There is no potential for archaeological remains to occur within the Exemplar Site, therefore there is **no cumulative effects** associated with either the NW Bicester Eco development or other development with regards to archaeological resources.

## Historic Landscape

There is likely to be a **minor adverse cumulative effect** on historic landscape as a result of the Exemplar Site and NW Bicester Eco developments. There would be **no cumulative effects** on

historic landscape associated with other developments, due to their distance from the Exemplar Site.

### **Soils and Contamination**

**No likely cumulative effects** with NW Bicester Eco development or with other developments have been identified.

### **Agriculture and Land Use**

There would be **no likely cumulative effects** on either agriculture or land use as a result of the Exemplar Site and NW Bicester Eco development both being developed.

In relation to cumulative effects associated with the Exemplar Site and other developments, there would also be **no likely cumulative effects** on either agriculture or land use.

### **Human Health**

There is potential to generate long-term **beneficial cumulative effects** on human health with the Exemplar Site and NW Bicester Eco developments. There will be opportunities to establish sustainable patterns of living, promote greater levels of physical activity and establish a strong sense of community spirit and well-being within the Eco development.

There is also potential for **beneficial cumulative effects** related to human health with other developments. These include indirect benefits from provision of new schools, new civic buildings, new housing and new employment opportunities. Provision of associated infrastructure, including new cycling routes and transport infrastructure could provide benefits to physical activity. There is potential for adverse cumulative effects associated with traffic generation, and resultant air quality and noise impacts, although they are not likely to be significant with regards to human health effects.

### **Socio Economics**

The potential to construct the whole site area of the proposed Bicester Eco development could reaffirm the vision of eco-Bicester and generate a number of significant positive impacts: This includes the potential to attract inward investment and associated employment generation, particularly in high-tech manufacturing, engineering and environmental industries. The potential effect could spread throughout the CIZ as the eco-credentials of the region make it an appealing business location. Similarly, the eco-vision of the settlement could foster entrepreneurship as the business potential of the market becomes realised. As a result, there are likely to be **major beneficial cumulative effects** resulting from the Exemplar Site and NW Bicester Eco developments.

The prevalence of a number of other significant development proposals within and around Bicester will generate a significant combined increase in the critical mass of Bicester and the services and facilities that are contained within it. This will also result in a **major beneficial cumulative effect**.

### **Waste**

The cumulative effect on the waste arisings and management of the Exemplar development in Cherwell District and Oxfordshire County have been assessed. Due to the design and mitigation measures being implemented as part of the Development, it is considered that **no likely cumulative effects** associated with either NW Bicester or other developments would occur during the construction or operational phases of the development.

## Traffic and Transportation

The potential for cumulative effects associated with the NW Bicester Eco development is assessed qualitatively, as traffic data is currently unavailable for this development. There will be key locations which will need to be considered with regards to traffic impacts if the NW Bicester Eco development becomes a committed development. Due to the limited information available at this stage, it is anticipated that the key locations include A4100 Banbury Road, Bucknell Road and the corridor through Bicester town centre. There is potential for **adverse cumulative effects** on driver delay, pedestrian delay and severance within the town centre, although sustainable design and mitigation would be integrated into the design in order to reduce these potential cumulative effects.

The quantitative Cumulative Impact Assessment of the Transport Assessment concluded that the cumulative traffic generated from the Exemplar Site and other developments are not likely to create any adverse environmental effects. As such, there are **no likely cumulative effects**.

## 18.6 Summary

This chapter has considered cumulative effects associated with the Exemplar Site. The baseline for the assessment included other future developments in the vicinity. The potential cumulative effects with other elements in NW Bicester Eco development relate to the following cumulative impact areas; landscape, ecology, hydrology, air quality, noise and vibration, heritage, soils and contamination, agriculture and land use, human health, socio-economics, waste and transport. Since NW Bicester Eco development is indicative, it was not possible to quantify impacts, although potential adverse cumulative effects were identified for air quality, noise and vibration, heritage and transport. Potential beneficial cumulative effects were identified for human health and socio-economics.

The potential cumulative effects with other developments are likely to be during the construction phase on traffic and transport, air quality and noise and vibration associated with the combined effect of construction vehicles and operation of machinery. No likely cumulative effects are anticipated during the operational phase of these other developments.

Combined or impact interactions are likely to occur during the construction phase. Each environmental chapter has identified mitigation measures to reduce impacts. Following implementation of these mitigation measures, there may still be combined effects of noise from construction vehicles and road traffic, and dust emissions from construction vehicles and construction activities. Other combined or impact interaction effects are considered to be mostly negligible.

# Abbreviations

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ABI	Annual Business Inquiry
ALC	Agricultural Land Classification
AQLVs	Air Quality Limit Values
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
BAP	Biodiversity Action Plan
BBOWT	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust
BGS	British Geological Society
BLHS	Bicester Local History Society
BMV	Best and Most Versatile
BMW	Biodegradable Municipal Waste
BRE	Building Research Establishment
CDC	Cherwell District Council
CD&E	Construction, Demolition and Excavation
CDM	Construction and Design Management Regulations
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
CIZ	Central Impact Zone
C&LG	Communities & Local Government
COSHH	The Control of Substances Hazardous to Health
CTA	Conservation Target Areas
DBA	Desk-based Assessment
DEFRA	Department for Environment Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
DMV	Deserted Medieval Village
EA	Environment Agency
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EQS	Environmental Quality Standards
EPO	Environmental Protection Officer
EPR	Environmental Permitting Regulations
EPS	European Protected Species
EPUK	Environmental Protection UK
ES	Environmental Statement

ETBS	Eco-town Biodiversity Strategy
FTE	Full Time Employment
GP	General Practitioner
GSV	Gas Screening Value
HAP	Habitat Action Plan
HER	Historic Environment Record
HIA	Health Impact Assessment
HWCN	Hazardous Waste Consignment Note
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IfA	Institute for Archaeologists
IMD	Index of Multiple Deprivation
IVC	In Vessel Composting
JSA	Jobs Seekers Allowance
LAeq	Equivalent Noise Level
LAQM	Local Air Quality Management
LAQM.TG(09)	Local Air Quality Management Technical Guidance
LAs	Local Authorities
LBAP	Local Biodiversity Action Plan
LDF	Local Development Framework
LNR	Local Nature Reserves
LSOA	Lower Super Output Areas
MAFF	Ministry of Agriculture, Fisheries and Food
MPS 2	Minerals Policy Statement 2
MRF	Materials Recovery Facility
NEC	Noise Exposure Category
NGR	National Grid Reference
NHS	National Health Service
NMR	National Monuments Record
NO2	Nitrogen dioxide
NOx	Total oxides of nitrogen
OCC	Oxfordshire County Council
OOS	Oxfordshire Ornithological Society
OS	Ordnance Survey
PIA	Personal Injury Accident
PM10	Particulate matter with an aerodynamic diameter of less than 10µm
PPE	Personal Protective Equipment

PPGs	Pollution Prevention Guidelines
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
PRoW	Public Rights of Way
RoWIP	Rights of Way Improvement Plan
SAC	Special Area of Conservation
SAP	Species Action Plan
SDA	Severe Disablement Allowance
SGV	Soil Guideline Values
SPA	Special Protection Area
SPOSH	Significant possibility of significant harm
SRP	Soil Resources Plan
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
SWMP	Site Waste Management Plan
SWRP	Sustainable Waste and Resources Plan
TA	Transport Assessment
TVERC	Thames Valley Environmental Records Centre
UKBAP	United Kingdom Biodiversity Action Plan
WAC	Waste Acceptance Criteria
WFD	Waste Framework Directive
WIZ	Wider Impact Zone
WRAP	Waste & Resources Action Programme
ZoI	Zone of Influence



# Glossary

**100- and 1000-year events** A means of identifying a likelihood of flooding, giving an estimate of how frequently a flood level or flow could be expected to occur. A 100-year event has a 1 in 100 (or 1%) chance of occurring in any one year.

**Aberford Series** Name given to the soil type present across the area.

**Alluvium** Sediment deposited by rivers on adjacent land.

**Ambient sound** The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.

**ARCADY** Traffic capacity modelling software for roundabouts

**Audible range** The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.

**Background noise** The term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L<sub>90</sub> noise level.

**Best and Most Versatile Land (BMV)** Land falling into Grades 1, 2 and 3a as determined under the Agricultural Land Classification system

**Blackwater** Foul drainage which is treated for domestic or commercial purposes to supplement or replace mains water supply

**Brashy** Term used to describe soils containing a high proportion of loose broken rock

**Calcareous** Soils developed on, for example, limestone rocks which contain calcium carbonate

**Code for Sustainable Homes** An environmental impact rating system for housing in England & Wales, setting new standards for energy and water efficiency, beyond those required for building regulations.

**Contaminated Land** Any area which appears to be in such a condition, by reason of substances in, on or under the land that significant harm is being caused, or there is a significant possibility of such harm being caused, or significant pollution of controlled waters is being, or is likely to be, caused. Land that has been polluted or contaminated will not necessarily fall within the above legal definition of contaminated land. For an area of land to meet the definition of contaminated land, a significant pollutant linkage must be established. A pollutant linkage consists of three parts; A source of contamination in, on or under the ground; A pathway by which the contamination is causing significant harm (or which represents a significant possibility of such harm being caused) and a receptor (of a type specified in the regulations).

**Contaminated Land Report 11** The model procedures for the Management of Land Contamination, CLR 11, have been developed to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with land contamination in a way that is consistent with government policies and legislation within the UK.

**Controlled Waters Risk Assessment** A staged approach to define the level of risk to controlled water as Land contamination can affect groundwater, freshwater and coastal waters. Groundwater is particularly vulnerable to contamination as it underlies many sites and is difficult to clean up once polluted.

**Cyprinid fishery** An *EC designated fishery* capable of supporting coarse fish.

**Decibel [dB]** The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels.

**Demography** Study of both quantitative and qualitative aspects of human population.

**dB(A):** A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not perceived to be as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.

**Early Medieval Period** AD410 to 1066

**Eco-development** In accordance with PPS1: Eco-towns, the eco-development is a development based on sustainability principles. The eco-development referred to in this Environmental Statement relates to the proposed Exemplar and NW Bicester developments.

**EC Designated fishery** A watercourse identified as maintaining fish and for which regular monitoring and reporting is undertaken by the Environment Agency

**Employed** Persons who are working full-time or part-time during a specified payroll period. Temporary employees and those on paid-leave are included in this definition

**Environmental Protection Act 1990, Part IIA** set up a system for the regulation of contaminated land in England and Wales. The regime provides a framework for identifying and remediating (cleaning up) contaminated land. Contaminated land is land that poses an unacceptable risk to human health or the environment through its current use. The Part 2A regime did not apply to radioactive contaminated land until it was extended in 2006.

**Erosion** Movement of soil materials by water or wind action

**Exemplar development** The first element of NW Bicester Eco-development being progressed by P3 Eco (Bicester) Ltd and A2Dominion Group. The Exemplar is assessed in this Environmental Statement and is the development being progressed with the associated planning application. A development description is available in Chapter 3 of the Environmental Statement.

**Flood Estimation Handbook (FEH)** A best practice approach to estimating flood runoff based on national records and statistical methods.

**Flood Zone 1** An area where flooding from watercourses or the sea is expected to occur less frequently than once in a thousand years (has less than a 0.1% chance of occurring in any one year).

**Flood Zone 2** An area where flooding from watercourses is expected to occur between once in a hundred years and once in a 1000 years, or from the sea between once in a two hundred years and once in a 1000 years

**Flood Zone 3** An area where flooding from watercourses is expected to occur more frequently than once in a hundred years or from the sea more than once in a two hundred years.

**Free-Field** Refers to a situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting surfaces.

**Full Time Employment** Working full-time is defined as working 31 hours or more a week.

**Ground Gas Risk Assessment** Land contamination can give rise to volatile contaminants which can pose a risk of harm to human health by asphyxiation or illness if inhaled. Vapours and gases such as methane may also pose a risk of fire or explosion. Good practice in gas hazard evaluation and risk assessment is to assess how to apply these to particular situations. Assessing the degree of risk posed by methane and other gases from the ground is a key step in the feasibility appraisal of new developments and of remedial works for existing ones.

**Health Impact Assessment** A process of assessing the impact of a project, plan or programme on human health and wellbeing.

**Heavy goods vehicles (HGV)** Assumed to be buses, rigid trucks and semi trailer trucks with a weight greater than 3 tonnes. Also heavy vehicles can be defined in terms of length as buses, or trucks with a length exceeding 5.25 metres.

**Hide** A measurement of land for tax assessment used in the Domesday Book. Approximately 120 acres, depending on local variations.

**Housing Tenure** Nature of an occupant's legal estate in a tract of land (freehold or leasehold) which indicates whether the occupant is an owner or tenant.

**Human Health Risk Assessment** The human health risk assessment process is used to establish the risk to humans and aims to provide a methodology (consistent with CLR 7-11) that supports quantitative risk assessment by deriving site specific assessment criteria to assess chronic risks to human health from land contamination and the site is evaluated according to either the existing use or to a proposed development. Land contamination can affect the health of people living, working, visiting or otherwise present on a site.

**Industry of Employment** The sector of employment, defined by the Standard Industrial Classification of employment (2007)

**ISIS** A computer modelling package used to estimate flows and flood levels in rivers.

**JFLOW** A computer package used to give a broad estimate of flood levels

**Job Seekers Allowance** JSA claimant count records the number of people claiming Jobseekers Allowance (JSA) and National Insurance credits at Jobcentre Plus local offices. People claiming JSA must declare that they are out of work, capable of, available for and actively seeking work during the week in which the claim is made.

**L<sub>n</sub> noise descriptors.** Because noise varies with time, a single noise value cannot adequately define the noise ambient. For this reason, the acoustic environment is described using a number of noise level descriptors (as used in this report) as follows;

**L<sub>10</sub>** The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.

**L<sub>90</sub>** The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L<sub>90</sub> noise level expressed in units of dB(A).

**L<sub>eq</sub>** Equivalent sound pressure level - the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.

<b>L<sub>Amax</sub></b>	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
<b>Leaching</b>	Movement of components of the soil to deeper depths as a result of water movement down through the soil
<b>Loamy</b>	A term used to describe soil texture when there is a mix of sand, silt and clay within the soil
<b>Loudness</b>	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on.
<b>Microphone</b>	An electro acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
<b>Main River</b>	A designated river where the Environment Agency has powers to carry out flood defence works
<b>Medieval Period</b>	1066 to 1540
<b>Modern period</b>	1914 to present
<b>Noise</b>	Sound which a listener does not wish to hear.
<b>NW Bicester</b>	The wider eco-development being progressed by P3 Eco and A2Dominion Group. This comprises a 416 hectare site to the north-west of Bicester. NW Bicester is not a committed development at present, but is considered in the cumulative effects assessment in this Environmental Statement as a future development in the area.
<b>Occupation</b>	A person's occupation is coded from the response to the question asking for the full title of the Main job and the description of what is done in that job. It is coded to the 2000 edition of the Standard Occupational Classification (SOC).
<b>Ordinary watercourse</b>	A (usually small) watercourse which does not form part of a <i>main river</i> . Maintenance of an ordinary watercourse is the responsibility of the riparian owner but local authorities have permissive powers to carry out flood defence works
<b>Post-medieval period</b>	AD1540 to AD1914
<b>Prehistoric period</b>	Pre 30,000BC to AD43
<b>Rainwater Harvesting</b>	Collecting, storing and using rainwater for domestic or commercial purposes to supplement or replace mains water supply
<b>Roman Period</b>	AD42 to AD410
<b>Salmonid fishery</b>	An EC designated fishery capable of supporting trout and similar fish.
<b>Sensitive Receptors</b>	People or places that have the potential to experience impacts.
<b>Shared Accommodation</b>	A house in multiple occupation
<b>Silage</b>	Fodder harvested whilst green and kept succulent by partial fermentation
<b>Soil Guideline Values</b>	are scientifically based generic assessment criteria to help evaluate long-term risks to human health from chemical contamination in soil.

**Soil Quality** The ability of a soil to provide a given function or functions (such as supporting crop growth, allowing water infiltration and storage to mitigate flood risk etc.)

**Standardised Mortality Rate** This rate is calculated by dividing the number of deaths by the actual local population in a particular age group multiplied by the standard population for that particular age group and summing across the relevant age groups.

**Suckler cows** Cows belonging to a meat breed or born of a cross with a meat breed, and belonging to a herd intended for rearing calves for meat production

**Subsoil** Lower layers of soil lying between the topsoil and the material (solid rock or sediment) on which the soil has developed

**Sustainable Drainage Systems (SuDS)** A sequence of water management practices and facilities designed to drain surface water in a manner that will provide a more natural and sustainable approach than what has been the conventional practice of routing run-off through a pipe to a watercourse.

**Topsoil** The upper layer of soil generally containing the majority of plant roots. Often distinguished from lower layers by colour.

**Unemployment** A person is defined as unemployed if he or she is not in employment, is available to start work in the next 2 weeks and has either looked for work in the last 4 weeks or is waiting to start a new job. This is consistent with the International Labour Office (ILO) standard classification.

**Unshared Accommodation** A dwelling consisting of one household space

**Waste Data Flow** A waste analysis programme used by local authorities to log waste arisings within their district

**Worklessness** Worklessness is a less familiar term than unemployment to describe those who are economically inactive. The economically inactive are people of working age who are not working, not in full-time education or training and are not actively seeking work.

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